2013 Annual Natural Resource Monitoring, Mitigation, and Management Report

Covering Activities Conducted from 16 October 2012 through 31 December 2013

Environmental Services Cooperative Agreement Remediation Program Munitions Response Areas

Former Fort Ord
Monterey County, California

March 28, 2014

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: 09595-13-057-003

Prepared by:

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CONTENTS

ACRONYMS AND ABBREVIATIONS ix

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 9

3.1.3 Grassland 9

3.1.4 Aquatic Features 10

3.2 . Environmental Characteristics of MRAs with Habitat Parcels 10

3.2.1 Future East Garrison MRA Site Description 10

3.2.2 Interim Action Ranges MRA Site Description 11

3.2.3 Parker Flats MRA Site Description 13

4.0 HMP SPECIES 14

4.1 HMP Amphibians 14

4.2 . HMP Birds 15

4.3 . HMP Reptiles 15

4.4 . HMP Mammals 16

4.5 . HMP Invertebrates 16

4.6 . HMP Shrubs 16

4.7 . HMP Herbaceous Perennials 18

4.8 . HMP Annuals 18

5.0 METHODS FOR MUNITIONS INVESTIGATION ACTIVITIES AND HABITAT MONITORING 19

5.1 . Methods for Munitions Investigation Activities 19

5.1.1 Methods for Vegetation Cutting 20

5.1.2 Methods for Digital Geophysical Mapping Investigation 20

5.1.3 Methods for Analog Investigation 20

5.1.4 Methods for Large-Scale Soil Disturbance 21

5.1.5 Methods for Interim Action Ranges Design Study 21

5.1.6 Methods for Other Activities in Support of Munitions Investigation Activities 22

5.2 . Habitat Monitoring Methods 22

5.2.1 Methods for Vegetation Monitoring 23

5.2.2 Methods for Supplemental Herbaceous Vegetation Monitoring 24

5.2.3 Methods for HMP Herbaceous Species Monitoring 25

5.2.4 Methods for HMP Manzanita Retention 26

5.2.5 Methods for Post-Rainfall CTS Monitoring 27

5.2.6 Methods for Aquatic Feature Monitoring 27

5.2.7 Methods for Weed Monitoring and Management 27

5.2.8 Methods for Erosion Control Monitoring 28

6.0 SUMMARY OF MUNITIONS INVESTIGATION ACTIVITIES AFFECTING HABITAT PARCELS 28

7.0 RESULTS of MANAGMENT AND MITIGATION ACTIVITIES 30
7.1 Natural Resource Impact Mitigation Checklists and Inspection Reports 30
7.1.1 NRIM Checklists 31
7.1.1.1 Parker Flats MRA 31
7.1.1.2 Seaside MRA 31
7.1.2 NRIM Field Inspection Reports 31
7.1.2.1 Future East Garrison MRA NRIM Inspection Report 32
7.1.2.2 Seaside MRA NRIM Inspection Report 32
7.2 . CTS Mitigation Measures Implemented 32
7.3 . Aquatic Feature Mitigation Measures 32
7.4 . Wildlife Relocation 33
7.5 . Weed Management Activities 34
7.6 . Environmental Awareness Training 35
7.7 . Erosion Control Monitoring and Mitigation 36
8.0 HABITAT MONITOIRNG ACTIVITIES 36
8.1 . Vegetation Monitoring in MRAs 36
8.1.1 Vegetation Monitoring in Future East Garrison MRA 37
8.1.2 Vegetation Monitoring in Interim Action Ranges MRA 38
8.1.2.1 Vegetation-Cut Areas in Range 44 and Range 47 Subarea C 38
8.1.3 Vegetation Monitoring in Parker Flats MRA 38
8.1.4 Vegetation Monitoring Discussion 38
8.2 . HMP Species Monitoring in MRAs 39
8.2.1 HMP Species Monitoring in Future East Garrison MRA 40

8.2.2 HMP Herbaceous Species Monitoring in IAR MRA 41

8.2.2.1 Ingress/Egress Routes in IAR MRA 42

8.2.2.2 Vegetation-Cut Areas in Range 44 and Range 47 Subarea C 43

8.2.2.3 Small-scale Excavation Areas in Range 44 and Range 47 Subarea C 45

8.2.4 HMP Annual Species Monitoring in Parker Flats MRA 47

8.2.4.1 HMP Herbaceous Species Monitoring Summary 47

8.3 . Aquatic Feature Monitoring in the Future East Garrison MRA 51

9.0 HABITAT RESTORATION IMPLEMENTATION AND MONITORING IN THE INTERIM ACTION RANGES MRA 52

10.0 CONCLUSION 52

11.0 REFERENCES 55

TABLES

1-1 Habitat Parcel Areas Affected by Munitions Investigation Activities Conducted by ESCA RP

1-2 Vegetation Monitoring Activities in Habitat Parcels for ESCA RP MRAs 2008-2013

2-1 HMP Species Occurrence in ESCA RP MRAs

3-1 Observed Plant Species in ESCA RP MRAs 2008 - 2013

3-2 Observed Wildlife Species in ESCA RP MRAs

3-3 Future East Garrison MRA Grenade Range: Observed Plant Species in Aquatic Features Subject to Sifting 2011 - 2013

7-1 Future East Garrison MRA Vegetation Cover in Areas Subject to Vegetation Cutting Conducted in 2010

7-2 Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs Vegetation Cover in Areas Subject to Vegetation Cutting Conducted in 2011 (Activity B)

7-3 Future East Garrison MRA 2013 Presence and Density of Monterey Spineflower after Vegetation Cutting

7-4 Future East Garrison MRA 2013 Presence and Density of Monterey Gilia and Seaside Bird's-beak after Vegetation Cutting

7-5 Future East Garrison MRA2013 Toro Manzanita Density Survey

7-6 Interim Action Ranges MRA HMP Herbaceous Species Presence by Activity Type

7-7 Interim Action Ranges MRA 2013 Presence and Density of Monterey Spineflower after Remedial Activities A - C in North Range 44 SCA

7-8 Interim Action Ranges MRA 2013 Presence and Density of Monterey Spineflower after Remedial Activities A - C in South Range 44 SCA and Central Area NCA

7-9 Interim Action Ranges MRA 2013 Presence and Density of Monterey Spineflower after Remedial Activity A - C in Range 47 NCA Subarea C

7-10 Interim Action Ranges MRA 2013 Presence and Density of Monterey Gilia, Seaside Bird's-beak and Coast Wallflower after Remedial Activities A-C in North Range 44 NCAs

7-11 Interim Action Ranges MRA 2013 Presence and Density of Monterey Gilia and Seaside Bird's-beak after Remedial Activities A-C in South Range 44 SCA and Central Area NCA

7-12 Interim Action Ranges MRA 2013 Presence and Density of Monterey Gilia after Remedial Activities A-C in Range 47 SCA Subarea C

7-13 Parker Flats MRA 2013 Presence and Density of Monterey Spineflower After Vegetation Cutting

FIGURES

1. Former Fort Ord Location Map
2. ESCA RP 2013 Habitat Monitoring Parcels
3. Munitions Response Areas with Habitat Parcels Overview
    a. Future East Garrison MRA
    b. Interim Action Ranges MRA
    c. Parker Flats MRA
4. Munitions Investigation Activities

a. Future East Garrison MRA Habitat Parcels

b. Interim Action Ranges MRA Habitat Parcels

5. Former Fort Ord Monterey Spineflower Critical Habitat Locations
6. California Tiger Salamander Habitat Buffer Zones
7. Vegetation Monitoring Locations
    a. Future East Garrison MRA
    b. Interim Action Ranges MRA
    c. Parker Flats MRA
8. HMP Herbaceous Species in All Habitat Parcels
    a. Monterey Spineflower
    b. Monterey Gilia
    c. Seaside Bird's-beak
    d. Coast Wallflower
9. HMP Annual Species in the Future East Garrison MRA
    a. Monterey Spineflower
    b. Monterey Gilia
    c. Seaside Bird's-beak
10. HMP Annual Species in the Interim Action Ranges MRA
    a. Monterey Spineflower
    b. Monterey Gilia
    c. Seaside Bird's-beak
    d. Coast Wallflower
11. HMP Annual Species in the Parker Flats MRA – Monterey Spineflower
12. Vegetation Cover Before and After Vegetation Cutting in 2011 in the IAR MRA (Average of All Locations)
13. Vegetation Cover Before and After Small-scale Excavations in 2011 in the IAR MRA (Average of All Locations)
14. Principal Components Analysis Plotting Relative Cover of Plant Species in Vegetation Transects Based on Similarity

APPENDICES

A Interim Action Ranges Munitions Response Area Habitat Restoration Implementation and Monitoring Report

B Natural Resource Impact Mitigation Checklists and Inspection Reports

C Documentation of Approval by USFWS for California Tiger Salamander Handling by ESCA RP Biologists

D Weed Monitoring Plan and Reports

E Erosion Monitoring Reports

F Future East Garrison Munitions Response Area Aquatic Features Remediation - Seed and Propagules Collection Plan; Aquatic Feature Geologist Survey

G Distribution List

[*this page was intestinally left blank*]

ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order of Consent
ARCADIS	ARCADIS U.S., Inc.
Army	United States Department of the Army
BMP	Best Management Practices
BO	Biological Opinion
BRAC	Base Realignment and Closure
CDFW	California Department of Fish and Wildlife
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter(s)
CNDDB	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	Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California
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 2012 through 31 December 2013
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCA	Special Case Area
SOP	Standard Operating Procedure
SQB	Senior Qualified Biologist
SUXOS	Senior Unexploded Ordnance Supervisor
USACE	United States Army Corps of Engineers
USFWS	United States 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 (ESCA) Remediation Program (RP) Team during the period from 16 October 2012 through 31 December 2013. The reporting period covers activities performed over a fifteen-month period; subsequent reporting on restoration monitoring will follow a calendar year (01 January – 31 December).

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) by the United States Fish and Wildlife (USFWS). 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 investigation activities. Implementation of the requirements by the ESCA RP Team is conducted in coordination with the Army.

ARCADIS U.S., Inc. (ARCADIS) has prepared this document on behalf of FORA (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 the Recipient, including any applicable governing documents and applicable laws and regulations.

This report is the sixth in a series of Annual Natural Resource Monitoring, Mitigation, and Management Reports produced for the ESCA RP. The five previous reports covered the 2008, 2009, 2010, 2011, and 2012 reporting periods (ESCA RP Team 2009, 2010a, 2011a, 2012a, 2013b).

1.2 Environmental Services Cooperative Agreement

The former Fort Ord (Figure 1) 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 March 31, 2007, the Army and FORA entered into an ESCA to provide munitions and explosives of concern (MEC) remediation services, thereby allowing the Army to transfer approximately 3,300 acres (1351.6 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 3,300 acres (1351.6 ha). The AOC was entered into voluntarily by FORA, the EPA Region 9, the DTSC, and the United States Department of Justice Environment and Natural Resources Division on December 20, 2006 (EPA Region 9 Comprehensive Environmental Response, Compensation, and Liability Act [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 CERCLA, as amended, 42 United States Code §§ 9604, 9606, and 9622.

FORA, through the ESCA RP Team, is in the process of completing the Army's MEC response actions in a program hereinafter identified as the ESCA RP. Proposed future land use designations for the ESCA Munitions Response Areas (MRAs) include: habitat reserve, habitat corridor, development (residential and non-residential), and borderland development areas along Natural Resources Management Area (NRMA) interface (Figure 2). 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

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 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 Terrain (MOUT) Site MRA, Parker Flats MRA, and Seaside MRA (Figure 1 and 2). 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, 2011a; 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, such as 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 Figure 2.

During this reporting period, ESCA RP Team munitions investigation activities and associated biological field activities were performed in three MRAs that contain habitat reserve or habitat corridor parcels: FEG, IAR, and Parker Flats (Tables1-1 and 1-2, Figures 3a, 3b, 3c, 4a, 4b, 4c). As detailed in Appendix A, habitat restoration activities were conducted in the IAR MRA Range 47 restoration area during this period.

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

2.0 NATURAL RESOURCE MONITORING AND MITIGATION REQUIREMENTS

Primary requirements for natural resource monitoring and mitigation 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, the 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 1992, 1997). Threatened and endangered plant and animal species as well as designated critical habitat for some species occur at the former Fort Ord. Each reuse area has been screened for potential impacts or disturbances to threaten and endangered 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, 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 investigation activities addressed in the HMP have several primary objectives: minimize disturbance associated with munitions investigation activities; avoid or minimize impacts to known sensitive HMP species, where feasible; conduct passive and/or active habitat restoration, where required; and conduct employee environmental awareness training.

A total of 18 species are 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 [*Arctostaphylos hookeri* subsp. *hookeri*], Toro manzanita [*Arctostaphylos montereyensis*], sandmat manzanita [*Arctostaphylos pumila*], Eastwood's ericameria [*Ericameria fasciculata*], and coast wallflower [*Erysimum ammophilum*]).

The types of effects that munitions investigation 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 plants of HMP species affected by munitions investigation activities was not quantified in the HMP because the range and quantity of MEC targets had not been determined and investigations are ongoing.

The HMP addresses potential effects of MEC investigation and remedial activities at the former Fort Ord 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* subsp. *arenaria*), seaside bird's-beak (*Cordylanthus rigidus* subsp. *littoralis*), coast wallflower, Yadon's piperia (*Piperia yadoni*), Eastwood's ericameria, Hooker's manzanita, Toro manzanita, sandmat manzanita, 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 considers two federally-listed HMP annual species with populations concentrated at the former Fort Ord as particularly vulnerable to the potential effects of MEC investigation and remedial activities at the former Fort Ord: Monterey spineflower and Monterey gilia.

Monitoring requirements at munitions investigation sites include baseline surveys prior to munitions investigation activities as well as follow-up monitoring after munitions investigation activities are complete. Follow-up surveys for shrubs and subshrubs are conducted in years 3, 5, 8, and 13 after munitions investigation activities, and follow-up surveys for HMP annuals are conducted in years 1, 3, 5, and 8 after munitions investigation activities (Burleson 2009). Follow-up monitoring of restored aquatic features occurs during each rainy season for five years after restoration. Data to be gathered during maritime chaparral baseline and follow-up 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, field notes and photographic 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. Monitoring methods are detailed in Section 5.

Habitat restoration activities in central maritime chaparral vegetation affected by munitions inspection activities focus on restoring naturally regenerating vegetation that exhibits characteristics such 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 investigation activities on the former Fort Ord has historically proceeded naturally within a several-year timeframe in areas that are subjected to controlled burning and vegetation cutting.

Post-disturbance restoration focusing on 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.

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.

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. The ESCA RP Team acts as the Army's agent to implement relevant requirements of the BOs while conducting fieldwork within ESCA MRAs. In this role, the ESCA RP Team members are in frequent communication with Mr. William Collins, Base Realignment and Closure (BRAC) Office Environmental Coordinator and Mr. Bart Kowalski, BRAC Office 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 ([*Lasthenia conjugens*]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 2009). 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 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 MRAs with habitat parcels at the former Fort Ord: central maritime chaparral, coast live oak woodland, grassland, and aquatic features. These are summarized below. In addition, Tables 3-1 and 3-2 summarize the plant and wildlife species observed in monitoring areas in the ESCA MRAs, especially those with habitat parcels where the ESCA RP biologists most frequently work. These lists do not represent a comprehensive inventory of all species expected in the MRAs, but only those that have been observed to date.

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 is the dominant vegetation type in the ESCA RP MRAs in which 2013 vegetation transect monitoring was conducted. Mature chaparral vegetation structure consists of a relatively simple canopy layer with a diversity of annual and short-lived herbaceous species in sunny openings between shrubs, including a number of local endemic taxa.

The sandy substrate typical of maritime chaparral habitats tends to be low in organic matter and nutrients, particularly nitrogen and phosphorus (Smith et. al 2002). As a result, microflora and microfauna play a particularly important role in nutrient cycling, and cryptogamic soil crusts are observed in most undisturbed chaparral vegetation. Two generalized subtypes of maritime chaparral have been characterized at the former Fort Ord: sandhill maritime chaparral and inland maritime chaparral (USACE 1992). Sandhill maritime chaparral occurs in the rolling sand hills of coastal areas on loose Aeolian sand (Smith et al. 2002). The deep sandy soils allow deep root penetration and retained moisture below the dry surface layers in summer. Sandhill maritime chaparral is typically dominated by stump-sprouting shrubs such as shaggy-barked manzanita (*Arctostaphylos tomentosa* subsp. *tomentosa*) and chamise (*Adenostoma fasciculatum*), along with a mixture of obligate-seeding regional endemics such as sandmat manzanita, Monterey ceanothus, and dwarf ceanothus (*Ceanothus dentatus*); these obligate-seeding shrubs are often codominant with the stump-sprouting shrubs, and chamise rarely contributes the greatest cover of any shrub species to the canopy. Sandhill chaparral occurs in the Seaside, Parker Flats, and Interim Action Ranges MRAs, as well as elsewhere on the western half of the former Fort Ord.

Further inland the elevation increases as sandstone outcroppings appear. The relatively thin veneer of sand, derived from sand deposits and weathering, forms a layer over the top of the sandstone outcroppings. Soil texture and permeability have a direct impact on root penetration and plant species distribution. Like sandhill chaparral, the inland maritime chaparral vegetation is also dominated by stump-sprouting shrubs such as chamise, which has relatively higher cover on sandstone compared with sand. Shaggy-barked manzanita is replaced by another stump-sprouting shrub, brittleleaf manzanita (*Arctostaphylos crustacea* subsp. *crustacea*), in inland areas, and a stump-sprouting ceanothus species, blue-blossom (*Ceanothus thyrsiflorus*), forms large colonies in the chaparral vegetation. Obligate-seeding shrub dominants include Toro manzanita, Hooker's manzanita, dwarf ceanothus, Monterey ceanothus, and others. Inland chaparral is widespread in the FEG MRA.

Fire plays a major role in chaparral ecosystems, typically occurring every few decades, returning nutrients to the soil that are tied up in dead wood and leaf litter as well as

creating openings with ample sunlight and space for seed germination and seedling establishment. A number of chaparral shrubs, such as shaggy-barked manzanita, brittleleaf manzanita, and chamise have underground or surface stems (burls) that resprout after fire. Other shrubs, such as dwarf ceanothus, Monterey ceanothus, sandmat manzanita, Hooker's manzanita, and Toro manzanita, are obligate seeders that can only recolonize a burned site from seed after fire; often the seed requires fire-induced cues in order to germinate. Post-fire sites are often carpeted with a mixture of obligate-seeding shrubs and herbaceous species the spring after a wildfire. As shrubs become re-established after fire, herbaceous and smaller species tend to be excluded by expanding canopies of the dominant shrubs; however, even in mature stands of central maritime chaparral, open areas may occur between shrubs that support 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 (*Quercus agrifolia*) 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 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 and County North MRAs. Like chaparral vegetation, oak woodland and annual grassland may integrate 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 (*Carpobrotus* spp.,

especially *C. edulis*), 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

Aquatic features are dominated by native herbaceous annual and perennial plants that are typical of seasonal wetlands in coastal California (Table 3-3). Species tend to occur in zones depending on the depth of the depression, from submergaent 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. 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 in the southern portion of the MRA in a former 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 grenade range aquatic features are surrounded by mostly 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 3a), 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] borderland interface buffer), and L20.19 1.1. Of the 251.5 acres (102 ha) within this MRA, 177.5 acres (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 2013). 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 5). There are 12 aquatic features concentrated in two main areas within the FEG MRA (Figure 3a). 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 (Burleson 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 2011a and 2012a).

Two aquatic features are located in the eastern edge of the former grenade range and one aquatic 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 un-vegetated 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 historical impact area. The IAR MRA is bordered by the Parker Flats MRA to the north, the Seaside MRA to the east, and the historical impact area to the southeast, south, and southwest (Figures 2, and 3b). The IAR MRA is contained within the jurisdictional boundaries of Monterey County and a small portion of 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 3b).

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 2013).

Vegetation in the IAR MRA consists primarily of central 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 5).

The areas within the IAR MRA that are the focus of monitoring efforts have been given the following names for the purposes of this report (Figure 3b):

- North Range 44: North Range 44 SCA
- South Range 44: South Range 44 SCAs/Central Area NCAs

- Range 47 Subarea A: Includes a portion of Range 47 subject to large-scale excavation in which the vegetative cover has historically been low, 10% or less (ESCA RP Team 2012a). Non-native pampas grass *(Cortaderia jubata, C. selloana)* was abundant in places. Historical aerial imagery indicates that the vegetation of the area has changed little since the 1970s, despite an apparent lack of recent disturbance, except for fire that has affected the whole range.

- Range 47 Subarea B: Includes the majority of Range 47, which was subject to large-scale excavation prior to restoration activities-

- Range 47 Subarea C: Includes a small portion of Range 47 surrounding the large-scale excavation area in which vegetation cutting took place in 2012

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 3c). 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. Of the 1,180 acres (477.5 ha) identified as the Parker Flats MRA, approximately 211 acres (85.36 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 Parker Flats MRA (Figures 2 and 3c).

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, which are all weathered dune sands (NRCS 2013).

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 protection of 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. 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). 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 6. ESCA RP biologists did not observe CTS in ESCA MRAs during the reporting period.

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 cold water 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 reported in BLM's portion of the Fort Ord National Monument adjacent to Toro Park (William Collins, personal communication) and suitable habitat is present in parcels outside of ESCA MRAs (USACE 1997). No red-legged frogs have been reported from vernal pools during Army monitoring since 1994. ESCA RP biologist did not observe California red-legged frogs in ESCA MRAs during the reporting period.

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 MRAs, found 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 plovers occur on flat sandy beaches 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 MRA includes 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 the ESCA RP Team 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. In 2012 a California black legless lizard was observed in maritime chaparral with sandy soil in a habitat reserve parcel in IAR MRA. ESCA RP biologists did not observe black legless lizards in ESCA MRAs during the reporting period.

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 (ESCA RP 2011a).

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 buckwheats in Monterey, Santa Cruz, and San Mateo Counties. The Smith's blue butterfly has not been observed by ESCA RP biologists in the ESCA MRAs; it occurs outside of the ESCA parcels 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 subsp. 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, which predominates in lowland ocean-facing central maritime chaparral, and brittleleaf manzanita, 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. Mapping work completed in 2012 by ESCA RP biologists suggests that densities of Hooker's manzanita have been over-estimated due to previous plant misidentification. Hooker's manzanita is found in the FEG, Parker Flats, and the MOUT Site MRAs.

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 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 a biennial to short-lived perennial in the mustard family that reaches from several inches to 1 to 2 feet (0.3 to 0.6 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 City of Marina. During 2013, coast wallflower was observed and mapped by ESCA RP biologists in both the Seaside MRA and in the IAR MRA North Range 44.

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 2009). 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 5. During 2013, Monterey spineflower was observed and mapped by ESCA RP biologists in FEG, IAR, and Parker Flats MRAs.

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 the Lightfighter Road 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* subsp. *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 biologists in maritime chaparral in IAR, Seaside, and FEG MRAs. According to the HMP, seaside bird's-beak has the potential to occur in Del Rey Oaks/Monterey and Parker Flats MRAs. During 2013, seaside bird's-beak was observed and mapped by ESCA RP biologists in the FEG and IAR MRAs.

Monterey gilia, sand 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 generally occurs in maritime chaparral and has been observed in IAR, FEG, Parker Flats, and Seaside MRAs. During 2013, Monterey gilia was observed and mapped by ESCA RP biologists in the FEG and IAR MRAs.

5.0 METHODS FOR MUNITIONS INVESTIGATION ACTIVITIES AND HABITAT MONITORING

This section summarizes the methods used for munitions investigation activities and associated biological monitoring. Munitions investigation activities include analog or geomagnetic investigation, vegetation cutting, small or large scale soil disturbance, and other minor activities. Associated biological monitoring involves using established or modified protocols to document baseline conditions prior to munitions investigation activities and to monitor vegetation recovery following munitions investigation activities. Munitions investigation activities were completed in FEG MRA on 10 September 2013, in IAR MRA on 15 May 2013, in PF MRA on 5 September 2013, and in SEA MRA on 13 September 2013.

5.1 Methods for Munitions Investigation Activities

Munitions investigation 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). Subsurface investigation areas range in size from a single cubic foot to several cubic feet, depending on the type, location, and position of the target. 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. Soil replacement follows the same sequence in reverse, with replacement of subsoil and then topsoil replacement after munitions investigation activities are complete.

This method facilitates vegetation regeneration by retaining the seed bank, nutrients, and beneficial organisms on the surface. Other minor activities in support of munitions investigation activities include installation of signage, trash and debris removal, erosion control monitoring and installation of erosion prevention materials.

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

5.1.1 Methods for Vegetation Cutting

Prior to initiation of munitions investigation activities, manual and mechanical vegetation cutting is conducted under the direction of the Senior Unexploded Ordnance Supervisor (SUXOS) and in coordination with ESCA RP Biologist. Manual vegetation cutting was conducted using power chippers, powered weed cutters, DR™ trimmers, chainsaws, and a variety of similar hand tools and equipment. Mechanical vegetation cutting was accomplished using Bobcat-style skip loaders or excavators that were equipped with vegetation-cutting heads. Vegetation-cutting support equipment included skip loaders, self-loading log trucks and/or excavators with grappling arms, which were used to load out salvageable timber or firewood from the cutting activity or remove cut brush from the work area for chipping. If consolidated chipping operations were conducted, excavators or loaders were used to feed the chipping or grinding equipment and spread or load chips. 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). Coast live oak trees and shrubs such as HMP manzanitas may be left in place but pruned to remove dead branches and to clear up to height sufficient to allow human access below the tree canopies; manzanita retention has been conducted primarily in the FEG MRA, as described further in Section 5.2.4. 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 Investigation

Digital Geophysical Mapping (DGM) munitions 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 guide the sled along parallel transects through the work area. Data is evaluated and target anomalies are selected for investigation. Unexploded ordnance (UXO) technicians reacquire target anomalies based on Global Positioning System (GPS) coordinates and intrusively investigate targets to depth.

5.1.3 Methods for Analog Investigation

Analog remedial investigations are surveys generally conducted on foot by technicians to locate and remove surface or subsurface MEC or munitions debris (MD). 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 MEC is detected on the surface of the investigation area, soil around the potential item is

removed using hand tools (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.

5.1.4 Methods for Large-Scale Soil Disturbance

Large-scale soil disturbance is required in isolated areas containing a high density of small metallic debris and ammunition links within the soil from 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, inspected by a UXO technician to determine that the material is free from potential MEC or MD, and later ground to wood chips. Excavated soils are transported by bulldozers or excavators and processed by UXO Teams at an onsite mechanical sift plant where potential MEC is removed from the soil.

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 of topsoil. 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 activities needed to support the Army's interim ROD; this process is described in the Phase II Interim Action Work Plan (ESCA RP Team 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-wide (3-m-wide) investigation transects placed 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.

During the Design Study, crews conducted root raking (removal), soil removal, and sifting, as described above. With the information gained from initial investigations, no further habitat disturbance was necessary in some areas, such as in the South Range 44 SCA/NCA. In the Range 47 SCA, on the other hand, large-scale vegetation removal and soil disturbance were necessary for munitions investigation activities.

The Phase II Interim Action Work Plan Addendum Habitat Restoration Plan (HRP) for the IAR MRA and associated Field Variance Forms address the implementation of

habitat restoration requirements as identified in the Installation Wide Habitat Management Plan (ESCA RP Team 2012b and 2013a; USACE 1997). See Section 8.0 and Appendix A for details on restoration planning, implementation, and monitoring in the IAR MRA.

5.1.6 Methods for Other Activities in Support of Munitions Investigation Activities

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.

Field activities are conducted in accordance with the HMP, BOs, and the appropriate ESCA work plan. Project personnel and subcontractors 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 munitions investigation 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 and herbaceous perennials are surveyed in the baseline year and in Years 1, 3, 5, and 8 post-remediation. Depending on the timing of the baseline monitoring effort and the time required to complete munitions investigation 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, post-rainfall CTS monitoring, monitoring of aquatic features, weed monitoring, and erosion monitoring. Monitoring related to restoration activities is described in Appendix A.

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+) are 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 (CNDDB; CDFW 2013).

5.2.1 Methods for Vegetation Monitoring

Shrub and herbaceous vegetation cover in areas subject to munitions investigation activities are measured in 164-foot-long (50-meter-long) line-intercept transects. Transects are concentrated in central maritime chaparral, coastal scrub, and oak woodland communities.

Prior to transect installation, site history and aerial images are reviewed, followed by vegetation mapping. Differences in stand age, species 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 burned 5 years ago and a separate set of transects may then be placed into an area that was cut or burned 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 for transect starting point (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. Waypoints obtained from a GPS unit are recorded for each end of a transect so that the same transect can be revisited in subsequent years. A photograph is taken from one end.

Aerial cover by shrub and tree species is recorded on data sheets for all plants that intercept the 164-foot-long (50-meter-long) 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 (Burleson 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.

FEG MRA: The Army conducted baseline surveys in FEG MRS 11 in 1996, and follow-up monitoring for HMP annual species was conducted by the Army in May (Monterey spineflower and Monterey gilia) and July (seaside bird’s beak) 2003 . The ESCA RP Team has been monitoring vegetation and HMP annuals in the FEG MRA since 2010.

During 2013, shrub and herbaceous transects were monitored by ESCA RP biologists in munitions investigation areas that had been investigated three years earlier. Some of these areas encompassed only one grid cell --100 foot by 100 foot (30 m b y 30 m) areas without any adjacent grid cells within the same stratum (e.g., year of brush-cutting).

Transects established in these areas were approximately 141 feet (43 m) in length instead of the survey protocol 164 feet (50 m).

Vegetation monitoring was conducted on the following dates in the FEG MRA: 28-29 May and 11-12 June 2013. Locations of all transects in the FEG MRA are shown in Figure 7a.

IAR MRA: The Army established initial baseline survey transects in this area in 2000 (Parsons 2005). The ESCA RP Team has been monitoring vegetation and HMP annuals in the IAR MRA since 2008.

Modifications to the 2009 vegetation monitoring protocol have been necessary for surveys in the IAR MRA because safety exclusion zones prevented ESCA RP biologists from entering the SCAs and NCAs to document baseline vegetation conditions. In order to document 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. The IAR MRA-wide shrub and herbaceous cover baseline was developed from data gathered from 29 164 feet (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.

In 2013 new shrub and herbaceous cover transects were established in IAR MRA North Range 44 and Range 47 Subarea A and B. Shrub and herbaceous cover transects established in 2012 were revisited in South Range 44 SCA/NCA and Range 47 Subarea C. Some shrub and herbaceous cover transects established in North Range 44 were shorter than 164 feet (50 m) in length, when the munitions investigation activity area was shorter than the standard transect length. For example, shrub and herbaceous cover transects were established in 'mag and dig' locations in North Range 44. These four transects ranged from 32.8 feet (10 m) to 60.7 feet (18.5 m) in length.

Vegetation monitoring was conducted on the following dates in the IAR MRA: 20-23, 28 May and 4-6, 11-12, 24-27 June 2013. Locations of all transects in the IAR MRA are shown in Figure 7b.

Parker Flats MRA: No vegetation monitoring was conducted in the Parker Flats MRA during the reporting period but will be conducted in 2014 as Year 5 post-activity monitoring.

5.2.2 Methods for Supplemental Herbaceous Vegetation Monitoring

Supplemental herbaceous 2.7 square-foot (0.25 m^2) 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 (Burleson 2009). ESCA RP biologists use approximately 50% cover of herbaceous species as the threshold for establishing quarter meter plots. Supplementary herbaceous quadrats are placed every 32.8 feet (10 m) on alternating sides

of each transect for a total of six plots per transect. Percent aerial cover for each plant species in the plot is recorded. If any HMP annuals occur within the quadrat, number of plants are counted and recorded. Comparative baseline data may not be available for quadrats.

Monitoring events for supplemental herbaceous vegetation occurred on the same dates as vegetation monitoring described in the prior section.

5.2.3 Methods for HMP Herbaceous Species Monitoring

The HMP herbaceous species monitoring surveys document baseline conditions and population change after munitions investigation and remediation activities. General reconnaissance surveys for all HMP herbaceous species are conducted throughout the focus areas of the MRA during the peak flowering period for each species. A minimum of twenty percent or thirty-eight (which ever number is larger) 100-ft x 100-ft grid cells per munitions investigation activity type are surveyed for all HMP herbaceous species during the peak flowering period (April through July, depending on the species). Populations of HMP species found within each grid cell are mapped with a hand-held GPS unit (Trimble GeoHX) to record their general distribution and range in the work area.

Numbers of plants are either counted directly, or, in areas with high population density, are sampled within circular plots (8.2 feet, or 2.5 meter (m) radius) following Burleson (2009). Where plants are concentrated in only a portion of a grid cell, the stands/colonies are mapped with a hand-held GPS unit. In portions of Range 44 and along ingress/egress corridors the plot shape is adjusted to fit the shape of the disturbance area. In accordance with the HRP, HMP plants in the IAR MRA are counted in each monitoring plot every year for seven years after habitat disturbance.

Sampling of known locations of HMP annuals in habitat parcels are shown In Figures 8a, 8b, 8c, and 8d, with more detailed locations shown by MRA in Figures 9, 10, and 11.

FEG MRA: HMP herbaceous plant monitoring was conducted on the following dates in the FEG MRA: 10, 17-18, 25-27, and 29 April 2013.

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 investigation activities prevented ESCA RP biologists from entering the SCAs and NCAs. Instead, modified reference baseline plots for HMP annual species monitoring were installed around the perimeter of the SCAs/NCAs; modified reference baseline plots were placed as close to the work area as possible or in habitat with similar vegetation structure and diversity to off-limit areas. In addition to monitoring 25 m^2 plots, HMP herbaceous plants were counted within100 x 100 foot (30 x 30 m) grid cells when it was feasible.

Baseline monitoring plots were established in six different locations prior to ESCA RP activities, based on habitat types (e.g., grassland, maritime chaparral), species distribution areas (e.g., seaside bird's-beak present or absent), and/or previous disturbance type (e.g., historically-altered chaparral, proposed munitions investigation activities haul road). The baseline areas are as follows:

- North Range 44 SCA, South Range 44 SCA/Central Area NCA
- Grassland
- Range 47 SCA Subarea A
- Range 47 SCA Subarea B
- Range 47 SCA Subarea C
- Ingress/Egress corridors

The ESCA RP IAR MRA HRP (ESCA RP Team 2013a) describes these baseline locations in more detail.

HMP herbaceous plant monitoring was conducted on the following dates in the IAR MRA: 16 and 22-25 April, 1-2, 6-10, 13-17, 20-23, and 31 May, 4-5, 11-13, 18, and 20 June 2013.

Parker Flats: HMP herbaceous plant monitoring was conducted on the following dates in the Parker Flats MRA: 29-30 April and 13 May 2013.

5.2.4 Methods for HMP Manzanita Retention

Data gathered by the ESCA RP Team between 2008 and 2013 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 plants, the ESCA RP Team developed methods for retaining any observed Hooker's and Toro manzanitas in areas subject to vegetation cutting in the FEG MRA.

Field sampling was conducted in 2012 and 2013 to measure the effectiveness of the HMP manzanita retention approach after munitions investigation activities. In 2012, 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. In 2013 the same grid cells containing retained species were revisited. Dead, dying, and fallen manzanitas were counted and recorded. The dead, dying, and fallen plants were subtracted from last year's totals to obtain the 2013 totals. 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.

Manzanita retention monitoring was conducted on the following dates in the FEG MRA: 25, 27-28 June and 12, 15-17, and 22 July 2013.

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; these inspections are focused on the known CTS buffer zones shown in Figure 6. All CTS inspectors have received the MRA-specific environmental awareness training.

Inspections take place prior to fieldwork commencement and involve careful examination surrounding and under 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 kilometers of known, current or historical CTS breeding pond (Figure 6). If CTS is observed by a crew member, the ESCA RP Senior Qualified Biologist (SQB) is consulted for approval prior to CTS relocation to a safe place by a USFWS-approved Qualified Biologist (QB), if necessary. A crew member stays with the animal until it is outside of the work area so that it is not injured or killed by a vehicle, predator, or other means.

5.2.6 Methods for Aquatic Feature Monitoring

In 2013 ESCA RP biologists conducted monitoring in the FEG MRA grenade range aquatic features. Vegetation and plant diversity and abundance within the aquatic features were visually surveyed. Photo-points were monitored after munitions investigation activities were complete.

Aquatic feature monitoring was conducted on the following dates in the FEG MRA: 26 February, 4, 6, and 11 March, 20 August, and 11 November 2013 (Appendix F).

5.2.7 Methods for Weed Monitoring and Management

Weed monitoring is conducted throughout the year using visual surveys, especially prior to and during the flowering season. As directed by the 1997 HMP the ESCA RP weed monitoring activities target pampas and/or jubata grass (*Cortaderia selloana, C. jubata*), French broom (*Genista monspessulana*), and iceplant. Weed abatement is conducted where necessary, including ESCA development parcels, to prevent the spread of these target weed species into habitat areas. In addition, any weedy species 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 in 2010 (ESCA RP Team 2010b). The plan identifies development of weed monitoring reports (minimum of one monitoring report per year) followed by weed management activities. A weed monitoring checklist with

locations of weeds observed during field surveys was also established to help track species and locations of observations. A copy of the monitoring checklist and the 2013 weed monitoring reports are attached as Appendix D.

Weed monitoring was conducted on the following dates in the FEG MRA: 26-27 November 2012; 12-13, 27 June, and 30 September 2013.

Weed monitoring was conducted on the following dates in the IAR MRA: 26-27 November 2012; 7 February, 11 March, 8, 22-24, 29 April, 1-3, 6, 8, 10, 13, 15-16, 20-23May, 5, 7, 10-13, 17-21, 24, 27 June, 1, 8-11, 15-17, 19, 22 July, 1, 19-21August, 17-18 October, and 4 November 2013.

Weed monitoring was conducted on the following dates in the Seaside MRA: 26-27 November 2012; 4 March 4, and 1 August 2013.

5.2.8 Methods for Erosion Control Monitoring

Erosion monitoring is conducted before and after rain events in areas subject to munitions investigation activities in or adjacent to habitat parcels. When necessary, the ESCA RP Team installs erosion control best management practices measures (BMPs), such as silt fencing, biodegradable weed-free straw wattles, biodegradable coconut fiber erosion control blankets, and creation of water bars using heavy equipment. Hydromulch has been applied in both the FEG MRA and IAR MRA to reduce potential erosion during the reporting period.

Erosion control checklists are filled out by ESCA RP personnel to help determine areas in need of erosion control measures and to document inspections. 2013 checklists and reports are attached as Appendix E.

Erosion monitoring was conducted on the following dates in the FEG MRA: 6 April, 19 November, and 3, 6 December 2012; 3 January, 8, 19, 21-22 February, and 4, 6, 11 March 2013.

Erosion monitoring was conducted on the following dates in the IAR MRA: 16 November, and 3 December 2012; 1-2 January, 21-22, 28 February, 4, 6, 8, 11, 15 March, 3 April, and 4 November 2013.

Erosion monitoring was conducted on the following dates in the Seaside MRA: 4, 11 March, and 6 November 2013.

6.0 SUMMARY OF MUNITIONS INVESTIGATION ACTIVITIES AFFECTING HABITAT PARCELS

Munitions investigation activities conducted by the ESCA RP Team in the reporting period affected approximately 66.6 acres (27 ha) in habitat parcels. Table 1-1 presents the

approximate number of acres affected during munitions investigation activities in habitat parcels in the FEG and IAR MRAs during this reporting period. Total habitat acres affected during the reporting period are: FEG MRA – 46.5 acres (18.8 ha) out of 177.5 habitat acres (69 ha), IAR MRA – 20.1 acres (8.1 ha) out of 206 habitat acres (83 ha) and Parker Flats MRA – 0 acres out of 166 habitat acres (67.1 ha).

The work included staging and maintenance of equipment and vehicles in staging areas and along ingress/egress routes, vegetation cutting and associated 'mag and dig' investigations, small-scale and large-excavations in support of munitions investigation activities, and associated soil stockpiling and replacement. These activities occurred in habitat parcels in the FEG and IAR MRAs in 2013 (Figures 4a and 4b).

An additional 10.3 acres (4.2 ha) of native coast live oak woodland vegetation in development parcels in the Parker Flats MRA were also subject to vegetation cutting in support of munitions investigation activities during the reporting period while under the oversight of the ESCA RP arborist and other biologists in order to retain healthy oak trees, remove diseased and dead trees, and minimize removal of limbs to the maximum extent feasible.

A summary of munitions investigation activities in each MRA is provided in the following sections.

6.1 Munitions Investigation Activities in Future East Garrison MRA

During the reporting period the following habitat acreage in the FEG MRA was affected by munitions investigation activities: equipment/vehicles/materials staging occurred on <1 acre (< 0.4 ha); vegetation cutting occurred on <1 acre (<0.4 ha); soil excavation occurred on <1 acres (<0.4 ha); and soil was stockpiled on <1 acre (<0.4 ha) of bare ground. Munitions investigation activities occurred on 46.5 acres (18.8 ha) of oak woodland and central maritime chaparral vegetation in habitat parcels in the FEG MRA during the reporting period (Table 1-1).

6.2 Munitions Investigation Activities in Interim Action Ranges MRA

During the reporting period the following habitat acreage in the IAR MRA was affected by munitions investigation activities: equipment/vehicle/material staging occurred on <1 acre (<0.4 ha); vegetation cutting occurred on 2.5 acres (1 ha); MEC investigations and clearance occurred on 20.1 acres (8.1 ha); and soil excavation and replacement occurred on 12.4 acres (5 ha). A total of 20.1 acres (8.1 ha) of central maritime chaparral vegetation were disturbed during munitions investigation activities in the IAR MRA in habitat parcels during the reporting period, a number lower than the total described herein due to more than one activity occurring in the same area (Table 1-1).

6.3 Munitions Investigation Activities in Parker Flats MRA

There were no munitions investigation activities performed in the Parker Flats MRA habitat parcel during the reporting period.

In a Parker Flats MRA non-habitat (development) parcel, Residential Quality Assurance (RQA) Level 2 munitions investigation activities were performed on approximately 12 acres (4.8 ha) (ESCA RP Team 2012c). Oak tree retention was coordinated by the ESCA RP arborist and field biologists in approximately 10.3 acres (4.2 ha) of coast live oak woodland. Special measures were taken to preserve coast live oak trees greater than six inches (15.2 cm) diameter at breast height (dbh). During the reporting period the following non-habitat acreage in the Parker Flats MRA was affected by munitions investigation activities: equipment/vehicle/material staging occurred on <1 acre (<0.4 ha); limited vegetation cutting occurred in 10.3 acres (4.2 ha); and munitions investigation occurred on 12 acres (<4.9 ha), and no soil excavation or stockpiling occurred (Table 1-1).

Prior to munitions investigation activities, the ESCA RP arborist and field biology team measured the dbh, number of trunks per tree, and tree health of all trees in the work area. Approximately 885 coast live oak trees were evaluated between October 16 and October 28, 2012. Although most oak trees were in good health, approximately ten trees were dead, diseased, or seriously damaged (bark removed and cambium damaged); these were removed. Healthy trees greater than six inches dbh (15.2 cm) were left standing. Low-hanging limbs that presented a safety hazard for the munitions investigation team were removed if there was no overall threat to tree health.

Investigation of anomalies included both near-surface digs using hand tools and subsurface investigation using either hand tools or backhoes. Field activities in the Parker Flats MRA RQA Level 2 area ended on September 5, 2013.

7.0 RESULTS OF MANAGMENT AND MITIGATION ACTIVITIES

This section summarizes the habitat management and mitigation activities required by the HMP and BOs and performed by the ESCA RP Team during the period from 16 October 2012 through 31 December 2013.

7.1 Natural Resource Impact Mitigation Checklists and Inspection Reports

NRIM Checklists and Inspection Reports tabulate detailed mitigation measures required in association with munitions investigation 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 B.

7.1.1 NRIM Checklists

There are two unnumbered and nine numbered NRIM Checklists that have been developed for activities that have occurred 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 (e.g., Checklist 1 Revision 0). After the development of a checklist, ESCA RP QBs conduct training events to update field personnel on compliance measures. NRIM checklist inspections are also conducted to document compliance with the checklist mitigation measures. During this reporting period, NRIM checklist revisions were developed to minimize impacts to natural resources in the Parker Flats MRA and Seaside MRA development parcels in support of the ESCA RP Residential Quality Assurance (RQA) implementation. The revised NRIM checklist training was provided to the field personnel. NRIM checklist inspections were carried out in the Seaside MRA and in FEG MRA during the reporting period.

7.1.1.1 Parker Flats MRA

One NRIM checklist revision (Checklist Number 1 Revision 1) was developed to minimize impacts to natural resources during munitions investigation activities in the Parker Flats MRA development parcel for the RQA Level 2 baseline DGM survey. The RQA Level 2 Baseline DGM Survey areas are designated as development parcels. No resource conservation requirements are associated with these parcels per the HMP; however, Checklist Number.1 Revision 1 was developed to address measures to minimize the overall impacts to the existing stand of native coast live oaks and as guidance to address measures that minimize impacts to CTS, Monterey gilia, and Monterey spineflower as a result of vegetation removal and munitions investigation activities. A copy of the checklist is included as Appendix B.

7.1.1.2 Seaside MRA

One NRIM checklist revision (Checklist Number 2 Revision 1) was developed to minimize impacts to natural resources during munitions investigation activities in the Seaside MRA development parcel for the RQA Level 2 baseline DGM survey and RQA Level 3 soil scrape and post-scrape DGM survey. The RQA Level 2 Baseline DGM Survey and Level 3 Soil Scrape and Post-Scrape DGM survey areas are designated as development parcels. No resource conservation requirements are associated with these parcels per the HMP; however, Checklist Number 2 Revision 1 was developed to address measures to minimize impacts to CTS, Monterey gilia, and Monterey spineflower, as well as other habitat impacts, as a result of vegetation removal and munitions investigation activities. A copy of the checklist is included as Appendix B.

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 B.

7.1.2.1 Future East Garrison MRA NRIM Inspection Report

On July 11, 2013, ESCA RP QBs conducted an inspection for habitat parcels E11b.6.1 and E11b.7.1.1 in the FEG MRA. The QBs inspected post-disturbance vegetation-cut areas and ingress/egress routes in four grid cells. QBs surveyed the number of Toro manzanitas retained during vegetation removal. Field personnel complied with the checklist mitigation measures, with no concerns to report. Copies of the inspection report are included in Appendix B.

7.1.2.2 Seaside MRA NRIM Inspection Report

On March 19, 2013, ESCA RP QBs inspected the RQA Level 3 soil scrape work and ingress/egress routes in the Seaside MRA. Field personnel limited ingress/egress routes to designated roads and corridors, as described in the checklist. Additionally, field personnel sloped the soil scrape to prevent trapping CTS. Field 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 B.

7.2 CTS Mitigation Measures Implemented

No new ESCA RP Biologists were approved by the USFWS to handle CTS for rescue and relocation in 2013.

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 near an open pit, to call the SQB immediately.

7.3 Aquatic Feature Mitigation Measures

Upland vegetation around the aquatic features consists of nearby central maritime chaparral and oak woodland; however, the immediate area around the aquatic features is largely bare sandstone due to past anthropogenic activity. Table 3-3 lists the plant species observed in the aquatic features to date.

From 01October 2012 through 22 January 2013, large-scale excavations and sifting in support of munitions investigation activities occurred in aquatic feature AF09-1 and in the vicinity of the southwestern aquatic features AF 09-1B and AF 09-2 . Work was conducted in accordance with FEG NRIM Checklist 5 Revision 2, FVF G4WP-005 (ESCA PR Team 2012c) and Group 4 RI/FS Work Plan Appendix C Standard Operating

Procedure for Soil and Vegetation Handling in Aquatic Features (ESCA RP Team 2010c). Appendix B provides the supporting documents.

Prior to munitions investigation activities in this area in fall 2012, ESCA RP biologists collected seeds in aquatic feature AF09-1 prior to munitions investigations in accordance with the Seed Collection Plan, FEG Grenade Range Aquatic Features (AF09-1, AF09-1B, AF09-2; Appendix F). Seeds, such as those of western rush, western goldenrod, and common spikerush, were collected from vegetation zones in each aquatic feature; seeds were labeled and stored separately in a cool dry place.

During munitions investigation activities, excavation and sifting was required only in aquatic feature AF09-1. The topsoil (first six inches [15.2 cm]) in aquatic feature AF09-1 was removed and segregated by vegetational zone, and soil from each zone was stockpiled separately. The topsoil was not sifted but investigated using instruments and visual inspection. Clumps of perennial vegetation in the topsoil were also salvaged by zone and stored on site.

The subsoil was then removed from the aquatic feature, sifted, and stockpiled separately. The subsoil deeper than 20 inches (50.8 cm) was removed, sifted ,and stored separately. All soil piles were appropriately labeled and covered with plastic for protection against wind and/or water erosion.

During subsurface work, a soil profile of each aquatic feature was surveyed by a geologist to document characteristics and impermeability of the different soil layers on 01 October 2013 (Appendix F). All three aquatic features included a layer of sandy clay topsoil above silty sand.

When munitions investigations activities were completed in January 2013, the subsoil was replaced and re-contoured back to original slope and grade. The subsoil was compacted and a water test was performed to ensure the aquatic feature would continue to hold water.

The topsoil was then replaced by vegetational zone and hand raked to prevent over-compaction. Seeds and duff collected in fall 2012 were broadcast by zone and lightly raked in. The salvaged plants were replanted by original vegetation zone. All plants were then watered.

7.4 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 no wildlife relocations performed by ESCA RP Team members during the reporting period.

7.5 Weed Management Activities

Consistent with the requirements of the HMP (USACE 1997) and BOs (USFWS 1999, 2002 and 2005), weed management activities are routinely conducted in ESCA parcels; 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..

Weed monitoring and removal activities in the IAR MRA Range 47 restoration area are summarized in Appendix A.

In 2012 and 2013, four weed monitoring reports were prepared for the FEG, IAR, and Seaside MRAs (Appendix D). Two of these focused on pampas grass, one on weed monitoring in the Seaside MRA, and one on weed monitoring in the FEG MRA.

Pampas Grass (*Cortaderia jubata, C. selloana*): Locations of pampas grass plants in FEG, IAR, and Seaside MRAs have been documented in the 27 November 2012 Weed Monitoring Report. Monitoring consisted of visual inspections of pampas grass plants in these MRAs. ESCA RP biologists removed and bagged the seed heads of the pampas grass plants observed. GPS coordinates were taken for all pampas grass plants observed for future monitoring and removal.

The 14 June 2013 Weed Monitoring Report identifies locations of pampas grass plants that were removed in FEG, IAR, and Seaside MRAs on 12-14 June 2013. Pampas grass plants were mapped during visual inspections of the MRAs and GPS coordinates were taken in November 2012. ESCA RP biologists and UXO technicians removed 111 pampas grass plants in the three MRAs. Small to medium-sized pampas grass plants were dug up with shovels. Larger pampas grass clumps, where access was possible, were excavated with the use of a backhoe. GPS coordinates were taken for all abated pampas grass plants.

Seaside MRA: The Weed Monitoring Plan for the Seaside MRA focuses on target weeds that occur in areas of surface soil disturbances resulting from munitions investigation activities by ESCA RP personnel in this MRA. The main goal of weed management in this area is to control invasive weed populations in habitat parcels or adjacent to habitat areas along the Borderland Interface to minimize degradation of habitat quality and/or sensitive plant populations. There are no habitat parcels in the Seaside MRA, but target weeds are monitored to minimize dispersal across the Borderland Interface into the adjacent NRMA (Figure 2).

On 04 March 2013 ice plant and pampas grass were observed during monitoring. Pampas grass plants were later removed; these efforts are summarized in the 14 June 2013 Weed Monitoring Report in Appendix D. It was recommended that the ice plant continue to be monitored and if necessary abated to prohibit seeds from spreading across the Borderland Interface into the NRMA.

FEG MRA**:** On July 16, 2013 approximately ten veldt grass (*Ehrharta calycina*) plants were observed in close proximity (within 10 feet [3 m] of each other) by ESCA RP biologists just outside the boundary of the FEG MRA on the east side of the roadway about ¼ mile (0.4 km) northwest of the turnoff to the tank wash area along Crescent Bluff Drive (near *Eucalyptus* stand).

This location was revisited on September 30, 2013 by four ESCA RP biologists, who surveyed suitable nearby areas in the FEG MRA for additional plants of veldt grass. No new plants were identified. Existing veldt grass plants were not abated and are currently growing in cracked asphalt just outside the FEG MRA.

7.6 Environmental Awareness Training

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 6). Environmental awareness training and CTS refresher training was provided to field personnel and supervisors prior to the beginning of MEC remedial investigation in the IAR and Seaside MRAs. Environmental awareness training was provided for the IAR MRA on 10 January 2013 and 10 July 2013. NRIM Checklist 2 Revision 1 training was conducted for the Seaside MRA on 01 August 2013.

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:

Training for the IAR MRA conducted by a QB during the reporting period included: Environmental Awareness Training and NRIM Checklist 7 revision 1 training conducted 10 January 2013 and 10 July 2013.

Training for the Seaside MRA conducted by a QB during the reporting period included: Environmental Awareness Training and NRIM Checklist 2 revision 1 training, 01 August 2013.

7.7 Erosion Control Monitoring and Mitigation

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

8.0 HABITAT MONITOIRNG ACTIVITIES

Monitoring is required in habitat parcels in association with potential or actual habitat disturbance as a result of ESCA RP munitions investigation activities. In general, baseline vegetation surveys are conducted prior to investigation activities or in nearby proxy areas. HMP shrubs and herbaceous species are also surveyed in Years 3, 5, 8, and 13 post-remediation. HMP annuals and herbaceous perennials are surveyed in the baseline year and in Years 1, 3, 5, and 8 post-remediation. Depending on the timing of the baseline monitoring effort and the time required to complete munitions investigation activities, post-disturbance vegetation surveys may begin more than one year after the baseline survey for HMP annuals and herbaceous perennials and/or more than three years after the baseline survey for shrub and herbaceous cover monitoring.

The habitat monitoring protocols are outlined in Section 5.2. A summary of habitat monitoring activities initiated by the ESCA RP Team during the reporting period is shown in Table 1-2.

Tables 7-1 through 7-13 present the results from habitat monitoring activities.

8.1 Vegetation Monitoring in MRAs

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

8.1.1 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 investigation activities in the FEG MRA; all were detailed in the 2012 Annual Natural Resource Report (ESCA RP 2013b). Of these transects, 39 were baseline transects in central maritime chaparral, two were situated in a largely un-vegetated mineral soil area in a portion of the grenade range, and two were located in oak woodland on the edge of the grenade range.

A total of six ESCA RP transects were established in the spring of 2013 in central maritime chaparral in areas in which the vegetation had been cut in 2010. Locations of all transects are shown in Figure 7a.

Baseline and post-activity data are compared by species absolute cover, relative cover, and frequency in Table 7-1.

Results from ESCA RP baseline central maritime chaparral transects indicate dominance by three shrub species: brittleleaf manzanita (45.8% average cover), chamise (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.

Shrub cover in 2013 had dropped from 107% in baseline transects to 54.4% three years after vegetation cutting in the six new 2013 transects installed in central maritime chaparral..Brittleleaf manzanita (15.2 % average cover), coyote bush (*Baccharis pilularis* subsp. *consanguinea*, 9.1%), and chamise (8.6 % average cover) had the greatest cover of any shrub species; these three species are all stump-sprouters that send up new stems from the base of previously cut mature plants. Other large shrub species exhibited less than 3% cover at the time of sampling. Pioneering shrubs and subshrubs that frequently germinate from seed and colonize burns and disturbed areas, such as deerweed (*Acmispon glaber*) and sticky monkeyflower (*Mimulus aurantiacus*), had 7.6% and 4.5% cover, respectively. Cover by obligate seeding HMP shrubs that are unable to sprout from the base such as Monterey ceanothus and Toro manzanita was less than 1% each, but is expected to increase as young plants become established. Among the native species exhibiting high frequencies (found in at least 80% of transects) in the Year 3 post-activity sampling were brittleleaf manzanita, chamise, rush-rose (*Helianthemum scoparium*), and sticky monkeyflower.

This vegetation type is classified as the brittleleaf manzanita shrubland alliance by CNPS and California Department of Fish and Game (CDFW; 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 CDFW Natural Communities Hierarchy (CDFW 2010) and in CNDDB (CDFW 2013); G2/S2 ratings indicate an alliance that is threatened throughout its range.

8.1.2 Vegetation Monitoring in Interim Action Ranges MRA

Native vegetation in the IAR MRA is comprised primarily of central maritime chaparral, with a small grassland area located in South Range 44 SCA. Vegetation cover sampling data prior to munitions investigation activities, as well as subsequent to vegetation cutting and 'mag and dig' operations, small-scale excavations, and large-scale excavation, are summarized in this section.

8.1.2.1 Vegetation-Cut Areas in Range 44 and Range 47 Subarea C

The entire IAR MRA burned in 2003The Army established initial baseline survey transects in this area in 2000 prior to this burn (Parsons 2005). Nineteen additional ESCA RP baseline transects were established between 2010 and 2011 in the IAR MRA prior to ESCA munitions investigation activities; these baseline transects were all located outside the SCAs and NCAs for safety reasons. Three of these transects serve as a vegetation baseline for habitat restoration in Range 47. Sixteen of these 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 investigation activities in the rest of the SCAs and NCAs in the IAR MRA (North Range 44 SCA, South Range 44/Central Area SCAs/NCAs, Range 47 SCA Subarea C, and ingress/egress corridors). Vegetation cutting was conducted in South Range 44 in 2011 and in North Range 44 in 2012.

Mean shrub and subshrub cover in these baseline transects was 94.5%, with four dominant shrubs: shaggy-barked manzanita (29.3% average cover), dwarf ceanothus (20.2% cover), Monterey ceanothus (13.5% cover), and chamise (9.0 % average cover), all of which had frequencies of 90% or greater (Table 7-2).

Follow-up vegetation monitoring transects in the IAR MRA were established in June 2012; sixteen in areas of vegetation cutting and six in areas with small-scale excavation. Locations of all transects in the IAR MRA are shown in Figure 7b. Transects were also established in the Range 47 restoration area, which encompasses Subareas A and B; data from these transects are reported in Appendix A.

8.1.3 Vegetation Monitoring in Parker Flats MRA

No vegetation monitoring was conducted in the Parker Flats MRA during 2013 but will be conducted in 2014 as Year 5 post-activity monitoring. Locations of all transects in the Parker Flats MRA are shown in Figure 7c.

8.1.4 Vegetation Monitoring Discussion

Different types of munitions investigation activities have strikingly different effects on maritime chaparral vegetation. Vegetation cutting leaves the root systems of many stump-sprouting shrubs intact, whereas soil excavation destroys root systems of all species. These differences are consistently reflected in monitoring data. Year 1 and Year 2 post-

activity data show a resurgence of dominance by stump-sprouting manzanita and chamise plants, with 25% or greater cover, and gradual re-colonization by obligate-seeding shrubs (Figure 12). Subshrubs such as the nitrogen-fixing deerweed are common immediately after vegetation cutting in some areas, along with rush-rose, which also tolerates disturbance of various types. Canopy cover is expected to increase exponentially over the coming years in vegetation-cut areas, and will include widespread dominants as well as HMP shrubs; sampling data in the IAR MRA show colonization of HMP shrubs from seed and retention of HMP manzanita species in the FEG MRA augment this process.

In contrast, native vegetation recovery after excavation (small-scale or large-scale) is dependent on either the existing seedbank in topsoil, if topsoil has been salvaged and replaced, or on gradual colonization of the bare excavated areas by means of seed dispersal into the excavated area over time and the contributions of any remaining seedbank. Often, excavated areas exhibit higher cover and diversity at the immediate edge of the excavation and lower diversity in the center. Initial shrub cover is low, usually less than 2 to 3%, since it is derived from seedling growth, with a relatively higher component of herbaceous species and subshrubs providing a sparse scattering of vegetative cover (Figure 13). Once again, deerweed and rush-rose are common in small-scale excavation areas after disturbance, along with other species, including the HMP annual, Monterey spineflower (see Section 7.2.2.1). Although recovery will be slower than in vegetation-cut areas, the presence and cover of dominant species is expected to increase over time.

Vegetation transect data collected in 2013 for areas treated in 2011 and 2012 are presented in Figure 14. Total cover by species was converted to relative cover for each transect before ordination. The transects are ordered based on similarity of vegetation using principal components analysis, which reveals which species vary the most strongly depending on two activity types: vegetation cutting and small-scale excavation. The polygons enclosing each of these four groups of vegetation samples show very little overlap, indicating that each of these groups is, in terms of vegetation composition, fairly distinct from the other groups. In particular, there is no overlap between transect data for vegetation cut areas and small-scale excavation areas because the vegetation composition is clearly different between those areas. Herbaceous vegetation is more pronounced than shrub cover in small-scale excavation areas and the reverse is true in vegetation-cut transects.

Vegetation recovery after large-scale excavation conducted in the IAR MRA is addressed in detail in Appendix A.

8.2 HMP Species Monitoring in MRAs

HMP species monitoring focuses on herbaceous species, mostly annuals, including Monterey spineflower, Monterey gilia, and seaside bird's-beak (Figures 8a, 8b, 8c, and 8d). In 2013, coast wallflower was observed for the first time by the ESCA RP biologists in the IAR MRA and Seaside MRA; this rare herbaceous perennial will be added to routine herbaceous HMP species monitoring efforts. In addition, routine monitoring has been conducted for HMP manzanitas that are part of the manzanita retention effort in the FEG MRA (see Section 5.2.4).

8.2.1 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 investigation activities: Monterey spineflower and Monterey gilia. One ESCA RP baseline HMP annual plots were installed in 2010 to monitor Monterey spineflower (Figure 9a) and three baseline HMP annual plots were installed to monitor Monterey gilia (Figure 9b). In 2013, an additional HMP species was observed in the FEG MRA in previously brush cut areas, seaside bird's-beak (Figure 9c).

This reporting period falls within Year 1 and 3 after remedial activities in 106 grid cells in the FEG MRA. In 2013, all HMP species plots (211 square feet [(25 m^2]) were revisited counted and populations mapped using hand-held GPS unit (Tables 7-3 and 7-4). Additionally, all grid cells where vegetation cutting occurred in 2010 and 2012 were surveyed for HMP species. No reference grid cells were available for sampling, however, because all grid cells in the FEG MRA have been subject to munitions investigation activities over the last three years.

Monterey spineflower: In general, Monterey spineflower is found in lower densities in the sandstone-derived substrate in the FEG MRA compared with the relatively high densities of Monterey spineflower that occupy Aeolian sandy substrates at lower elevations to the west and southwest, such as in the Interim Action Ranges and Parker Flats MRAs. Monterey spineflower was not found in the FEG MRA in the flora and fauna base-wide 1992 surveys (USACE 1992; Figure 8a).

In spring 2010 in baseline sampling in the FEG MRA, a total of 236 Monterey spineflower plants were counted in two plots, yielding an average density of 118 Monterey spineflower plants. Ingress/egress routes (i.e. established trails and fuel breaks) and other open areas were searched for all HMP annual species during these surveys. Precipitation during the 2009-2010 water year was 22.3 inches (56.6 cm).

In spring 2013 sampling, there were a total of 138 Monterey spineflowers observed in the FEG MRA in one plot located along an ingress/egress route. Because munitions investigation activities had taken place throughout the entire FEG MRA during the past three years, no reference plot was available for comparison. Precipitation during the 2012-2013 water year was 11.4 inches (29 cm), about half of the rainfall of the 2011 baseline year.

Vegetation cutting followed by 'mag and dig' investigations was the main munitions investigation activity in the part of the FEG MRA in which Monterey spineflower was observed in 2013 (Figures 4a and 9a); no Monterey spineflower were observed in grid cells that had been subject to vegetation cutting for any post-activity years.

Monterey gilia: Monterey gilia occurs in relatively low densities in loose sandy soils with low silt content in several locations at the former Fort Ord. It was mapped in 1992 in low densities in a central swath across the former military base, with higher densities in the northwest (Figure 8b, USACE 1992). A small area was mapped near the eastern

perimeter of the FEG MRA, and it is in this general area that low numbers of Monterey gilia continue to be observed.

In 2010 baseline sampling, an average of 30 Monterey gilia plants were sampled in three plots, for a total of 90 plants in three grid cells.

No Monterey gilia plants were observed along ingress/egress routes in 2013 in the FEG MRA, but Monterey gilia plants were present in several grid cells after vegetation cutting. Eleven Monterey gilia plants were counted in a portion of a grid cell that had been subject to vegetation cutting two years ago in 2011(Figure 9b). In portions of two grid cells subject to vegetation cutting three years ago, a total of 5 Monterey gilia was censused, with a mean density of 1.7 plants per plot.

Seaside bird's-beak: In 1992, base-wide mapping indicates low density of seaside bird's-beak in a central swath through mostly the northern half of the former Fort Ord, with a small area of low-density bird's-beak in the eastern FEG MRA (Figure 8c, USACE 1992). Between 2010 and 2012, seaside bird's-beak was not observed in the FEG MRA by ESCA RP biologists.

In 2013, 187 seaside bird's-beak plants were located in one grid cell located just south of the previously mapped 1992 seaside bird's-beak distribution (Figures 8c and 9c) in a Year 3 post-activity vegetation-cut area; there was a mean density of 61 seaside bird's beak plants per 211 square feet (25 m^2) in one grid cell.

Toro manzanita and Hooker's manzanita: To mitigate for possible reduction in the abundance of obligate-seeding HMP manzanita shrubs in vegetation-cut areas in the FEG MRA, 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 (Section 5.2.4).

An average of 20.9 Toro manzanitas per acre (0.4 ha) survived in 2012 after vegetation cutting using the modified shrub retention method (Table 7-5). This number held steady at 20.8 surviving Toro manzanitas per acre (0.4 ha) in 2013. Only three Toro manzanitas have died subsequent to vegetation cutting activities, mostly from toppling. Hooker's manzanitas also occur in the manzanita retention area in very low densities, and these plants continue to survive.

8.2.2 HMP Herbaceous Species Monitoring in IAR MRA

Three HMP annual species were observed in the IAR MRA in 2010 in areas targeted for munitions investigation activities: Monterey spineflower, Monterey gilia, and seaside bird's-beak. In 2013, coast wallflower was also observed growing in the IAR MRA, and this species has been added to routine HMP herbaceous species monitoring in the IAR MRA (Figures 10a, 10b, 10c, and 10d).

Baseline data for HMP herbaceous species in the IAR MRA was gathered in 2010 by monitoring a combination of baseline plots and 100 x 100 foot (30 x 30 m) grid cells prior to ESCA munitions investigation activities in order to document HMP annual species densities before and after disturbance. The baseline plots were placed in locations where the annual HMP species were observed during surveys of relatively large areas surrounding target locations for munitions investigations. Post-disturbance plots were placed in smaller disturbance areas. Reference plots were placed around the perimeter of the SCAs and NCAs.

Data for baseline conditions prior to munitions investigation activities are shown in tables for both 2010 and 2012, so that results can be compared between MRAs based on 2010 sampling events. However, only 2012 baseline data are used for calculation of performance metrics, as described in Appendix A and specified in the HRP (ESCA RP Team 2013a).

In 2013, numbers of HMP herbaceous plants were either counted directly in grid cells, or, in areas with high population density, small portions of grid cells were sampled with circular plots (8.2 feet, or 2.5 m radius) following Burleson (2009) in order to obtain population estimates. Where plants were concentrated in only a portion of a grid cell, the stands/colonies were censused and mapped with a hand-held GPS unit and the proportion of the grid cell providing suitable habitat was estimated and used for density calculations. In portions of Range 44 and along remediation ingress/egress corridors the plot shape was adjusted to fit the linear shape of the disturbance area.

Data are presented in Tables 7-6 - 7-12 and include density values expressed as the number of plants per plot in order to facilitate comparisons with other 25 m^2 plot data from previous years. Data are reported separately for North Range 44, South Range 44, Range 47 Subareas A and B, and Range 47 Subarea C based on activity types: ingress/egress routes; vegetation cutting followed by possible ‘mag and dig’; and small-scale excavation. Results of HMP annual establishment in the Range 47 large-scale excavation area are provided in Appendix A, along with details on seeding and planting efforts.

8.2.2.1 Ingress/Egress Routes in IAR MRA

When present, HMP annuals are concentrated primarily along the disturbed open margins of ingress/egress routes (Figure 7b). Monterey spineflower is particularly tolerant of these disturbance conditions, and in 2013 a total of 241 Monterey spineflower plants were found along ingress/egress routes in North Range 44 and 3,349 plants were found along ingress/egress routes in South Range 44 (Tables 7-7 to 7-12).

Monterey gilia generally occurs in lower densities than Monterey spineflower throughout its range. No Monterey gilia plants were found along ingress/egress routes in North Range 44 and three plants were found along ingress/egress routes in South Range 44.

Seaside bird's-beak was only found along ingress/egress routes in South Range 44, where two plants were located in 2013 (Figure 10c).

8.2.2.2 Vegetation-Cut Areas in Range 44 and Range 47 Subarea C

Monterey spineflower: Monterey spineflower ranged from an average of 27.2 to 40.5 plants per plot in the 2012 baseline sampling prior to disturbance, depending on the location, a lower number than observed in baseline sampling in 2010 (Table 7-7). In 2013, one reference grid cell was sampled, and there were 450 Monterey spineflower plants in this grid cell, with a mean density of 19.0 plants per plot.

North Range 44: In areas that were subject to vegetation cutting in 2012 in North Range 44, Monterey spineflower exhibited a mean density of 68.9 plants per plot (Table 7-14). Monterey spineflower was located in 30 grid cells in Year 1 post-activity vegetation-cut areas in North Range 44 in 2013, compared with 6 in the 2012 baseline. A total of 64,228 Monterey spineflower plants were estimated to occur in North Range 44 in areas subject to vegetation cutting.

South Range 44: In South Range 44 in areas subject to vegetation cutting in 2011, an average Monterey spineflower density of 158.6 plants per plot (Table 7-8) was measured in 2013. Monterey spineflower was located in 3 grid cells in Year 2 post-activity vegetation-cut areas in South Range 44 in 2013, compared with 14 grid cells the 2012 baseline. A total of 3,601 Monterey spineflower plants were estimated to occur in South Range 44 in vegetation-cut areas.

Range 47 Subarea C: In Range 47 Subarea C in areas subject to vegetation cutting in 2011, there was an average density of 7.8 Monterey spineflower plants per plot (Table 7-9). Monterey spineflower was located in 7 grid cells in Year 2 post-activity vegetation-cut areas in Range 47 Subarea C in 2013, compared with 5 grid cells in the 2012 baseline. A total of 1,716 Monterey spineflower plants were estimated to occur in Range 47 Subarea C in vegetation-cut areas.

In summary, Monterey spineflower density was higher in both North and South Range 44 and in Range 47 Subarea C in vegetation-cut areas in 2011 and 2012 than in the 2012 baseline. Monterey spineflower was found in 40 grid cells in vegetation-cut areas in the IAR MRA in 2013 (excluding Subareas A and B), a larger number than presence in 25 grid cells in the 2012 baseline and 43 grid cells in the IAR MRA reported in the 2010-2011 baseline, excluding Subareas A and B (ESCA RP Team 2013b).

Monterey gilia: 2012 baseline data for Monterey gilia indicate an average of 0.0 to 2.7 plants per plot prior to disturbance, depending on location. In 2013, one reference grid cell was sampled, and there were 12.0 Monterey gilia plants per plot.

North Range 44: In areas subject to vegetation cutting in 2012 in North Range 44, a mean Monterey gilia density of 5.8 plants per plot (Table 7-10) was observed in 2013. Monterey gilia was located in 29 grid cells in Year 1 post-activity vegetation-cut areas in

North Range 44 in 2013, compared with no grid cells in the 2012 baseline. A total of 2,329 plants were counted in North Range 44 in vegetation-cut areas.

South Range 44: In South Range 44 in areas subject to vegetation cutting in 2011, Monterey gilia had an average density of 3.1 plants per plot (Table7-11). Monterey gilia was located in 8 grid cells in Year 2 post-activity vegetation-cut areas in South Range 44 in 2013, compared with 14 in the 2012 baseline. A total of 33 plants were counted in South Range 44 in areas subject to vegetation cutting.

Range 47 Subarea C: In Range 47 Subarea C in areas subject to vegetation cutting in 2011, Monterey gilia exhibited an average density of 6.6 plants per plot (Table 7-12) in 2013. Monterey gilia was located in 2 grid cells in Year 2 post-activity vegetation-cut areas in Range 47 Subarea C in 2013, the same number as the 2012 baseline. A total of 66 plants were counted in Range 47 Subarea C in vegetation-cut areas.

In summary, Monterey gilia density was higher in North Range 44 in vegetation-cut areas in 2012 than in the 2012 baseline data, and was similar or insignificantly higher than baseline data in South Range 44 and Range 47 Subarea C. Monterey gilia was found in 37 grid cells in the IAR MRA in 2013in areas subject to vegetation cutting, almost twice as many grid cells as presence in 19 grid cells in 2010-2011, excluding Subareas A and B, as reported in the HRP (ESCA RP 2013a), and more than twice as many grid cells as the 16 grid cells in the 2012 baseline.

Seaside bird's-beak: 2012 baseline data for seaside bird's-beak indicate an average of 3.3 to 9.3 plants per plot prior to disturbance, depending on the location. In 2013, one reference grid cell was sampled, and there were 108 seaside bird's-beak plants in this grid cell, or 8.5 plants per plot.

North Range 44: In areas subject to vegetation cutting in 2012 in North Range 44, seaside bird's-beak exhibited a mean density of 45.4 plants per plot (Table 7-10) in 2013. Seaside bird's-beak was located in 11 grid cells in Year 1 post-activity vegetation-cut areas in North Range 44 in 2013, compared with 9 grid cells in the 2012 baseline. A total of 4,662 seaside bird's-beak plants were counted in North Range 44 in vegetation-cut areas.

South Range 44: In South Range 44 in areas subject to vegetation cutting in 2011, seaside bird's-beak had an estimated average density of 41.0 plants per plot (Table 7-11) in 2013. Seaside bird's-beak was located in 3 grid cells in Year 2 post-activity vegetation-cut areas in South Range 44 in 2013, compared with 14 grid cells in the 2012 baseline. A total of 123 plants were counted in South Range 44 in all in vegetation-cut areas.

Range 47 Subarea C: No seaside bird's-beak plants were observed in Range 47 Subarea C.

In summary, seaside bird's-beak density was higher in both North and South Range 44 in vegetation-cut areas in 2011 than in the 2013 reference plot. Seaside bird's-beak was found in 13 grid cells in the IAR MRA in 2013, compared with 21 grid cells in 2010-2011, excluding Subareas A and B, as reported in the HRP (ESCA RP Team 2013a) 9

grid cells in the 2012 baseline for North Range 44, and 9grid cells in 2012 baseline for South Range 44.

Coast wallflower: Prior to 2013, coast wallflower had not been observed in the IAR MRA by ESCA RP biologists, so no reference data from previous years exist. Two reference grid cells were established for coast wallflower in North Range 44, the only location in the IAR MRA where this HMP herbaceous perennial has been observed. A total of 11 plants were counted in the two grid cells, providing an average density of 0.1 plants per plot (Table 7-17).

Six nearby grid cells in vegetation-cut areas were also surveyed for coast wallflower, and coast wallflower plants were counted in 3 of these (50%), with an estimated average density of 0.4 plants per plot. A total of 65 plants were counted in North Range 44 in all.

8.2.2.3 Small-scale Excavation Areas in Range 44 and Range 47 Subarea C

Monterey spineflower: Monterey spineflower ranged from an average of 6 to 40.3 plants per plot in the 2012 baseline sampling prior to disturbance, depending on the location (Table 7-7). In 2013, one reference grid cell was sampled, and there were 450 Monterey spineflower plants in this grid cell, with a mean density of 19.0plants plants per plot.

North Range 44: In North Range 44 in areas subject to small-scale excavations in 2012, an average Monterey spineflower density of 23.2 plants per plot was measured in these small excavated areas (Table 7-14). Monterey spineflower was located in 11 grid cells in small-scale excavation areas in North Range 44 in 2013, compared with 9 in the 2012 baseline. A total of 1,294 Monterey spineflower plants were estimated to occur in North Range 44 in small-scale excavation areas.

South Range 44: In South Range 44 in areas subject to small-scale excavations in 2011, Monterey spineflower exhibited an average estimated density of 410.1 plants per plot in these small-scale excavation areas in 2013 (Table 7-8). Monterey spineflower was located in 4 grid cells in small-scale excavation areas in South Range 44 in 2013, compared with 11 in the 2012 baseline. A total of 7,763Monterey spineflower plants were estimated to occur in South Range 44 in small-scale excavation areas.

Range 47 Subarea C: In Range 47 Subarea C in areas subject to small-scale excavations in 2011, none of the 3 grid cells sampled (0%) in 2013 supported Monterey spineflower.

In summary, Monterey spineflower density was higher in both North and South Range 44 in Year 1 and Year 2 post-activity small-scale excavation areas than in the 2013 reference plot. Monterey spineflower was absent in Range 47 Subarea C. Monterey spineflower was found in 15 grid cells in the IAR MRA in 2013 (excluding Subarea B) in areas subject to small-scale excavation, compared with 25 grid cells in the 2013 baseline.

Monterey gilia: 2012 baseline data for Monterey gilia indicate an average of 1.0 individual per plot prior to disturbance. In 2013, one reference grid cell was sampled, and there were 12 Monterey gilia plants in this grid cell, or 0.25 plants per plot.

North Range 44: In North Range 44 in areas subject to small-scale excavations in 2012, Monterey gilia exhibited a mean estimated density of 4.4 plants per plot in 2013 (Table 7-10). Monterey gilia was located in 10 grid cells in small-scale excavation areas in North Range 44 in 2013, compared with none in grid cells in the 2012 baseline. A total of 108 plants were counted in North Range 44 in small-scale excavation areas.

South Range 44: In South Range 44 in areas subject to small-scale excavations in 2011, the average density of Monterey gilia was 3.7 plants per plot in 2013 (Table 7-11). Monterey gilia was located in 3 grid cells in small-scale excavation areas in South Range 44 in 2013, compared with 14 grid cells in the 2012 baseline. A total of 11 plants were counted in South Range 44 in small-scale excavation areas.

Range 47 Subarea C: In Range 47 Subarea C in areas subject to small-scale excavations in 2011, Monterey gilia had an average density of 1.0 individual per plot in 2013 (Table 7-12). Monterey gilia was located in 1 grid cell in small-scale excavation areas in Range 47 Subarea C in 2013, compared with 2 grid cells in the 2012 baseline. One individual was located in Range 47 Subarea C in small-scale excavation areas.

In summary, Monterey gilia density was higher in both North and South Range 44 than in the 2013 reference plot and the same as in the reference plot in Subarea C. Monterey gilia was found in 14 grid cells out of 19 grid cells surveyed (74%) in suitable areas subject to small-scale excavation the IAR MRA in 2013.

Seaside bird's-beak: 2012 baseline data for seaside bird's-beak indicate an average of 3.3 to 9.3 plants per plot prior to disturbance, depending on the location. In 2013, one reference grid was sampled, and there were 108 seaside bird's-beak plants in this grid cell, or 8.5 plants per plot.

In small-scale excavation areas in 2012 in North Range 44, 2grid cells in 2013 supported seaside bird's-beak, with an estimated average density of 1 individual per plot (Table 7-10). A total of 2 plants were counted in North Range 44 in all, and no plants were located in South Range or in Range 47 Subarea C in small-scale excavation areas.

In summary, seaside bird's-beak density was lower in North Range 44 in Year 1 post-activity small-scale excavation areas in 2012 than in the 2013 reference plot and lower than the 2012 baseline; small-scale excavation areas lack the host plant for this root-parasite except along the margins. Seaside bird's-beak was found in 2 grid cells in the IAR MRA in areas subject to small-scale excavations. No seaside bird's-beak presence was anticipated in the performance targets for small-scale excavation in Years 1, 2, and 3.

8.2.4 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 munitions investigation activities.

Monterey spineflower: Monterey spineflower has a wide distribution at the former Fort Ord, and was mapped in 1992 as having low to medium densities over large portions of the Parker Flats MRA (Figure 11).

During 2010 baseline surveys for Monterey spineflower in the Parker Flats MRA a total of 316 plants were counted in three plots in three grid cells, at a mean density of 105.3 plants per plot.

In 2013, four years after munitions investigation activities were completed, 341 Monterey spineflower plants were observed in four grid cells along ingress/egress routes, at a mean density of 35.7 plants per plot.

Although only 42 Monterey spineflower plants were counted in 2013 in Year 4 vegetation-cut areas, densities were similar to ingress/egress routes; one plot containing 42 Monterey spineflower was found in one grid cell out of the four surveyed, or 25%.

8.2.4.1 HMP Herbaceous Species Monitoring Summary

Observed patterns of HMP herbaceous species occurrence the different MRAs in 2013 are summarized here.

Monterey spineflower: Of the four herbaceous species surveyed in the FEG, IAR, and Parker Flats MRAs in 2013 by ESCA RP biologists, Monterey spineflower had the highest total number of plants, 83,162. A total of 138 were observed in the FEG MRA, 82,641 in the IAR MRA, and 383 in the Parker Flats MRA (Tables 7-3, 7-7, 7-8, 7-9, 7-13).

2010 Baseline Comparisons: Average Monterey spineflower densities in 2010 baseline sampling ranged between 89 and 158.1 Monterey spineflower plants per plots in all three MRAs, but colony sizes were larger in the IAR MRA than in the FEG and Parker Flats MRAs; these results are consistent with the Monterey spineflower mapping conducted in 1992 (USACE 1992). The IAR MRA supports the largest expanse of sandhill central maritime chaparral of the three MRAs monitored in 2013, and it is here that the greatest numbers of Monterey spineflower stands are concentrated (Figures 8a).

The habitat parcels in the Parker Flats MRA are dominated by coast live oak woodland, with far less acreage of central maritime chaparral; in the habitat parcels of the Parker Flats MRA, Monterey spineflower is concentrated in openings in central maritime chaparral and coast oak woodland along trails and ingress/egress routes.

The substrate of much of the FEG MRA is sandstone, with a much thinner layer of sandy soil on the surface than in the IAR MRA. This may contribute to the narrower distribution of Monterey spineflower in this MRA.

Rainfall in the water year 2012-2013 (11.4 inches, 29 cm) was about half of the baseline precipitation in water year 2009-2010 (22.3 inches, 56.6 cm).

2013 Monterey Spineflower Densities along Ingress/Egress Routes: One or more Monterey spineflower colonies were observed along ingress/egress routes in all three MRAs, in one location in the FEG MRA, eight locations in the IAR MRA, and four locations in the Parker Flats MRA. Monterey spineflower plants have been well-documented in such locations, although persistence varies; their densities decline over time if there is weed competition, disturbance, or canopy overgrowth (USFWS 2008a). The small spines on the Monterey spineflower fruits aid in dispersal and the seeds persist in the seedbank for considerable periods of time. 2013 Post-activity Densities in Vegetation-cut Areas: The presence of Monterey spineflower in areas subject to vegetation-cutting followed by possible 'mag and dig' activities differs noticeably between the FEG, IAR, and Parker Flats MRAs. Since appearance of HMP herbaceous species after vegetation cutting depends on sufficient rainfall coupled with the presence of viable seeds in the seedbank that respond to the increased light and available space this disturbance creates, patchiness is expected but so are geographical differences that reflect the overall density and spread of each HMP species in the area.

In the FEG MRA, no Monterey spineflowers were observed in 2013 in grid cells that had been subject to vegetation cutting for any post-activity years.

In the IAR MRA, the mean density of Monterey spineflower plants in Year 1 post-activity vegetation-cut areas in North Range 44 was more than twice that of 2012 baseline plots, and the total number of Monterey spineflower in 30 grid cells was 82,191 plants in 2013, a much larger number than quantified in 2010 or 2012. IAR MRA Year 2 post-activity plots in vegetation-cut areas in South Range 44 also supported high mean densities of Monterey spineflowers, but these spineflower colonies were much more limited in extent compared with the 2010 and 2012 baseline sampling events, with only 3 grid cells containing spineflowers in comparison with the 11 in each baseline sample.

Only one colony of Monterey spineflower was observed in 2013 in the Parker Flats MRA in Year 4 post-activity areas, with a mean density of 41 Monterey spineflower plants per plots.

Rainfall in the water year 2012-2013 (11.4 inches, 29 cm) was about half of the 2010 baseline precipitation in water year 2009-2010 (22.3 inches, 56.6 cm).

2013 Post-activity Densities in Small-scale Excavation Areas: Because small-scale excavations involve the removal of all above- and below-ground vegetative parts as well as the topsoil, native vegetation recovery after small-scale excavation depends on either the existing seedbank in topsoil, if topsoil has been salvaged and replaced, or on gradual colonization of the bare excavated areas by means of seed dispersal into the excavated

area over time and the contributions of any remaining seedbank. Often, excavated areas exhibit higher cover and diversity at the immediate edge of the excavation and lower diversity in the center.

No small-scale excavation activities were conducted in the FEG or Parker Flats MRAs in 2013. The average 2013 density of Monterey spineflower in Year1 post-activity plots in small-scale excavation areas in North Range 44 was 23.2 plants per plot, which was lower than the baseline average from 2010 and 2012, although the data are not significantly different. The Year 2 post-activity plots in small-scale excavation areas in South Range 44 showed elevated Monterey spineflower densities (410.1 Monterey spineflower plants per plot). The lack of competition from fast-growing stump-sprouting shrubs may play a role in boosting Monterey spineflower density the second year after a small-scale excavation event.

Monterey gilia: Monterey gilia is confined to the dune complexes of the Monterey area along 22 miles of coastline, often in small localized colonies. Population censuses indicate large changes in density from year to year, depending on climatic conditions. Seeds tend to persist in the seedbank, and new colonies are sometimes discovered in areas that have been recently burned or cleared. In general, Monterey gilia occurrences along the coast exhibit higher densities than inland occurrences. Monterey gilia appears to be particularly susceptible to competition by invasive non-native species (USFWS 2008b). Monterey gilia was only observed in the FEG and IAR MRAs in 2013 (Figure 8b).

2010 Baseline Comparisons: 2010 baseline data for Monterey gilia in the FEG MRA was an average of 30 plants per plot, in contrast to the much lower density quantified in the IAR MRA, an average of 1.5 to 3.4 plants per plot; in both locations, the baseline data encompasses a single plot in two grid cells. In 1992, no Monterey gilia was mapped in the IAR MRA, and only a small area was mapped near the eastern perimeter of the FEG MRA (USACE 1992).

2013 Monterey Gilia Densities along Ingress/Egress Routes: No Monterey gilia was found in 2013 along ingress/egress routes in the FEG MRA, and the mean density of Monterey gilia in South Range 44 in the IAR MRA along ingress/egress routes was 3 plants per plot based on one plot in one grid cell; no Monterey gilia were found in North Range 44 along ingress/egress routes. This isolated occurrence is typical of limited Monterey gilia colonies along the edges of ingress/egress routes and haul roads.

2013 Post-activity Densities in Vegetation-cut Areas: Monterey gilia was found in post-activity areas subject to vegetation cutting in both the FEG and IAR MRAs.

In the IAR MRA, Monterey gilia showed slightly elevated mean densities in 2013 in Year 1 and Year 2 post-activity sampling compared with 2012 baseline density; the data are not significantly different (Table 7-10-7-12). In vegetation-cut areas in the IAR MRA, the distribution of the Monterey gilia spanned 39 occupied grid cells and average density was 5.8 Monterey gilia plants per plot in Range 44 Year 1 post-activity areas, with a total

of 2,239plants. In the FEG MRA, there were no Monterey gilia plants observed in Year 1 post-activity areas in the 44 grid cells that were surveyed.

Year 2 post-activity data in vegetation-cut areas in South Range 44 in the IAR MRA show an average of 3.1 Monterey gilia plants per, for a total of 33 Monterey gilia plants. An additional 66 Monterey gilia were observed in Range 47 Subarea C Year 2 post-activity vegetation- cut areas, with an average density of 6.6 plants per plot in two grid cells.

In the FEG MRA, one small colony of Monterey gilia was located in one grid cell out of 39 in Year 2 post-activity areas, with an average density of 11 Monterey gilia per 211 square-foot (25 m^2) plot. The FEG MRA also has 37 grid cells that experienced vegetation cutting three years ago, and Monterey gilia were found in two grid cells, with a mean density of 2.0 Monterey gilia plants per plot. These data suggest persistence of Monterey gilia in the FEG MRA in small colonies, and a more robust population in the IAR MRA.

2013 Post-activity Densities in Small-scale Excavation Areas: No small-scale excavation activities were conducted in the FEG or Parker Flats MRAs in 2013.

The average density of Monterey gilia in 2013 Year1 post-activity plots in North Range 44 small-scale excavation areas in the IAR MRA is lower than density data from along ingress/egress routes and in vegetation cut areas, with an average density of 4.4 Monterey gilia plants per plot. Surprisingly, Monterey gilia were found in 10 out of 11 grid cells containing small-scale excavation areas, despite the disruption of vegetation and soil profiles. The Year 2 post-activity plots in South Range 44 small-scale excavation areas showed Monterey gilia densities of 3.7 plants per plot, in three out of eight grid cells. A single Monterey gilia was also found in a small-scale excavation area in Range 47 Subarea C. The lack of competition from fast-growing stump-sprouting shrubs, lack of woody debris, and presence of a robust surrounding Monterey gilia stand may all play a role in the persistence of Monterey gilia in small-scale excavation areas two years after the disturbance.

Seaside bird's-beak: 2010 Baseline Comparisons: There are no baseline data for seaside bird's-beak from the FEG or Parker Flats MRAs. 2010 baseline surveys for seaside bird's-beak in the IAR MRA located several grid cells containing this rare hemi-parasite in North Range 44, with mean densities ranging from 3.6 to 30.7 seaside bird's-beak plants per 25 m^2 per plot.

2013 Seaside Bird's-beak Densities along Ingress/Egress Routes: Two seaside bird's-beak plants were observed in one location at the edge of an ingress/egress route in the IAR MRA in 2013. No seaside bird's-beak plants were observed along ingress/egress routes in the FEG or Parker Flats MRA.

2013 Post-activity Densities in Vegetation-cut Areas: Seaside bird's-beak was censused in post-activity areas subject to vegetation cutting in both the FEG and IAR MRAs.

In North Range 44 in the IAR MRA in 2013, a total of 4,662 seaside bird's-beak plants were censused in Year 1 post-activity vegetation-cut areas, at a mean density of 45.4 plants per plot. Year 2 post-activity vegetation-cut areas in South Range 44 supported a mean density of 5 plants per plot, for a total of 10 plants in two grid cells.

In the FEG MRA, no seaside bird's-beak plants were found in Year 1 and Year 2 post-activity vegetation-cut areas, but 61 plants were discovered in one colony in one Year 3 post-activity grid cell in 2013. Seaside bird's beak would likely persist in these areas as long as there are suitable host plants, sunny openings, and a lack of weed competition.

2013 Post-activity Densities in Small-scale Excavation Areas: No small-scale excavation activities were conducted in the FEG or Parker Flats MRAs in 2013. The average density of seaside bird's beak plants in 2013 in North Range 44 in the IAR MRA in small-scale excavation areas was 2 seaside bird's beak plants in each of two plots. Seaside bird's-beak densities in small-scale excavation areas would likely remain low until suitable host plants become established.

Coast wallflower: Coast wallflower has been mapped at the former Fort Ord near Monterey Bay, inland in the Marina area, in the Seaside MRA, and east of the IAR MRA (USACE 1992). It was observed for the first time in the Seaside MRA in 2013 by ESCA RP biologists, and 65 plants were discovered in North Range 44 in the IAR MRA in 2013 (Figure 10d). Little is known to date about the distribution of this species at this inland site. One other species that is often found on coastal headlands in the region was also observed nearby, sea-thrift (*Armeria maritima*).

The two 2013 reference areas supported 11 plants, or an average of 5.5 coast wallflower plants per plot.

The Year 1 post-activity vegetation-cut area supporting coast-wallflower encompassed three grid cells, with a mean density of 28 plants per plot and a total of 54 coast wallflower plants.

8.3 Aquatic Feature Monitoring in the Future East Garrison MRA

During 2013, aquatic feature monitoring was conducted in the grenade range aquatic features and encompassed the following: general site reconnaissance, botanical surveys, photo documentation, geological investigations, munitions investigation activities work monitoring, and restoration.

Wetland species in the aquatic features in the grenade range were documented in zonal gradients in 2012, depending on depth and duration of standing water. At the bottom of the aquatic feature, rhizomatous herbaceous perennials predominated, 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 differed 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*). The vegetation zonal boundaries of each of the aquatic feature were mapped using a hand held GPS unit. (Trimble GeoHX). Photo points were established prior to munitions investigation activities.

9.0 HABITAT RESTORATION IMPLEMENTATION AND MONITORING IN THE INTERIM ACTION RANGES MRA

Habitat restoration implementation and monitoring activities for the reporting period are summarized in Appendix A and are based on an HRP 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 2013a). 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 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 and are associated with restoration strategies encompassing monitoring only, passive restoration and passive and active restoration.

Subsequent to completion of soil replacement in Range 47 in December 2013, installation of erosion control BMPs, animal deterrent fencing around the perimeter of the site, and an irrigation system and associated infrastructure was completed prior to planting of over 30,000 container plants in January and February 2013. In addition, seeding of targeted areas in the IAR MRA was also conducted to boost native species cover and re-establish HMP species in suitable locations.

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 for Year 1 are reported in Appendix A. As part of implementation of the HRP, a comprehensive adaptive management plan has been implemented that focuses on managing the active restoration sites. The adaptive management plan utilizes a wide range of qualitative and quantitative monitoring data to evaluate site conditions and determine the need for additional actions. Restoration monitoring and adaptive management will continue in 2014 in North Range 44, South Range 44, and Range 47.

10.0 CONCLUSION

A total of 66.6 acres (27 ha) of habitat area in the FEG and IAR MRAs was affected during the reporting period by munitions investigation and response activities, as a result of vegetation cutting, and small- and large-scale excavations; no habitat area in the Parker Flats MRA was subject to munitions investigation activities during the reporting period.

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 34 vegetation transects, 96 herbaceous species quadrats, and 185 HMP annual plots, along with surveys on 109 acres for HMP herbaceous species provided the ESCA RP Team with valuable baseline and post-activity data to guide in ongoing site management.

Baseline 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 investigation activities. Vegetation recovery will continue to be monitored over the next five years in these areas.

Recovery of native vegetation after vegetation cutting has been rapid in central maritime chaparral, often reaching 25% or greater in the first year after disturbance as stump-sprouting dominant shrubs such as chamise, shaggy-barked manzanita, and brittleleaf manzanita exhibit robust recovery after vegetation cutting. A range of seedlings of obligate-seeding shrubs in these vegetation-cut areas suggest that a mixed population of shrub species will predominate in these chaparral stands in the coming years, including HMP shrubs. In addition, 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 in 2012 to ensure the ongoing presence of seed-producing mature manzanita plants in the FEG MRA, such as Toro manzanita and Hooker's manzanita.

In contrast, native vegetation recovery after excavation (small-scale or large-scale) is dependent on either the existing seedbank in topsoil, if topsoil has been salvaged and replaced, or on gradual colonization of the bare excavated areas by means of seed dispersal into the excavated area over time and the contributions of any remaining seedbank. Often, excavated areas exhibit higher cover and diversity at the immediate edge of the excavation and lower diversity in the center. Initial shrub cover is low, with a relatively higher component of herbaceous species and subshrubs providing a sparse scattering of vegetative cover. Although recovery is slower than in vegetation-cut areas, the presence and cover of dominant species is expected to increase over time.

HMP herbaceous species tend to fluctuate in population size and location through time. Of the four herbaceous species surveyed in habitat parcels in the FEG, IAR, and Parker Flats MRAs in 2013 by ESCA RP biologists, Monterey spineflower had the highest total number of plants, 83,162. Monterey spineflower densities were slightly lower than the 2010 baseline and often higher than the 2012 reference plot in the IAR MRA in vegetation-cut areas and in Year 2 small-scale excavation areas.

Monterey gilia colonies continue to be small and localized in the FEG MRA but a larger robust stand in the IAR MRA supports well over 2,000 plants. Seaside bird's-beak colonies are dependent on host plant interactions and exhibit greater densities after Year 1 vegetation cutting activates in the IAR MRA than in the 2010 baseline, with approximately 5,600 plants counted in grid cells.

A new HMP herbaceous species was observed in both the Seaside and IAR MRAs in 2013, coast wallflower. Sixty-five plants were found flowering and fruiting in North Range 44, with the greatest densities of plants in recently vegetation-cut areas.

Ongoing studies provide insights into the response of these HMP annual species to different disturbance types that may provide guidance on effective ways to minimize, avoid, or mitigate for impacts to sensitive species during munitions investigation activities.

Planned activities in FEG, IAR, Parker Flats and Seaside MRAs in 2014 include weed and erosion control monitoring and abatement. Habitat monitoring activities expected in 2014 for each MRA is listed below.

FEG MRA:

- Vegetation Transects
- Herbaceous Quadrats
- HMP Annual Surveys
- Toro Manzanita Surveys

IAR MRA (SCAs and NCAs):

- Vegetation Transects
- Herbaceous Quadrants
- HMP Annual Surveys

Parker Flats MRA:

- Vegetation Transects
- Herbaceous Quadrants
- HMP Annual Surveys

Habitat restoration implementation in Range 47 SCA in the IAR MRA commenced in December 2012 after soil backfilling was complete. Appendix A provides details on the restoration implementation and monitoring activities in the IAR MRA.

11.0 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. (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.

California Department of Fish and Wildlife (CDFW). 2010. List of Vegetation Alliances and Associations. Vegetation Classification and Mapping Program. Sacramento, CA. September.

———. 2013. Natural Diversity Data Base (CNDDB) RareFind Version 4. Sacramento, California.

California Invasive Plant Council. 2006. California Invasive Plant Inventory. 39 pp.

California Native Plant Society (CNPS). 2013. 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.

_____. 2010c. Group 4, Remedial Investigation / Feasibility Study Work Plan, Volume 1 - Work Plan, Future East Garrison Munitions investigation Area. 8 October. (Fort Ord Administrative Record No. ESCA-0233C).

_____. 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 investigation 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. FVF G4WP-005 modifies the Final Group 4 RI/FS Work Plan, Future East Garrison Munitions investigation Area, Former Fort Ord, Volume 2, Appendix C. Addition of Standard Operating Procedures for Soil and Vegetation Handling in Aquatic Features. September 27, 2012 (Fort Ord Fort Ord Administrative Record No. ESCA-0233C.6)

_____. 2013a. Phase II Interim Action Work Plan Addendum Habitat Restoration Plan, Interim Action Ranges Munitions investigation Area, Former Fort Ord, Monterey County, California. February 2013. (Fort Ord Administrative Record No. ESCA-0261)

_____. 2013b. 2012 Annual Natural Resource Monitoring, Mitigation, and Management Report, Former Fort Ord, Monterey County, California, 29 March. (Fort Ord Administrative Record No. ESCA-0266)

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 investigation Remedial Investigation / Feasibility Study, Parker Flats Munitions investigation Area, Former Fort Ord, California. August 31. (Fort Ord Administrative Record No. OE-0523N)

Natural Resources Conservation Service (NRCS). 2013. 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.

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 investigation Area, Track 2 Munitions investigation Site, Former Fort Ord, California. June 24. (Fort Ord Administrative Record No. OE-0661)

_____. 2009. 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)

———. 2008a. Endangered and Threatened Wildlife and Plants; Designation of Critical habitat for the Monterey Spineflower (*Chorizanthe pungens* var. *pungens*). Federal Register Vol. 73, No. 6. 1525. January 9 (73 FR 1525).

———. 2008b. Monterey Gilia (*Gilia tenuiflora* subsp. *arenaria*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, California. March.

Zander Associates (Zander). 2002. Assessment East Garrison – Parker Flats Land Use Modifications, Fort Ord, California. May 1. (Fort Ord Administrative Record No. BW-2180).

Table 1-1
Habitat Parcel Areas Affected by Munitions Investigation Activities Conducted by ESCA RP

ESCA RP 2013 Annual Natural Resources Report

Munitions Response Area	Total Habitat Acres	Munitions Investigation Activity	Habitat Acres Affected	Total Habitat Acres Affected
Future East Garrison (Parcels E11b.6.1 and E11b.7.1.1)	177.5	Maintenance/ Staging	0	46.5
		Vegetation Cutting	<1	
		MEC Investigation and Clearance	46.5	
		Excavation	<1	
		Stockpiling	<1	
Interim Action Ranges SCAs/NCAs	206	Maintenance/ Staging	<1	20.1
		Vegetation Cutting	2.5	
		MEC Investigation and Clearance	20.1	
		Excavation	12.4	
		Stockpiling	0	
Munitions Response Area	**Total Habitat Acres**	**Munitions Investigation Activity**	**Parker Flats RQA Development Parcel Acres Affected**	**Total Parker Flats RQA Development Acres Affected**
Parker Flats RQA	N/A	Maintenance/ Staging	<1	12
		Vegetation Cutting	10.3	
		MEC Investigation and Clearance	12	
		Excavation	0	
		Stockpiling	0	

Table 1-2
Vegetation Monitoring Activities in Habitat Parcels for ESCA RP MRAs
2008 - 2013

ESCA RP 2013 Annual Natural Resources Report

Munitions Response Area	Monitoring Activity	Number of Monitoring Events per Year												Total Baseline Transects and HMP Annuals Plots	Post-activity Transects, HMP Annuals Plots and Surveys	Total Transects, HMP Annuals Plots, and Surveys
		2008		2009		2010		2011		2012		2013				
		Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity			
Future East Garrison	Vegetation transects	-	-	-	-	-	-	39	-	4	-	-	6	**43**	**6**	**49**
	HMP annual plots	-	-	-	-	5	-	-	-	-	5	-	6	**5**	**11**	**16**
	HMP annual surveys (acres)	-	-	-	-	-	-	-	-	-	-	-	64.7	**0**	**64.7**	**64.7**
	Toro manzanita surveys (acres)	-	-	-	-	-	-	-	-	-	29	-	26.4	**0**	**55.4**	**55.4**
Interim Action Ranges-Army Remediation Areas	Vegetation transects	-	30	-	-	-	20	-	-	-	-	-	-	**0**	**50**	**50**
	Herbaceous quadrats	-	12	-	-	-	-	-	-	-	-	-	-	**0**	**12**	**12**
	HMP annual plots	-	63	-	-	-	63	-	-	-	-	-	-	**0**	**126**	**126**
Interim Action Ranges-ESCA Remediation Areas (SCAs/NCAs)	Vegetation transects	-	-	-	-	17	-	2	-	-	16	-	28	**19**	**44**	**63**
	Herbaceous quadrats	-	-	-	-	-	-	-	6	-	53	-	96	**0**	**155**	**155**
	HMP annual plots	-	-	-	-	187	-	-	-	-	44	-	173	**187**	**217**	**404**
	HMP annual surveys (acres)	-	-	-	-	-	-	-	-	-	-	-	27.5	**0**	**28**	**27.5**
Parker Flats Phase II	Vegetation transects	11	-	-	-	-	-	-	-	-	11	-	-	**11**	**11**	**22**
	Herbaceous quadrats	-	-	-	-	-	-	-	-	-	6	-	-	**0**	**6**	**6**
	HMP annual plots	10	-	-	-	-	-	-	10	-	10	-	6	**10**	**26**	**36**
	HMP annual surveys (acres)	-	-	-	-	-	-	-	-	-	-	-	16.8	**0**	**17**	**16.8**
County North	HMP annual plots	-	-	15	-	-	-	-	-	-	-	-	-	**15**	**0**	**15**
Total Vegetation Transects		**11**	**30**	**-**	**-**	**17**	**20**	**41**	**-**	**4**	**27**	**-**	**34**	**73**	**111**	**184**
Total Herbaceous Quadrats		**0**	**12**	**-**	**-**	**-**	**-**	**-**	**6**	**-**	**59**	**-**	**96**	**0**	**77**	**77**
Total HMP Annual Plots		**10**	**63**	**15**	**-**	**192**	**63**	**-**	**10**	**-**	**59**	**-**	**185**	**217**	**380**	**597**
Total Acres for HMP Annual Surveys		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**109**	**-**	**-**	**0**
Total Acres for Toro Manzanita surveys		-	-	-	-	-	-	-	-	-	**29**	-	**26**	-	**29**	**29**

Table 2-1
HMP Species Occurrence in ESCA RP MRA Habitat Parcels for ESCA RP MRAs

2013 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					
Ambystoma californiense	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
Rana draytonii	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					
Charadrius nivosus nivosus	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					
Euphilotes enoptes smithi	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
Linderiella occidentalis	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					
Sorex ornatus salarius	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					
Anniella pulchra nigra	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					
Chorizanthe pungens var. *pungens*	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, 2010-2013 FEG, 2008-2013 IAR, 2008-2013 PF, 2012-2013 SEA
Chorizanthe robusta var. *robusta*	robust spineflower	Federally Endangered/CNPS 1B.1	Coastal strand, coastal scrub areas below 300 meters elevation from Marin to Monterey Counties.	None	None
Cordylanthus rigidus ssp. *littoralis*	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	2013 FEG, 2008-2013 IAR
Gilia tenuiflora ssp. *arenaria*	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	2008-2013 IAR, 2010-2013 FEG, 2010 SEA
Herbaceous Perennials					
Erysimum ammophilum	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	2013 IAR, 2013 SEA
Piperia yadoni	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					
Arctostaphylos hookeri ssp. *hookeri*	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	2012-2013 FEG, 2012-2013 PF
Arctostaphylos montereyensis	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	2010-2013 FEG, 2008-2013 PF
Arctostaphylos pumila	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	2008-2013 IAR, 2008-2013 SEA
Ceanothus rigidus	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	2010-2013 FEG, 2008-2013 IAR
Ericameria fasciculata	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	2010-2013 FEG, 2008-2013 IAR

1 Occurrence records from 1992 Fort Ord Baseline Flora and Fauna

MRA Abbreviations (* habitat parcel present)
CN = County North*
CSUMB = California State University Monterey Bay
DRO/M = Del Rey Oaks/ Monterey*
FEG = Future East Garrison*
IAR = Interim Action Ranges*
LS = Laguna Seca Parking
MOUT = Military Operations Urban Training Site
PF = Parker Flats*
SEA = Seaside

Table 3-1
Observed Plant Species in ESCA RP MRAs 2008-2013

ESCA RP 2013 Annual Natural Resources Report

Scientific Name	Common Name	HMP species	CNPS Listing status	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA	Notes
Trees											
Acacia baileyana	Cootamunda wattle, Bailey's acacia						x				
Acacia melanoxylon	blackwood acacia			lim			x		x		
Arbutus menziesii	**Pacific madrone**					**x**	**x**	**x**			
Eucalyptus camaldulensis	red river gum			lim			x				
Hesperocyparis macrocarpa	**Monterey cypress**		**1B.2**				**x**	**x**	**x**		may or may not be native to this location
Myoporum laetum	myoporum			mod			x		x		
Pinus radiata	**Monterey pine**		**1B.1**			**x**	**x**	**x**	x	x	may or may not be native to this location
Populus trichocarpa	**black cottonwood**					**x**	**x**				volunteer in restoration area
Quercus agrifolia	**coast live oak**				**x**	**x**	**x**	**x**	**x**	**x**	
Salix lasiolepis	**arroyo willow**				**x**	**x**	**x**	**x**	**x**		
Shrubs and Subshrubs											
Acmispon glaber	**deerweed**				**x**	**x**	**x**	**x**	**x**	**x**	
Adenostoma fasciculatum	**chamise**				**x**	**x**	**x**	**x**	**x**	**x**	
Arctostaphylos crustacea* subsp. *crustacea	**brittleleaf manzanita**						**x**	**x**			
Arctostaphylos hookeri	**Hooker's manzanita**	**HMP**	**1B.2**				**x**	**x**		**x**	
Arctostaphylos montereyensis	**Toro manzanita**	**HMP**	**1B.2**				**x**	**x**		**x**	
Arctostaphylos pajaroensis	**Pajaro manzanita**						**x**				
Arctostaphylos pumila	**sandmat manzanita**	**HMP**	**1B.2**		**x**	**x**		**x**	**x**	**x**	
Arctostaphylos tomentosa* subsp. *tomentosa	**shaggy-barked manzanita**				**x**	**x**		**x**	**x**	**x**	
Artemisia californica	**California sagebrush**				**x**	**x**	**x**	**x**	**x**	**x**	
Baccharis pilularis subsp. consanguinea	**coyote bush, coyote brush**				**x**	**x**	**x**	**x**	**x**	**x**	
Ceanothus dentatus	**dwarf ceanothus**				**x**	**x**	**x**	**x**	**x**	**x**	
Ceanothus incanus	**coast whitethorn**						**x**				
Ceanothus rigidus	**Monterey ceanothus**	**HMP**	**4.2**		**x**	**x**	**x**	**x**	**x**	**x**	
Ceanothus thyrsiflorus	**blue blossom**						**x**	**x**			
Cistus incanus	hairy rock-rose						x	x		x	
Ericameria ericoides	**dune-heather, mock-heather**				**x**	**x**	**x**	**x**	**x**	**x**	
Ericameria fasciculata	**Eastwood's ericameria, Eastwood's goldenbush**	**HMP**	**1B.1**		**x**	**x**	**x**	**x**	**x**	**x**	
Eriodictyon californicum	**California yerba santa**							**x**			
Eriogonum fasciculatum var. foliolosum	**California buckwheat**							**x**			
Eriophyllum confertiflorum	**golden yarrow**				**x**	**x**	**x**	**x**	**x**	**x**	
Frangula californica	**California coffeeberry**				**x**	**x**	**x**	**x**	**x**	**x**	
Garrya elliptica	**coast silk-tassel**				**x**	**x**	**x**	**x**	**x**		
Helianthemum scoparium	**rush-rose**				**x**	**x**	**x**	**x**	**x**	**x**	
Heteromeles arbutifolia	**toyon**				**x**	**x**	**x**	**x**	**x**	**x**	
Lepechinia calycina	**pitcher sage**				**x**	**x**	**x**	**x**			
Lupinus arboreus	**coastal bush lupine**				**x**	**x**	**x**	**x**	**x**	**x**	
Lupinus chamissonis	**silver bush lupine**				**x**	**x**	**x**	**x**	**x**	**x**	
Mimulus aurantiacus	**sticky monkeyflower**				**x**	**x**	**x**	**x**	**x**	**x**	
Pyracantha	firethorn			lim				x			
Ribes malvaceum	**chaparral currant**				**x**	**x**	**x**	**x**	**x**	**x**	
Ribes speciosum	**fuchsia-flowered gooseberry**				**x**	**x**	**x**	**x**	**x**	**x**	
Rubus ursinus	**California blackberry**						**x**	**x**	**x**		
Salvia mellifera	**black sage**				**x**	**x**	**x**	**x**	**x**	**x**	
Solanum umbelliferum	**blue witch nightshade**				**x**	**x**		**x**	**x**		
Symphorocarpus mollis	**creeping snowberry**				**x**	**x**	**x**	**x**	**x**		
Toxicodendron diversilobum	**poison-oak**				**x**	**x**	**x**	**x**	**x**	**x**	
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)											
Achillea millefolium	**common yarrow**				**x**	**x**	**x**	**x**	**x**	**x**	
Acmispon heermannii var. orbicularis	**wooly lotus**				**x**	**x**	**x**		**x**		
Acmispon strigosus	**Bishop's lotus**				**x**	**x**	**x**				
Agrostis exarata* var. *pacifica	**spike bentgrass**						**x**	**x**			
Agrostis pallens	**thin grass**							**x**	**x**		
Aira caryophyllea	common silver-hair grass				x	x	x	x	x		
Alopecurus saccatus	Pacific foxtail						**x**				Found in aquatic features
Amsinckia intermedia	**common fiddleneck**				**x**	**x**					
Anagallis arvensis	scarlet pimpernel				x	x	x	x	x	x	
Antirrhinum majus	snapdragon					x					cultivated plant, appeared in container planting
Apiastrum angustifolium	**wild celery**				**x**	**x**	**x**			**x**	
Armeria maritima* subsp. *californica	**California sea pink, sea thrift**				**x**						

Table 3-1
Observed Plant Species in ESCA RP MRAs 2008-2013

ESCA RP 2013 Annual Natural Resources Report

Scientific Name	Common Name	HMP species	CNPS Listing status	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA	Notes
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)											
Artemisia douglasiana	**mugwort**					**x**	**x**				
Artemisia dracunculus	**tarragon**								**x**		
Artemisia pycnocephala	**sandhill sagebrush, beach sagewort**								**x**		
Avena barbata	slender wild oat				x	x	x	x	x	x	
Avena fatua	wild oat						x	x			
Briza maxima	rattlensnake grass					x	x	x	x	x	
Briza minor	little rattlesnake grass						x				
Bromus carinatus	**California brome**						**x**		**x**		
Bromus diandrus	ripgut brome				x	x	x	x	x	x	
Bromus hordeaceus	soft chess				x	x	x	x	x	x	
Bromus madritensis subsp. *rubens*	red brome			high	x	x	x	x	x	x	
Calandrinia ciliata	**red maids**				**x**	**x**	**x**	**x**			
Calochortus albus* var. *albus	**fairy lanterns, globe lily**				**x**	**x**	**x**				
Calyptridium monandrum	**pussy paws**				**x**	**x**					
Camissonia contorta	**contorted suncups**				**x**	**x**					
Camissoniopsis cheiranthifolia	**beach-primrose**					**x**					
Camissoniopsis micrantha	**small suncups**				**x**	**x**	**x**	**x**	**x**		
Cardionema ramosissimum	**sand mat**				**x**	**x**	**x**	**x**	**x**		
Carduus pycnocephalus	Italian thistle								x		
Carex brevicaulis	**short-stemmed sedge**						**x**				
Carex globosa	**round-fruited sedge**				**x**	**x**	**x**	**x**	**x**		
Carpobrotus edulis	hottentot fig/ice plant			high	x	x	x	x	x	x	
Castilleja exserta* subsp. *latifolia	**purple owl's clover**				**x**	**x**			**x**		
Caulanthus lasiophyllus	**California mustard**				**x**	**x**					
Centaurea melitensis	tocalote			mod	x	x	x	x	x	x	
Chlorogalum pomeridianum* var. *divaricatum	**soap plant/amole**						**x**				
Chorizanthe diffusa	**diffuse chorizanthe**				**x**	**x**	**x**	**x**	**x**		
Chorizanthe douglasii	**Douglas' spineflower**						**x**				
Chorizanthe pungens* var. *pungens	**Monterey spine-flower**	**HMP**	**1B.1**		**x**	**x**	**x**	**x**	**x**		
Cirsium occidentale* var. *occidentale	**cobweb thistle**				**x**	**x**	**x**		**?**		
Cirsium occidentale* var. *venustum	**Venus thistle**								**x**		
Cirsium vulgare	bull thistle			mod		x	x		x		
Clarkia lewisii	**Lewis' clarkia**		**4.3**					**x**			
Clarkia amoenea	**farewell-to-spring**					**x**					California native wildflower but not expected to be native in this location; appeared amongst container plantings
Claytonia perfoliata	**miner's lettuce**				**x**	**x**					
Clinopodium douglasii	**yerba buena**						**x**	**x**			
Collinsia heterophylla	**Chinese houses**					**x**					
Conium maculatum	poison-hemlock			mod			x			x	
***Cordylanthus rigidus* subsp.**	**seaside bird's-beak**	**HMP**	**1B.1**		**x**	**x**	**x**		**x**		
Corethrogyne filaginifolia	**California aster**				**x**	**x**	**x**	**x**	**x**	**x**	
Cortaderia jubata	pampas grass, jubata grass			high	x	x	x	x	x	x	
Cotula coronopifolia	brass buttons			lim			x				Found in aquatic features
Crassula connata	**pygmy weed**				**x**	**x**	**x**				
Croton californicus	**California croton**				**x**	**x**	**x**	**x**	**x**	**x**	
Cryptantha clevelandii* var. *florosa	**coastal cryptantha**				**x**	**x**	**x**		**?**		
Cryptantha micromeres	**small-flowered cryptantha**				**x**	**x**	**x**				
Cryptantha microstachys	**Tejon cryptantha**					**x**					
Cyperus eragrostis	**tall flatsedge**						**x**				Found in aquatic features
Daucus pusillus	**rattlesnake weed**				**x**	**x**	**x**				
Deinandra [Hemizonia] corymbosa subsp. corymbosa	**coast tarweed**						**x**				
Deinandra increscens* subsp. *increscens	**grassland tarweed**				**x**	**x**	**x**	**x**	**x**	**x**	
Deschampsia danthonioides	**annual hairgrass**						**x**				
Dichelostemma capitatum	**blue dicks, wild hyacinth**				**x**	**x**	**x**	**x**			
Dodecatheon clevelandii* var. *sanctarum	**padre's shooting stars**						**x**				
Drymocallis glandulosa* var. *glandulosa	**sticky cinquefoil**				**x**	**x**	**x**				
Dudleya cymosa subsp. pumila	**canyon liveforever**								**?**		
Dudleya lanceolata	**lance-leaved live-forever**						**x**	**x**	**?**		
Eleocharis acicularis var. acicularis	**slender spikerush**						**x**				Found in aquatic features
Eleocharis macrostachya	**common spikerush**						**x**				Found in aquatic features
Elymus glaucus	**western ryegrass**				**x**	**x**	**x**	**x**	**x**	**x**	
Epilobium brachycarpus	**tall annual willowherb**					**x**			**x**		
Epilobium canum	**California-fuchsia**					**x**					volunteer in restoration area
Eriastrum virgatum	**wand woollystar**		**4.3**		**x**	**x**	**x**				
Erigeron canadensis	**horseweed**				**x**	**x**	**x**	**x**	**x**	**x**	
Erigeron foliosus var. foliosus	**leafy daisy**				**x**						
Eriogonum nudum* var. *auriculatum	**nude buckwheat**						**x**				
Erodium botrys	long-beaked filaree				x	x	x	x	x	x	
Erodium cicutarium	red-stemmed filaree			lim	x	x		x			

Table 3-1
Observed Plant Species in ESCA RP MRAs 2008-2013

ESCA RP 2013 Annual Natural Resources Report

Scientific Name	Common Name	HMP species	CNPS Listing status	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA	Notes
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)											
Erysimum ammophilum	**coast wallflower**	**HMP**	**1B.2**		**x**						Also in lead remediation area
Eschscholzia californica	**California poppy**				**x**	**x**			**x**		
Euphorbia peplus	petty spurge					x					
Euthamia occidentalis	**western goldenrod**						**x**				Found in aquatic features
Festuca microstachya	**small fescue**				**x**	**x**					
Festuca myuros	rattail fescue			mod	x	x	x	x	x		
Festuca octoflora	**six-weeks fescue**				**x**	**x**	**x**				
Festuca perennis	Italian rye grass			mod			x				
Fritillaria affinis	**checker lily, Mission bells**				**x**						
Galium californicum	**California bedstraw**				**x**	**x**	**x**				
Galium porrigens* var. *porrigens	**climbing bedstraw**				**x**	**x**	**x**	**x**	**x**	**x**	
Gamochaeta ustulata	**purple cudweed**				**x**	**x**	**x**	**x**			
Gastridium phleoides	nit grass						x				
Geranium dissectum	cut-leaved geranium						x				
Gilia capitata* subsp. *abrotanifolia	**ball gilia**										California native wildflower; appeared amongst container plantings
Gilia tenuiflora* subsp. *arenaria	**Monterey [sand] gilia**	**HMP**	**1B.2**		**x**	**x**	**x**		**x**		
Gilia tricolor	**bird's eyes**					**x**					California native wildflower; appeared amongst container plantings
Helminthotheca echioides	bristly ox-tongue			lim		x					
Herniaria hirsuta subsp. *cinerea*	hairy rupturewort					x					
Heterotheca grandifolia	**telegraph weed**				**x**	**x**	**x**	**x**	**x**	**x**	
Hordeum marinum subsp. *gussoneanum*	Mediterranean barley			mod			x				Found in aquatic features
Hordeum murinum	foxtail barley			mod							
Horkelia cuneata var cuneata	**coast horkelia, wedge-leaved horkelia**				**x**	**x**	**x**	**x**	**x**	**x**	
Hypochaeris glabra	smooth cat's ears			lim	x	x	x	x			
Hypochaeris radicata	cat's ears			mod	x	x	x				
Juncus bufonius* var. *occidentalis	**toad rush**						**x**				Found in aquatic features
Juncus effusus* var. *pacificus	**bog rush**					**x**					volunteer in restoration area
Juncus occidentalis	**western rush**						**x**				Found in aquatic features
Juncus phaeocephalus* var. *phaeocephalus	**brown-headed rush**						**x**				Found in aquatic features
Lagurus ovatus	hare's tail grass						x	x			
Lathyrus vestitus* var. *vestitus	**wild sweet pea, Pacific pea**									**x**	
Layia hieraceioides	**tall layia**						**x**				
Layia platyglossa	**tidy tips**				**x**	**x**					
Lamarckia aurea	goldentop grass										
Lepidium nitidum	**common pepperweed**					**x**					
Leptochloa fusca* subsp. *fascicularis	**bearded sprangletop**					**x**					
Lessingia pectinata* var. *pectinata	**common lessingia**				**x**	**x**	**x**	**x**			
Limonium sinuatum	wavyleaf sealavender, statice						x				
Logfia gallica	narrow-leaved filago				x	x	x	x	x	x	
Logfia filaginoides	**California filago**				**x**	**x**	**x**				
Lomatium parvifolium	**coastal biscuitroot**		**4.2**		**x**		**x**		**x**		
Lupinus bicolor	**miniature lupine**						**x**				
Lupinus concinnus	**elegant lupine**					**x**					
Lupinus nanus	**sky lupine**				**x**	**x**					
Lupinus truncatus	**blunt-leaved lupine**					**x**	**x**				
Luzula comosa	**Pacific wood rush**						**x**	**x**			
Lythrum hyssopifolia	hyssop-leaved loosestrife			lim			x				Found in aquatic features
Madia exigua	**small tarweed**				**x**	**x**	**x**				
Madia sativa	**coast tarweed**							**x**			
Marah fabaceus	**wild cucumber**				**x**	**x**	**x**				
Medicago polymorpha	bur-clover			lim			x				
Melica imperfecta	**Coast Range melic**				**x**	**x**	**x**				
Melilotus indicus	yellow sweet-clover					x	x		x		Found in aquatic features
Mimulus cardinalis	**scarlet monkeyflower**					**x**					California native wildflower but not expected to be native in this habitat; appeared amongst container plantings

Table 3-1
Observed Plant Species in ESCA RP MRAs 2008-2013

ESCA RP 2013 Annual Natural Resources Report

Scientific Name	Common Name	HMP species	CNPS Listing status	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA	Notes
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)											
Monardella undulata	**curly-leaved monardella**		**4.2**		**x**	**x**					
Navarretia hamata subsp. parviloba	**hooked navarretia**				**x**	**x**	**x**		**x**		
Navarretia intertexta	**needle-leaved navarretia**				**x**		**x**				
Nemophila menziesii	**baby blue-eyes**					**x**					
Nuttallanthus texanus	**toad-flax**				**x**	**x**	**x**				
Orobanche bulbosa	**chaparral broomrape**				**x**						
Oxalis pilosa	**hairy wood sorrel**					**x**					
Papaver californicum	**fire poppy**						**x**				
Parapholis incurva	sicklegrass					x					
Pectocarya penicillata	**winged combseed**				**x**	**x**					
Petrorhagia dubia	hairypink				x	x					
Phacelia campanularis	**desert bluebells**					**x**					California native wildflower but not expected to be native in this location; appeared amongst container plantings
Phacelia distans	**wild heliotrope**				**x**						
Phacelia douglasii	**Douglas' phacelia**				**x**	**x**					
Piperia michaelii	**Michael's rein-orchid**		**4.2**				**x**		**x**		
Plagiobothrys collinus* var. *fulvescens	**rusty-haired popcorn flower**				**x**	**x**					
Plantago coronopus	cut-leaved plantain				x		x		x		
Plantago erecta	**California plantain**				**x**	**x**	**x**				
Poa annua	annual bluegrass					x					
Poa secunda	**one-sided bluegrass**				**x**					**x**	
Pogogyne serpylloides	**thymeleaf mesamint**						**x**				Found in aquatic features
Polycarpon depressum	**California polycarp**						**x**				
Polygala californica	**California milkwort**						**x**				
Polypogon monspeliensis	rabbitsfoot grass			lim		x	x				Found in aquatic features
Pseudognaphalium beneolens	**fragrant everlasting**				**x**	**x**	**x**				
Pseudognaphalium californicum	**California everlasting**				**x**	**x**	**x**		**x**		
Pseudognaphalium canescens	**white everlasting**							**x**	**x**		
Pseudognaphalium ramosissimum	**pink everlasting**				**x**	**x**	**x**	**x**	**x**	**x**	
Pseudognaphalium stramineum	**cottonbatting plant**				**x**	**x**	**x**				
Psilocarphus tenellus	**slender woolly marbles**					**x**	**x**				
Pterostegia drymarioides	**fairy mist**				**x**	**x**	**x**				
Rumex acetosella	sheep sorrel			mod	x	x	x	x	x	x	
Rumex crispus	curly dock			lim			**x**				Found in aquatic features
***Rumex salicifolius* subsp.**	**willow dock**						**x**				Found in aquatic features
Sagina apetela	**sticky pearlwort**					**x**					
Sanicula crassicaulis	**Pacific sanicle**						**x**				
Sanicula laciniata	**coast sanicle**						**x**				
Senecio aphanactis	**chaparral ragwort**		**2B.2**		**x**						
Senecio glomeratus	cut-leaved fireweed			mod		x	x	x	x	x	
Senecio vulgaris	common ragwort					x					
Silene gallica	windmill pink				x	x	x				
Silybum marianum	milk thistle			lim					x		
Sisymbrium orientale	Indian hedgemustard					x					
Sisyrinchium bellum	**blue-eyed grass**						**x**				
Solidago californica	**California goldenrod**							**x**			
Soliva sessilis	South American soliva						x				Found in aquatic features
Sonchus asper subsp. asper	prickly sow-thistle				x	x	x	x	x		
Sonchus oleraceus	common sow-thistle				x	x	x	x	x	x	
Spergularia rubra	red sand-spurrey					x	x				
Stachys bullata	**wood mint**									**x**	
Stephanomeria virgata* subsp. *virgata	**tall milk aster**										
Stipa lepida	**foothill needlegrass**						**x**	**x**			
Stipa pulchra	**purple needlegrass**				**x**	**x**	**x**	**x**			
Stylocline gnaphalioides	**everlasting neststraw**				**x**	**x**	**x**				
Taraxia [Camissonia] ovata	**suncups**				**x**	**x**	**x**				
Toxicoscordion fremontii	**Fremont's star lily**				**x**						
*Tribolium obliterum**	cape grass						x				Found in aquatic features
Trifolium angustifolium	narrow-leaved crimson clover						x	x		x	
Trifolium dubium	shamrock clover						x				
Trifolium gracilentum	**pinpoint clover**				**x**		**x**				
Trifolium hirtum	rose clover			mod		x	x	x	x		
Trifolium microcephalum	**hairy clover, small-headed clover**					**x**					
Trifolium wormskoldii	**tomcat clover**						**x**				
Triteleia ixioides* subsp. *ixioides	**golden brodiaea, prettyface**						**x**				
Triodanis perfoliata	**venus' looking-glass**						**x**				
Typha domingensis	**southern cattail**						**x**				Found in aquatic features
Uropappus lindleyi	**silver puffs**				**x**	**x**	**x**				
Vicia sp.	vetch						**x**				
Viola cultivar	pansy					x					appeared among container plantings
Zeltnera davyi	**Davy's centaury**						**x**				

Table 3-1
Observed Plant Species in ESCA RP MRAs 2008-2013

ESCA RP 2013 Annual Natural Resources Report

Scientific Name	Common Name	HMP species	CNPS Listing status	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA	Notes
Ferns and Fern-relatives											
Dryopteris arguta	**coastal wood fern**						**x**	**x**			
Pentagramma triangularis* subsp. *triangularis	**goldenback fern**						**x**				
Pteridium aquilinum* var. *pubescens	**western bracken fern**				**x**		**x**	**x**	**x**		

Notes:
Native species in bold

Species and locations noted in this table are for work areas, including monitoring areas and ingress/egress routes; this is not a comprehensive list

Status Codes:

California Native Plant Society (CNPS)

Rare Plant Rank (RPR)
RPR 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere

RPR 2A: Plants Presumed Extirpated in California, but More Common Elsewhere

RPR 2B: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

RPR 3: Plants About Which More Information is Needed - A Review List

RPR 4: Plants of Limited Distribution - A Watch List

Extensions to List Categories

0.1 - Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)

0.2 – Moderately threatened in California (20-80% occurrences threatened/moderate degree and immediacy of threat)

0.3 – Not very threatened in California (<20% of occurrences threatened/low degree and immediacy of threat or no current threats known)

California Invasive Plant Council (Cal-IPC) ratings:
• high – severe ecological impacts, high rates of dispersal and establishment.
• moderate – substantial and apparent ecological impacts , moderate to high rates of dispersal, establishment
• limited – invasive but impacts not widespread statewide, low to moderate rates of dispersal, may be locally

Table 3-2
Observed Wildlife Species in ESCA RP MRAs

ESCA RP 2013 Annual Natural Resource Report

Scientific Name	Common Name	HMP species	IAR MRA Range 44	IAR MRA Range 47	IAR MRA	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA
MAMMALS									
Canis latrans	Coyote		x	x	x	x	x	x	x
Dipodomys heermanni	Heerman's kangaroo rat							x	
Lepus californicus	Black-tailed jackrabbit		x	x	x	x	x	x	x
Lynx rufus	Bobcat		x	x	x	x	x	x	x
Mus musculus	House mouse				x				
Neotoma fuscipes	Dusky-footed wood rat		x		x	x	x	x	
Odocoileus hemionus	Mule deer		x	x	x	x	x	x	x
Procyon lotor	Raccoon					x		x	
Sorex ornatus salarius	Monterey ornate shrew	x							
Spermophilus beecheyi	California ground squirrel							x	
Sylvilagus audubonii	Desert cottontail		x	x				x	
Sylvilagus bachmani	Brush rabbit							x	
Thomomys bottae	Botta's pocket gopher			x				x	
Urocyon cinereoargenteus	Gray fox					x		x	
REPTILES AND AMPHIBIANS									
Ambystoma tigrinum californiense	California tiger salamander	x				x			
Aneides lugubris	Arboreal salamander				x				
Anneilla pulchra nigra	California black legless lizard	x	x						
Bufo boreas	Western toad					x			
Crotalus oreganus oreganus	Northern Pacific rattlesnake		x	x	x	x	x		
Lampropeltis getulus	Common kingsnake					x			
Phrynosoma blainvillii	coast horned lizard		x	x	x	x			
Pituophis melanoleucus	Gopher snake		x	x	x	x	x		
Pseudacris regilla	Pacific treefrog					x			
Rana catesbeiana	Bullfrog					x			
Sceloporus occidentalis	Western fence lizard		x	x	x	x	x	x	x
Thamnophis sirtalis	Common garter snake					x			
Uta stansburiana	Side-blotched lizard							x	
BIRDS									
Accipiter cooperii	Cooper's hawk					x		x	
Amphispiza belli	Bell's sage sparrow			x				x	
Anas platyrhynchos	Mallard duck					x			
Aphelocoma californica	Western scrub jay		x	x	x	x	x	x	

Table 3-2
Observed Wildlife Species in ESCA RP MRAs

ESCA RP 2013 Annual Natural Resource Report

Scientific Name	Common Name	HMP species	IAR MRA Range 44	IAR MRA Range 47	IAR MRA	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA
BIRDS									
Baeolophus inornatus	Oak titmouse					x		x	
Buteo lineatus	Red-shouldered hawk					x			
Buteo jamaicensis	Red-tailed hawk		x	x	x	x	x	x	
Callipepla californica	California quail		x	x	x	x	x	x	
Calypte anna	Anna's hummingbird		x	x	x	x	x	x	
Carduelis psaltria	Lesser goldfinch		x	x	x	x	x		
Carpodacus mexicanus	House finch					x		x	
Carpodacus purpureus	Purple finch					x			
Cathartes aura	Turkey vulture			x					
Chamaea fasciata	Wrentit		x	x	x	x	x	x	
Charadrius alexandrinus niv	Western snowy plover	x							
Charadrius vociferus	Killdeer		x	x	x	x	x		
Circus cyaneus	Northern harrier		x	x	x				
Colaptes auratus	Northern flicker							x	
Corvus brachyrhynchos	American crow		x	x	x	x	x	x	x
Dendroica coronata	Yellow-rumped warbler							x	
Dendroica occidentalis	Hermit warbler							x	
Dendroica townsendi	Townsend's warbler							x	
Empidonax difficilis	Pacific-slope flycatcher					x			
Falco sparverius	American kestrel		x	x	x	x	x		
Gallinago gallinago	Common snipe					x			
Geococcyx californianus	Greater roadrunner		x	x	x				
Hirundo rustica	Barn swallow		x	x	x	x			
Junco hyemalis	Dark-eyed junco					x		x	
Lanius ludovicianus	Loggerhead shrike							x	
Meleagris gallapavo	Wild turkey					x	x		
Mimus polyglottos	Northern mockingbird							x	
Myiarchus cinerascens	Ash-throated flycatcher					x			
Petrochelidon pyrrhonota	Cliff swallow					x			
Phalacrocorax auritus	Double-crested cormorant								
Phalaenoptilus nuttallii	Common poorwill					x			
Picoides nuttallii	Nuttall's woodpecker							x	
Pipilo crissalis	California towhee					x		x	
Pipilo maculatus	Spotted towhee					x		x	
Poecile rufescens	Chestnut-backed chickadee							x	
Psaltriparus minimus	Bushtit					x		x	

Table 3-2
Observed Wildlife Species in ESCA RP MRAs

ESCA RP 2013 Annual Natural Resource Report

Scientific Name	Common Name	HMP species	IAR MRA Range 44	IAR MRA Range 47	IAR MRA	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA
BIRDS									
Sayornis saya	**Say's phoebe**							x	
Sturnella neglecta	**Western meadowlark**							x	
Thryomanes bewickii	**Bewick's wren**					x		x	
Toxostoma redivivum	**California thrasher**		x	x	x			x	
Vireo huttoni	**Hutton's vireo**					x		x	
Vermivora ruficapilla	**Nashville warbler**								
Zenaida macroura	**Mourning dove**		x	x	x	x	x	x	
Zonotrichia atricapilla	**Golden-crowned sparrow**							x	
INVERTEBRATES									
Linderiella occidentalis	**California linderiella**	x				x			

Native species in bold

Table 3-3
Future East Garrison MRA
Grenade Range: Observed Plant Species in Aquatic Features Subject to Sifting
2011-2013
ESCA RP 2013 Annual Natural Resources Report

Scientific Name	Common Name	Wetland Indicator Status[1]	AF09-1	AF09-1B	AF09-2
Acmispon glaber	**deerweed**	**NL**	**x**	**x**	**x**
Agrostis exarata* var. *pacifica	**spike bentgrass**	**FACW**	**x**		**x**
Aira caryophyllea	common silver-hair grass	FACU			x
Alopecurus saccatus	Pacific foxtail	OBL	x		
Anagallis arvensis	scarlet pimpernel	NL	x	x	x
Arctostaphylos montereyensis	**Toro manzanita**	**NL**			**x**
Baccharis pilularis* subsp. *consanguinea	**coyote brush**	**NL**	**x**	**x**	**x**
Briza minor	little rattlesnake grass	NL			x
Bromus diandrus	ripgut brome	NL	x		
Bromus hordeaceus	soft chess	NL	x		
Bromus madritensis subsp. *rubens*	red brome	NL	x		
Carex c.f. brevicaulis	**short-stemmed sedge**	**NL**		**x**	
Crassula connata	**pygmy weed**	**FAC**		**x**	
Eleocharis acicularis* var. *acicularis	**slender spikerush**	**OBL**	**x**	**x**	
Eleocharis bella	**beautiful spikerush**	**FACW**	**x**		**x**
Eleocharis macrostachya	**common spikerush**	**OBL**	**x**		**x**
Euthamia occidentalis	**western goldenrod**	**FACW**	**x**		
Festuca myuros	rattail fescue	NL		x	x
Festuca perenne	annual wild rye	NL			x
Gamochaeta ustulata	**purple cudweed**	**NL**	**x**	**x**	**x**
Gastridium phleoides	nit grass	FACU			x
Geranium dissectum	cut-leaved geranium	NL	x		
Helianthemum scoparium	**rush-rose**	**NL**			**x**
Hypochaeris glabra	smooth cat's ear	NL	x		x
Juncus bufonius* var. *occidentalis	**toad rush**	**FACW**	**x**	**x**	**x**
Juncus occidentalis	**western rush**	**FACW**	**x**	**x**	**x**
Juncus phaeocephalus* var. *phaeocephalus	**brown-headed rush**	**FACW**	**x**	**x**	**x**
Logfia [Filago] gallica	narrow-leaved filago	NL	x	x	x
Luzula comosa	**Pacific wood rush**	**FAC**			**x**
Lythrum hyssopifolia	hyssop-leaved loosestrife	OBL	x	x	x
Madia exigua	**small tarweed**	**NL**	**x**	**x**	**x**
Medicago polymorpha	bur-clover	NL	x		
Navarretia hamata* subsp. *parviloba	**hooked navarretia**	**NL**		**x**	
Plantago coronopus	cut-leaved plantain	FACW	x		x
Plantago erecta	**California plantain**	**NL**	**x**		**x**
Polypogon monspeliensis	rabbitsfoot grass	FACW	x	x	x
Psilocarphus brevissimus* var. *brevissimus	**woolly marbles**	**FACW**	**x**	**x**	
Psilocarphus tenellus	**slender woolly marbles**	**OBL**		**x**	**x**
Quercus agrifolia	**coast live oak**	**NL**			**x**
Rubus ursinus	**California blackberry**	**FACU**	**x**		
Salix lasiolepis	**arroyo willow**	**FACW**	**x**		
Soliva sessilis	South American soliva	FACU	x		
Sonchus asper subsp. *asper*	prickly sow-thistle	FACU	x		
Tribolium obliterum	cape grass	NL	x	x	
Typha latifolia	**broadleaf cattail**	**OBL**			**x**

Native species in bold

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

Wetland indicator status -- 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
Vegetation Cover in Areas Subject to Vegetation Cutting Conducted in 2010

ESCA RP 2013 Annual Natural Resource Report

Scientific Name	Common Name	Baseline Data 2010 - 2011					Post-activity Data 2013				
		Thirty-nine Transects					Six Transects				
		Percent Cover				Frequency	Percent Cover				Frequency
		Mean Absolute Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover		Mean Absolute Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	
Arctostaphylos crustacea subsp. *crustacea*	brittleleaf manzanita	45.8%	32.3%	8.7%	41.8%	89.7%	15.2%	10.4%	8.6%	21.3%	83.3%
Adenostoma fasciculatum	chamise	27.4%	22.4%	6.0%	25.0%	100%	8.6%	6.2%	5.1%	12.0%	100%
Arctostaphylos montereyensis	**Toro manzanita**	**14.4%**	**19.8%**	5.3%	13.1%	**64.1%**	**0.1%**	**0.3%**	0.2%	0.2%	**33.3%**
Salvia mellifera	black sage	7.2%	15.5%	4.2%	6.6%	56.4%	1.8%	3.5%	2.9%	2.5%	33.3%
Baccharis pilularis subsp. *consagnuinea*	coyote brush	2.2%	4.1%	1.1%	2.0%	48.7%	9.1%	9.7%	7.9%	12.8%	33.3%
Mimulus aurantiacus	sticky monkeyflower	2.1%	4.1%	1.1%	1.9%	59.0%	4.5%	4.4%	3.6%	6.3%	100%
Garrya elliptica	coast silk tassel	1.5%	3.9%	1.0%	1.4%	28.2%	0.1%	0.2%	0.2%	0.1%	16.7%
Ceanothus rigidus	**Monterey ceanothus**	**1.5%**	**2.2%**	0.6%	1.4%	**48.7%**	**0.7%**	**1.2%**	1.0%	0.9%	**66.7%**
Frangula californica subsp. *californica*	California coffeeberry	1.3%	3.5%	0.9%	1.2%	20.5%	1.0%	2.3%	1.9%	1.3%	16.7%
Heteromeles arbutifolia	toyon	1.0%	2.7%	0.7%	1.0%	17.9%	0.6%	1.0%	0.8%	0.9%	33.3%
Quercus agrifolia	coast live oak	0.7%	3.5%	0.9%	0.7%	12.8%	0.7%	1.5%	1.3%	0.9%	33.3%
Ericameria ericoides	dune-heather, mock-heather	0.7%	3.9%	1.1%	0.6%	5.1%	0.0%	--	--	0.0%	0.0%
Toxicodendron diversilobum	poison-oak	0.4%	1.4%	0.4%	0.4%	10.3%	0.0%	--	--	0.0%	0.0%
Ceanothus thyrsiflorus	blue blossom	0.3%	1.8%	0.5%	0.3%	5.1%	0.2%	0.4%	0.3%	0.3%	33.3%
Artemisia californica	California sagebrush	0.3%	1.4%	0.4%	0.2%	5.1%	0.0%	--	--	0.0%	0.0%
Ribes malvaceum	chaparral currant	0.1%	0.6%	0.2%	0.1%	5.1%	0.5%	1.1%	0.9%	0.7%	16.7%
Croton californicus	California croton	0.1%	0.3%	0.1%	0.1%	5.1%	0.0%	--	--	0.0%	0.0%
Acmipson glaber	deerweed	0.1%	0.4%	0.1%	0.1%	2.6%	7.6%	17.2%	14.1%	10.7%	50.0%
Lepechinia calycina	pitcher sage	0.0%	0.3%	0.1%	0.0%	2.6%	0.0%	--	--	0.0%	0.0%
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.2%**	0.0%	0.0%	**2.6%**	**0.0%**	**--**	--	0.0%	**0.0%**
Eriophyllum confertiflorum	golden yarrow	0.0%	0.1%	0.0%	0.0%	5.1%	1.4%	3.4%	2.8%	2.0%	33.3%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.1%	0.0%	0.0%	2.6%	0.0%	--	--	0.0%	0.0%
Helianthemum scoparium	rush-rose	0.0%	0.0%	0.0%	0.0%	5.1%	2.3%	2.2%	1.8%	3.2%	83.3%
Arctostaphylos hookerii	**Hooker's manzanita**	**0.0%**	**--**	--	0.0%	**0.0%**	**0.1%**	**0.2%**	0.2%	0.1%	**16.7%**
Total Mean Percent Shrub and Subshrub Cover		***107.0%***	***10.7%***	***2.9%***	***--***	***--***	***54.4%***	***3.9%***	***3.2%***	***--***	***--***
Herbaceous Plants Between Shrubs and Subshrubs		***2.0%***	***4.4%***	***1.2%***	***--***	***51.3%***	***16.8%***	***18.2%***	***15.0%***	***--***	***100.0%***
Target Weed Total (*Carpobrutus edulis*)		***0.4%***	***2.7%***	***0.7%***	***0.4%***	***2.6%***	***0.0%***	***--***	***--***	***--***	***0.0%***
Total Mean Percent Vegetative Cover		***109.4%***	***--***	***--***	***--***	***--***	***71.3%***	***--***	***--***	***--***	
Total Mean Percent Bare Ground		***7.1%***	***10.7%***	***--***	***--***	***84.6%***	***34.8%***	***10.4%***	***--***	***--***	***100%***

Table 7-2
Interim Action Ranges MRA
South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Vegetation Cutting Conducted in 2011 (Activity B)

2013 Annual Natural Resource Report

Scientific Name	Common Name	Baseline Data 2010 - 2011					Post-activity Data 2012					Post-activity Data 2013				
		Ten Transects areas with Vegetation Cutting Conducted in 2011														
		Percent Cover				Frequency	Percent Cover				Frequency	Percent Cover				Frequency
		Mean Absolute Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover		Mean Absolute Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover		Mean Absolute Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	15.6%	4.9%	31.0%	100%	9.4%	4.9%	3.6%	43.7%	100%	11.6%	6.7%	4.9%	36.2%	100%
Ceanothus dentatus	dwarf ceanothus	20.2%	16.0%	5.0%	21.4%	89.7%	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	14.3%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**9.3%**	**2.9%**	**14.3%**	**96.6%**	**0.7%**	**0.7%**	**0.5%**	**3.0%**	**57.1%**	**1.1%**	**1.4%**	**1.0%**	**3.3%**	**71.4%**
Adenostoma fasciculatum	chamise	9.0%	6.9%	2.2%	9.5%	89.7%	3.3%	1.5%	1.1%	15.5%	100%	4.5%	2.4%	1.7%	14.2%	100%
Helianthemum scoparium	rush-rose	8.1%	9.1%	2.9%	8.6%	86.2%	2.0%	5.2%	3.8%	9.5%	42.9%	2.0%	4.9%	3.6%	6.4%	85.7%
Salvia mellifera	black sage	5.3%	7.2%	2.3%	5.6%	69.0%	1.5%	2.2%	1.6%	7.1%	85.7%	3.5%	6.1%	4.5%	10.9%	85.7%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**2.0%**	**0.6%**	**1.7%**	**65.5%**	**1.6%**	**1.3%**	**0.9%**	**7.4%**	**85.7%**	**2.7%**	**1.9%**	**1.4%**	**8.5%**	**85.7%**
Ericameria ericoides	dune-heather, mock-heather	1.5%	5.6%	1.8%	1.6%	24.1%	0.5%	1.2%	0.9%	2.1%	14.3%	0.6%	1.5%	1.1%	1.8%	14.3%
Eriophyllum confertiflorum	golden yarrow	1.5%	2.2%	0.7%	1.6%	65.5%	0.1%	0.1%	0.1%	0.4%	42.9%	0.3%	0.4%	0.3%	0.9%	57.1%
Acmispon glaber	deerweed	1.4%	0.0%	--	1.5%	0.0%	1.2%	1.3%	0.9%	5.7%	85.7%	3.8%	3.9%	2.9%	11.8%	85.7%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	1.8%	0.6%	0.7%	24.1%	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mimulus aurantiacus	sticky monkeyflower	0.5%	0.9%	0.3%	0.5%	27.6%	0.0%	0.1%	0.1%	0.2%	14.3%	0.1%	0.2%	0.1%	0.3%	28.6%
Lepechinia calycina	pitcher sage	0.4%	1.4%	0.5%	0.4%	20.7%	0.0%	0.0%	--	0.0%	0.0%	0.1%	0.2%	0.1%	0.2%	10.0%
Frangula californica subsp. *californica*	California coffeeberry	0.9%	1.9%	0.6%	1.0%	31.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.4%	1.1%	0.4%	0.4%	13.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.5%**	**0.2%**	**0.2%**	**17.2%**	**0.1%**	**0.2%**	**0.1%**	**0.3%**	**14.3%**	**0.0%**	**0.1%**	**0.1%**	**0.2%**	**14.3%**
Garrya elliptica	coast silk-tassel	0.0%	0.0%	--	0.0%	0.0%	0.4%	1.0%	0.7%	2.1%	28.6%	0.5%	1.4%	1.0%	1.7%	28.6%
Symphoricarpos mollis	creeping snowberry	0.0%	0.0%	--	0.0%	0.0%	0.1%	0.3%	0.2%	0.6%	14.3%	0.3%	0.8%	0.6%	0.9%	14.3%
Quercus agrifolia	coast live oak	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.0%	--	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%	14.3%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	--	0.0%	0.0%	0.1%	0.1%	0.1%	0.3%	28.6%	0.1%	0.2%	0.1%	0.2%	14.3%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***	***5.0%***	***1.6%***	***100%***		***21.1%***	***1.5%***		***97.8%***		***31.3%***	***2.8%***	***1.1%***	***97.5%***	
Herbaceous Plants Between Shrubs and Subshrubs		***1.3%***	***2.3%***	***1.3%***	***1.4%***	***90.0%***	***3.5%***	***5.3%***			***90.0%***	***2.8%***	***4.4%***	***2.6%***		***80.0%***
Target Weed Total (*Carpobrutus edulis*)		***0.0%***	***0.0%***			***60.0%***	***0.5%***	***0.5%***	***0.4%***	***2.2%***	***57.1%***	***0.5%***	***0.5%***	***0.3%***	***1.6%***	***71.4%***
Total Mean Percent Vegetative Cover		***95.8%***	***--***		***--***	***--***	***25.1%***	***--***		***--***	***--***	***34.7%***	***17.2%***	***29.0%***	***--***	***--***
Total Mean Percent Bare Ground		***19.3%***	***9.3%***	***2.9%***	***--***	***100%***	***75%***	***7.9%***	***5.8%***	***--***	***100%***	***68.3%***	***9.2%***	***6.8%***	***--***	***100%***

HMP Species in Bold

Table 7-3
Future East Garrison MRA
2013 Presence and Density of Monterey Spineflower After Vegetation Cutting

ESCA RP 2013 Annual Natural Resource Report

Post Activity Data - 2013									
	Estimated Plants in Sampled Grid Cells	**Total Number of Plants in All 211 sq. ft. plots**	**Mean Density (number of plants per 211 sq. ft.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Spineflower (*Chorizanthe pungens* var. *pungens*)									
Baseline Pre-disturbance									
2010	236	236	118.0	106.0	473.2	2	--	--	--
2012	110	110	55.0	52.3	233.6	2	--	--	--
Activity A - (Ingress/Egress Routes in 2013)									
Post-activity 2013	138	138	138.0	--	--	2	1	55	50%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	0	0	0.0	0.0	--	2	0	0	0%
Post-activity Year 2	0	0	0.0	0.0	--	2	0	0	0%
Post-activity Year 3	0	0	0.0	0.0	--	2	0	0	0%
2013 Sampling Totals	***138***	***138***				***2***	***1***	***55***	**50%**

Table 7-4
Future East Garrison MRA
2013 Presence and Density of Monterey Gilia and Seaside Bird's-beak
After Vegetation Cutting
ESCA RP 2013 Annual Natural Resource Report

Post-activity Data - 2013									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Gilia (*Gilia tenuiflora* subsp. *arenaria*)									
Baseline Pre-disturbance									
2010	330	90	30.0	22.9	38.6	3	--	--	--
2012	15	15	7.5	6.4	28.4	2	--	--	--
Activity A - (Ingress/Egress Routes)									
Post-activity 2013	0	0	0.0	0.0	--	3	0	1	0%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	0	0	0.00	--	--	3	0	44	0%
Post-activity Year 2	11	11	11.00	--	--	3	1	39	33%
Post-activity Year 3	5	4	2.00	0.00	--	3	2	37	67%
2013 Sampling Totals	***16***	***15***				***3***	***3***	**121**	**100%**
Seaside Bird's-beak (*Cordylanthus rigidus* subsp. *littoralis*)									
Baseline Pre-disturbance									
2010	--	--	--	--	--	--	--	--	--
2012	--	--	--	--	--	--	--	--	--
Activity A - (Ingress/Egress routes 2013)									
Post-activity Year 3	0	0	0.0	--	--	0	0	1	
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	0	0	0	--	--	0	0	44	--
Post-activity Year 2	0	0	0	--	--	0	0	39	--
Post-activity Year 3	187	61	61	0.0	--	0	1	37	100%*
2013 Sampling Totals	***187***	***61***				***0***	***2***	**121**	**100%***

*exceeds number of baseline grid cells sampled

Table 7-5
Future East Garrison MRA
2013 Toro Manzanita Density Survey
ESCA RP 2013 Annual Natural Resources Report

Habitat Parcel	1992 Baseline Toro Density	2012	2013	2013	2012	2013
		Number of Protected Toro Manzanita Plants		Area Surveyed (acres)	Number of Protected Toro Manzanita Plants Per Acre	
West - E11b.6.1	High	339	339	11.2	30.1	30.1
East - E11b.6.1	High	150	147	6.2	24.2	23.7
East - E11b.7.1.1	Medium	59	59	8.7	6.8	6.8
All habitat parcels	**High & Medium**	**548**	**545**	**26.2**	**20.9**	**20.8**

Table 7-6
Interim Action Ranges MRA
HMP Herbaceous Species Presence by Activity Type
2013 Annual Natural Resource Report

Activity Category	Location	Restoration Strategy	Total HMP Species Present Prior to Activities	Total HMP Species Present in 2013 After Activities
Ingress/egress routes (Activity A)	All ingress/ egress routes	Monitoring only	1	3
Above-ground vegetation cutting followed by target-specific excavation (Activity B)	North Range 44 SCAs and Central Area NCAs, South Range 44 SCAs, Range 47 SCA Subarea C	Monitoring only	6	7
Small-scale soil excavation (Activity C)	North Range 44 SCAs and Central Area NCAs, South Range 44 SCAs, Range 47 SCA Subarea C	Passive (seeding) [1]	6	4
	Grassland grid cell in South Range 44 SCA		1	1
Large-scale soil excavation (Activity D)	Range 47 Subarea A (low recruitment area)	Passive (seeding)	1	3
	Range 47 Subarea B	Active (container planting and seeding)	5	6

[1] Seeding delayed until fall 2013 due to ongoing munitions investigation activities during most of 2013

[2] Only limited field surveys allowed in Range 47 prior to munitions investigations activities

Table 7-7
Interim Action Ranges MRA
2013 Presence and Density of Monterey Spineflower
after Remedial Activities A - C in North Range 44 SCA
2013 - Annual Natural Resource Report

Post-activity Data - 2013									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Spineflower (*Chorizanthe pungens* var. *pungens*)									
Baseline Pre-disturbance									
2010	4,909	4,909	153.4	254.7	76.3	31	--	--	--
2012	287	287	31.9	31.9	19.8	6	--	--	--
Activity A - (Ingress/Egress Routes)									
Post-activity 2013	241	152	30.5	56.4	66.3	6	4	6	67%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	64,228	2,067	68.9	54.5	16.9	6	30	31	100%*
Activity C - (Small-scale Excavation)									
Post-activity Year 1	1294	301	23.2	31.1	17.0	6	11	13	100%*
2013 Sampling Totals	***65,763***	***2,520***				***6***	**45**	***50***	**100%***
Reference Plot									
2013 Survey	450	19	19.0	--	--	1	1	1	--

* exceeds number of baseline grid cells sampled

Table 7-8
Interim Action Ranges MRA
2013 Presence and Density of Monterey Spineflower
after Remedial Activities A - C in South Range 44 SCA and Cnetral Area NCA
2013 - Annual Natural Resource Report

Post-activity Data - 2013									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Spineflower (*Chorizanthe pungens* var. *pungens*)									
Baseline Pre-disturbance									
2010	2,355	2,355	196.3	203.2	105.4	12	--	--	--
2012	567	567	40.5	47.8	22.6	14	--	--	--
Activity A - (Ingress/Egress Routes)									
Post-activity 2013	3,349	876	219.0	124.5	146.5	12	4	4	33%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 2	3,601	476	158.6	162.0	273.0	12	3	3	25%
Activity C - (Small-scale Excavation)									
Post-activity Year 2	7,763	1,640	410.1	428.8	504.6	12	4	4	33%
2013 Sampling Totals	***14,713***	***2,992***				***12***	***11***	**11**	**92%**
Reference Plot									
2013 Survey	450	19	19.0	--	--	1	1	1	100%

Table 7-9
Interim Action Ranges MRA
2013 Presence and Density of Monterey Spineflower
after Remedial Activity A - C in Range 47 NCA Range 47 Subarea C
2013 - Annual Natural Resource Report

Post-activity Data - 2013									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Spineflower (*Chorizanthe pungens* var. *pungens*)									
Baseline Pre-disturbance									
2010	5,903	5,903	347.2	622.5	263.6	17	--	--	--
2012	30	30	6.0	4.8	4.6	5	--	--	--
Activity A - (Ingress/Egress Routes)									
Post-activity 2013	0	0	0.0	--	--	5	0	5	0%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 2	1,716	78	7.8	13.4	9.8	5	7	7	100%*
2013 Sampling Totals	***1,716***	***78***				***5***	***7***	***12***	
Reference Plot									
2013 Survey	450	19	19.0	--	--	1	1	1	100%

* exceeds number of baseline grid cells sampled

Table 7-10
Interim Action Ranges MRA
2013 Presence and Density of Monterey Gilia, Seaside Birds -beak and Coast Wallflower
after Remedial Activities A-C in North Range 44 NCAs
2013- Annual Natural Resource Report

Post-activity Data 2013									
	Estimated Plants in Sampled Grid Cell(s)	Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)	Mean Density (number of plants per 211 ft. sq.)	Standard Deviation	90% Confidence Interval	Number of Grid Cell(s) Surveyed Based on Previous Occurrences	Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013	Total Surveyed Grid Cells or Partial Grid Cells in 2013	Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline
Monterey Gilia (*Gilia tenuiflora* subsp. *arenaria*)									
Baseline Pre-disturbance									
2010	1,248	122	11.1	13.2	4.5	25	--	--	--
2012	0	0	0.0	--	--	2	--	--	--
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	2,329	278	5.8	5.5	1.7	25	29	38	100%*
Activity C - (Small-scale Excavation)									
Post-activity Year 1	108	70	4.4	4.3	2.5	25	10	11	40.0%
2013 Sampling Totals	***2,437***	**348**				***25***	***39***	***49***	
Reference Plot									
2013 Survey	12	12	12.0	--	--	1	1	100%	100%
Seaside Bird's-beak (*Cordylanthus rigidus* subsp. *littoralis*)									
Baseline Pre-disturbance									
2010	1,833	1,833	107.8	105.2	44.5	17	--	--	--
2012	39	20	3.3	2.6	2.1	9	--	--	--
Activity A - (Ingress/Egress routes)									
Post-activity 2013	0	0	0.0	0.0	--	17	0	5	0.0%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	4,549	386	38.6	35.6	20.6	17	10	35	59%
Activity C - (Small-scale Excavation)									
Post-activity Year 1	2	2	1.0	0.0	--	17	2	17	11.8%
2013 Sampling Totals	***4551***	**388**				***17***	***12***	***57***	
Reference Plot									
2013 Survey	108	8.5	8.5	--	--	1	1	1	100%
Coast Wallflower (*Erysimum ammophilum*)									
Baseline Pre-disturbance									
2010	--	--	--	--	--	--	--	--	--
2012	--	--	--	--	--	--	--	--	--
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 1	54	28	4.7	3.1	5.2	0	6	6	100%**
2013 Sampling Totals	***54***	**28**							
Reference Plot									
2013 Survey	11	11	5.5	2	9	2	2	2	100%

* exceeds number of baseline grid cells sampled

**recorded as 100%, never observed before in this location

Table 7-11
Interim Action Ranges MRA
2013 Presence and Density of Monterey Gilia and Seaside Bird's-beak
after Remedial Activities A-C in South Range 44 SCA and Cnetral Area NCA
2013 - Annual Natural Resource Report

Post-activity Data 2013									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Gilia (*Gilia tenuiflora* subsp. *arenaria*)									
Baseline Pre-disturbance									
2010	605	56	8.0	6.4	4.3	7	--	--	--
2012	94	38	2.7	2.3	1.1	14	--	--	--
Activity A - (Ingress/Egress Routes)									
Post-activity 2013	3	3	3.0	--	--	7	1	1	14%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 2	33	28	3.1	2.2	1.5	7	8	8	100%*
Activity C - (Small-scale Excavation)									
Post-activity Year 2	11	11	3.7	3.1	5.2	7	3	3	43%
2013 Sampling Totals	***47***	***42***				***7***	***12***	**12**	
Reference Plot									
2013 Survey	12	12	12.0	--	--	1	1	1	100%
Seaside Bird's-beak (*Cordylanthus rigidus* subsp. *littoralis*)									
Baseline Pre-disturbance									
2010	365	365	91.3	40.3	47.4	4	--	--	--
2012	84	84	9.3	7.8	4.9	9	--	--	--
Activity A - (Ingress/Egress routes)									
Post-activity 2013	2	2	2.0	--	--	4	1	1	25.0%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 2	123	123	41.0	62.4	73.4	9	3	4	33.3%
2013 Sampling Totals	***125***	***125***				***4***	***4***	***5***	
Reference Plot									
2013 Survey	108	8	8.5	--	--	1	1	1	100%

* exceeds number of baseline grid cells sampled

Table 7-12
Interim Action Ranges MRA
2013 Presence and Density of Monterey Gilia
after Remedial Activity A - C in Range 47 SCA Subarea C
2013 - Annual Natural Resource Report

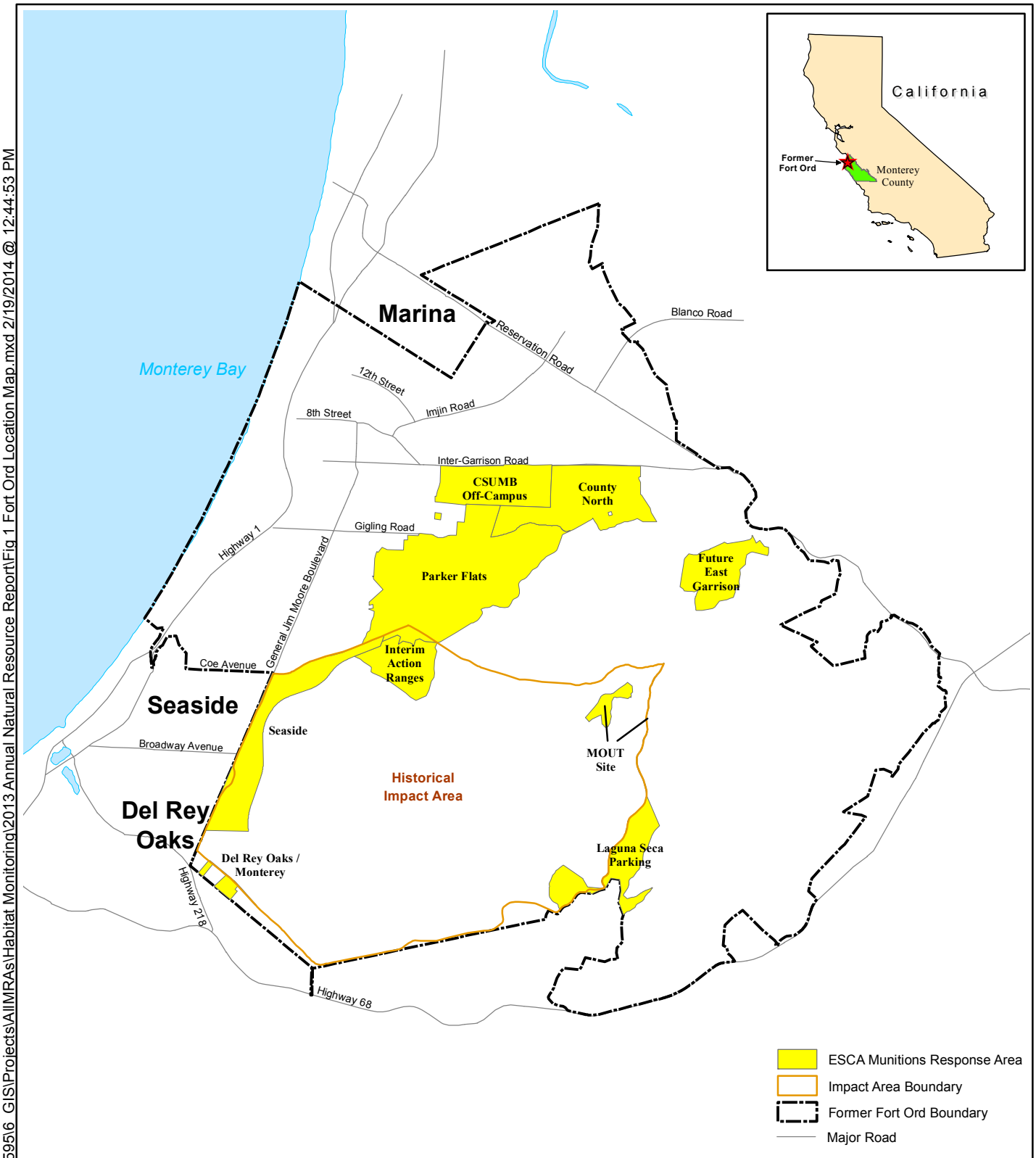
Post-activity Data 2013									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Gilia (*Gilia tenuiflora* subsp. *arenaria*)									
Baseline Pre-disturbance									
2010	172	27	3.0	1.8	1.0	11	--	--	--
2012	6	4	2.0	--	--	2	--	--	--
Activity A - (Ingress/Egress Routes)									
Post-activity 2013	8	8	8.0	--	--	2	1	7	50%
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 2	66	66	6.6	8.9	39.7	2	2	10	100%
Activity C - (Small-scale Excavation)									
Post-activity Year 2	1	1	1.0	--	--	2	1	5	50%
2013 Sampling Totals	***80***	***78***				***2***	***4***	**22**	
Reference Plot									
2013 Survey	12	12	12.0	--	--	1	1	1	100%

*exceeds number of baseline grid cells containing HMP herbaceous species

Table 7-13
Parker Flats MRA
2013 Presence and Density of Montery Spineflower
after Vegetation Cutting
ESCA RP 2013 Annual Natural Resources Report

Post-activity Data 2013 (Year 4)									
	Estimated Plants in Sampled Grid Cell(s)	**Estimated Plants in Sampled Grid Cell(s) (per 211 ft. sq.)**	**Mean Density (number of plants per 211 ft. sq.)**	**Standard Deviation**	**90% Confidence Interval**	**Number of Grid Cell(s) Surveyed Based on Previous Occurrences**	**Number of Surveyed Grid Cells or Partial Grid Cells that Contained Plants in 2013**	**Total Surveyed Grid Cells or Partial Grid Cells in 2013**	**Percentage of Surveyed Grid Cells Containing Plants Compared to Baseline**
Monterey Spineflower (*Chorizanthe pungens* var. *pungens*)									
Baseline Pre-disturbance									
2008	1,369	1,369	111.3	96.1	64.4	8	--	--	--
2011	407	407	83.8	61.6	103.9	3	--	--	--
2012	571	571	79.9	82.5	139.2	3	--	--	--
Activity A - (Ingress/Egress Routes in 2013)									
Post-activity 2013	341	143	35.7	0.0	--	3	4	69	100%*
2013 Sampling Totals	***341***								
Activity B - (Vegetation Cut/Mag and Dig)									
Post-activity Year 4	42	41	41.0	34.1	19.8	3	1	4	33%
2013 Sampling Totals	***383***					***3***	***5***	***73***	***100%****

*exceeds previous grid cell number



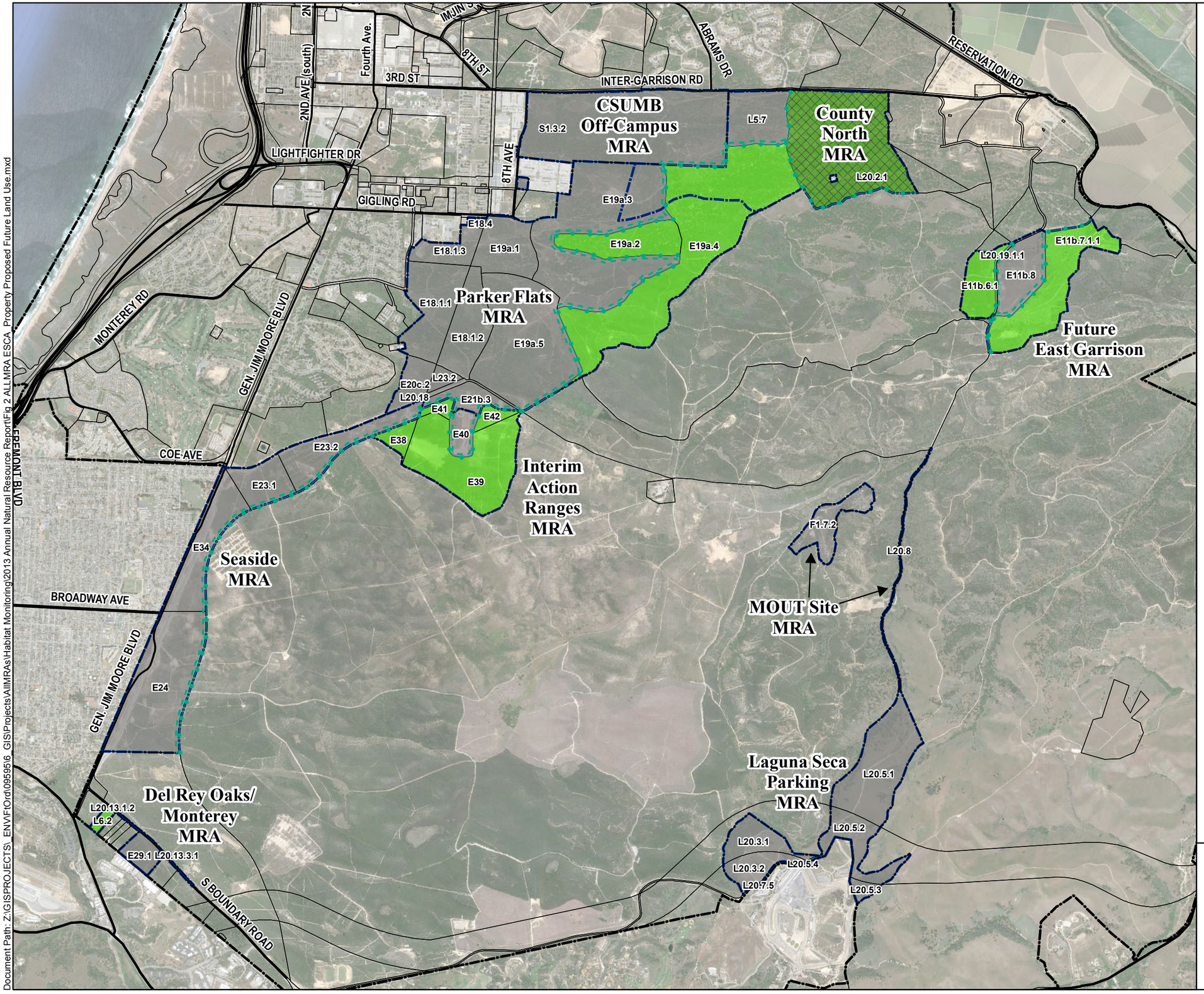
ARCADIS
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report
Former Fort Ord
Location Map

FORA ESCA RP
Monterey County, California

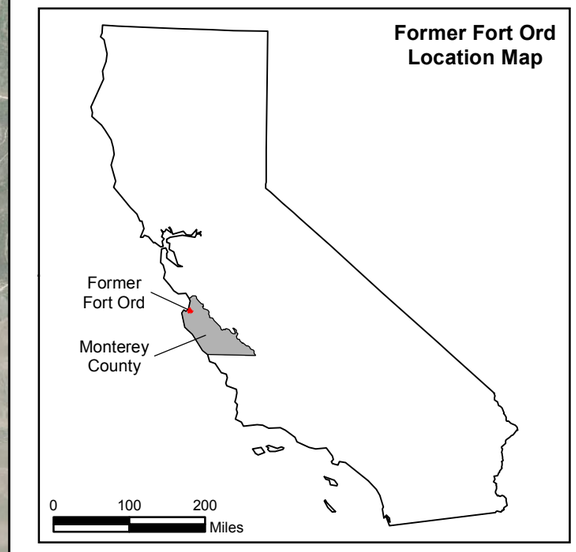
Figure 1

Z:\GISPROJECTS_ENV\FtOrd\09595\6_GIS\Projects\AIIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 1 Fort Ord Location Map.mxd 2/19/2014 @ 12:44:53 PM



Legend

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



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 3,000 6,000 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE | ENGINEERS

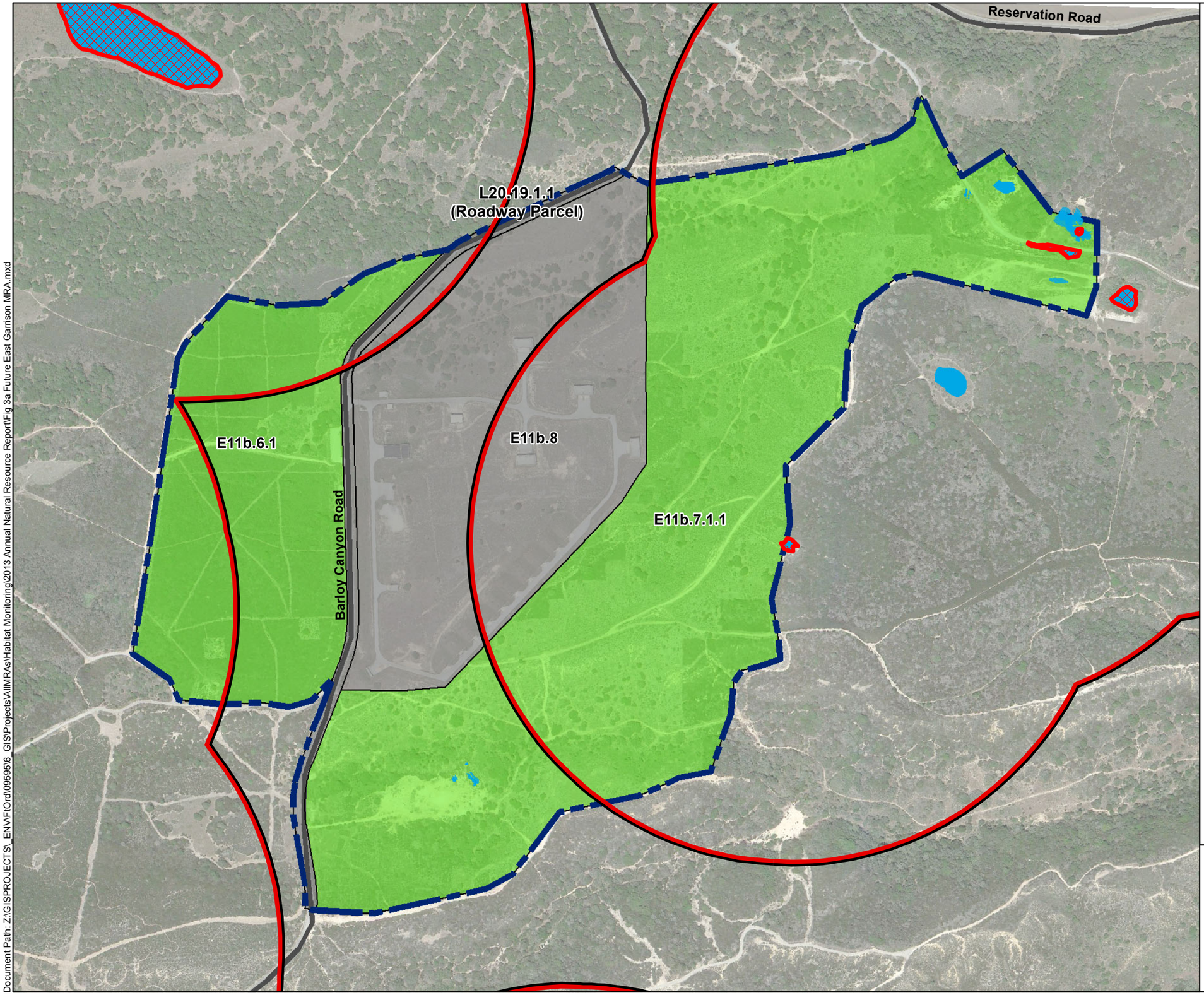
2013 Annual Natural Resource Report

ESCA RP
2013 Habitat Monitoring Parcels

FORA ESCA RP
Monterey County, California

Figure 2

Document Path: Z:\GIS\PROJECTS_ENVFtOrd\0959516_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 2 ALLMRA ESCA_Property Proposed Future Land Use.mxd

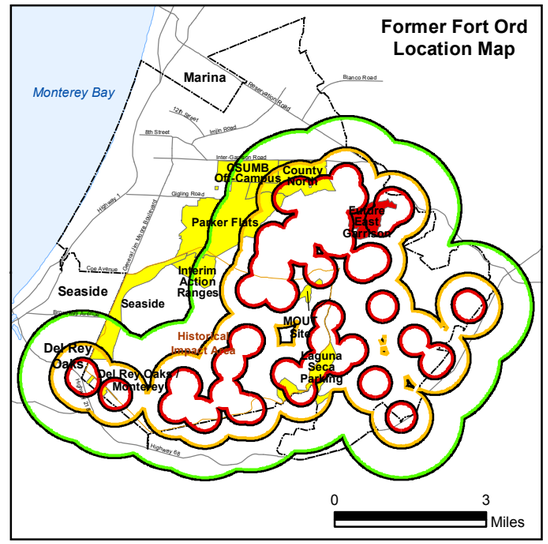


Legend

- Munitions Response Area
- Major Road
- E11b.8 — USACE Parcel
- Habitat Reserve
- Development Parcel
- Aquatic Features
- Aquatic Feature with Documented CTS Presence

California Tiger Salamander (CTS) Buffer

- 500 m
- 1 km
- 2 km



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 500 1,000 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

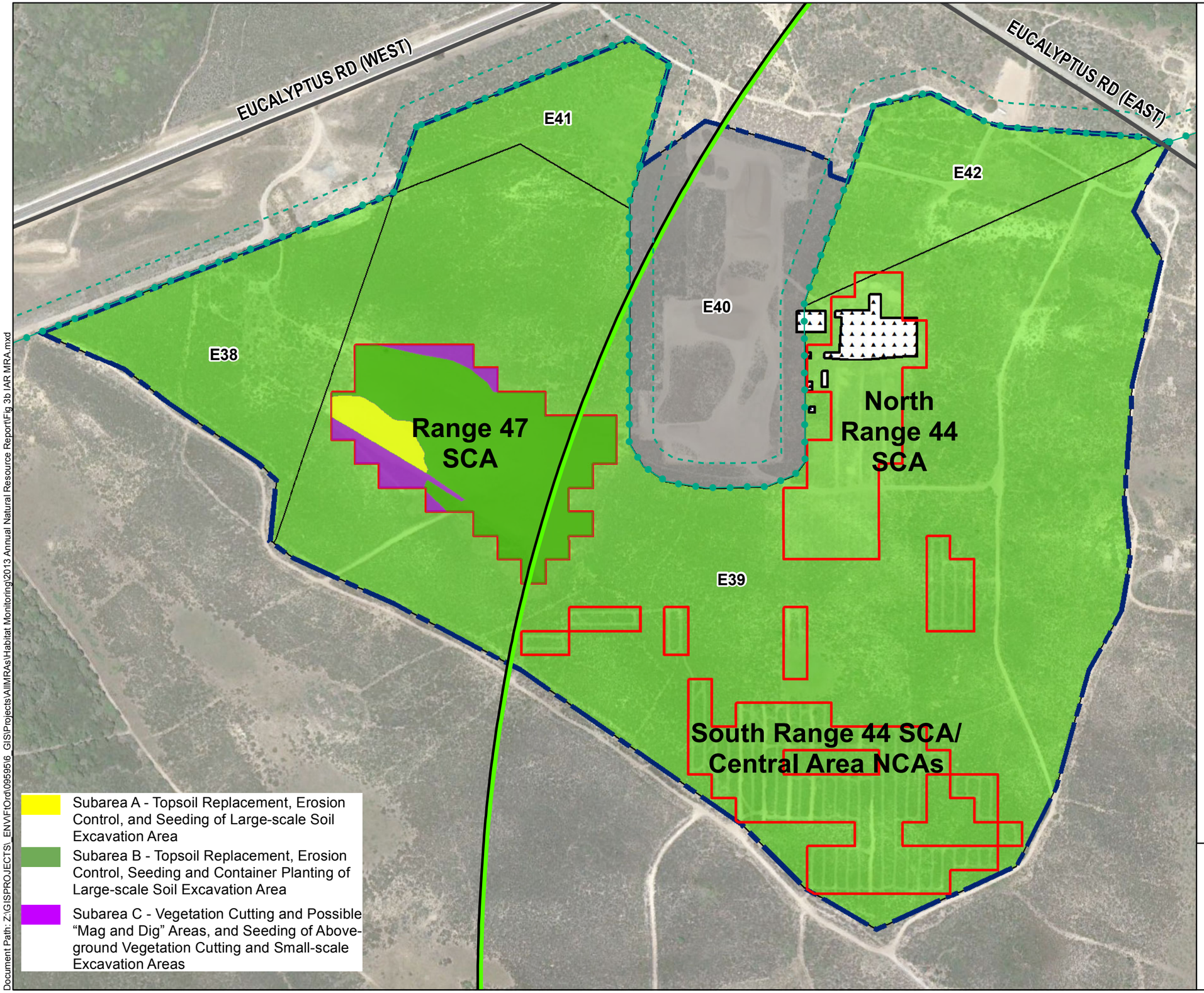
2013 Annual Natural Resource Report

Munitions Response Areas with Habitat Parcels Overview Future East Garrison MRA

FORA ESCA RP
Monterey County, California

Figure 3a

Document Path: Z:\GIS\PROJECTS_ENV\FtOrd\0959516_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 3a Future East Garrison MRA.mxd

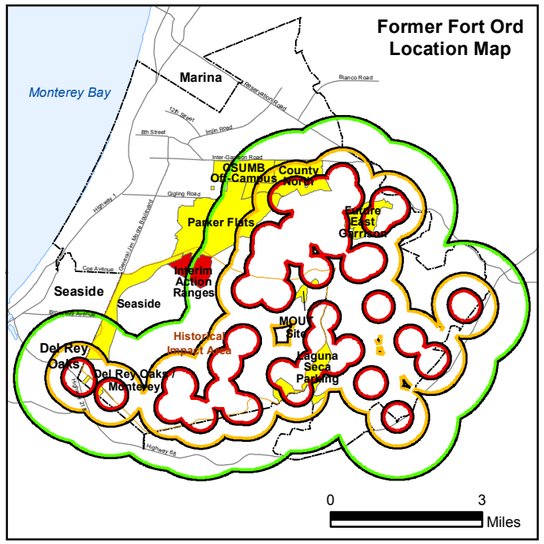


Legend

- Munitions Response Area
- Major Road
- E23.1 USACE Parcel
- Site 39 (HA44) US Army Action
- Special Case and Non-Completed Areas (Work Areas)
- Habitat Reserve
- Development Parcels
- Borderland Interface
- 100-Foot Buffer from Borderland Interface

California Tiger Salamander Buffer

- 500 m
- 1 km
- 2 km



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 400 800 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE | ENGINEERS

2013 Annual Natural Resource Report

Munitions Response Areas with Habitat Parcels Overview
Interim Action Ranges MRA

FORA ESCA RP
Monterey County, California

Figure 3b

Document Path: Z:\GIS\PROJECTS_ENV\FtOrd\0959516_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 3b IAR MRA.mxd

B ST
C ST
7TH AVE
6TH AVE
8TH AVE
C ST
JOE LLOYD WAY
L32.1
COL. DURHAM RD
ARNHEM RD
CUT-OFF RD
GIGLING RD
PARKER FLATS
E18.4
E19a.1
E19a.2
E19a.3
E19a.4
E19a.5
E18.1.3
E18.1.1
E18.1.2
NIJMEGEN RD
NUMA WATSON RD
PARKER FLATS CUT-OFF RD
PARKER FLATS RD
L23.2
E20c.2
L20.18
E21b.3
EUCALYPTUS RD (WEST)
EUCALYPTUS RD (EAST)

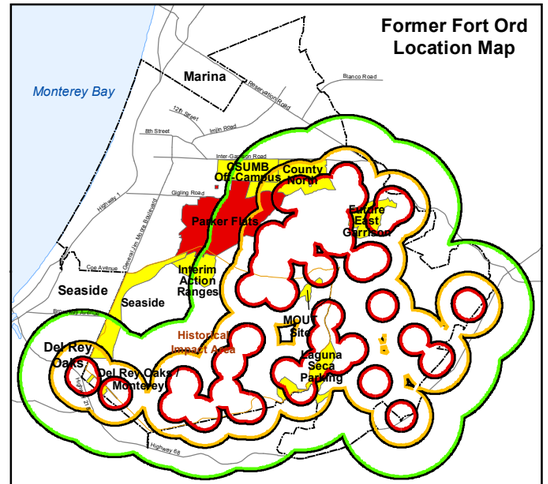
Legend

- Munitions Response Area
- Major Road
- E23.1 USACE Parcel
- Habitat Reserve
- Development Parcels
- Borderland Interface
- 100-Foot Buffer from Borderland Interface

California Tiger Salamander Buffer

- 500 m
- 1 km
- 2 km

Former Fort Ord Location Map



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 1,000 2,000 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE | ENGINEERS

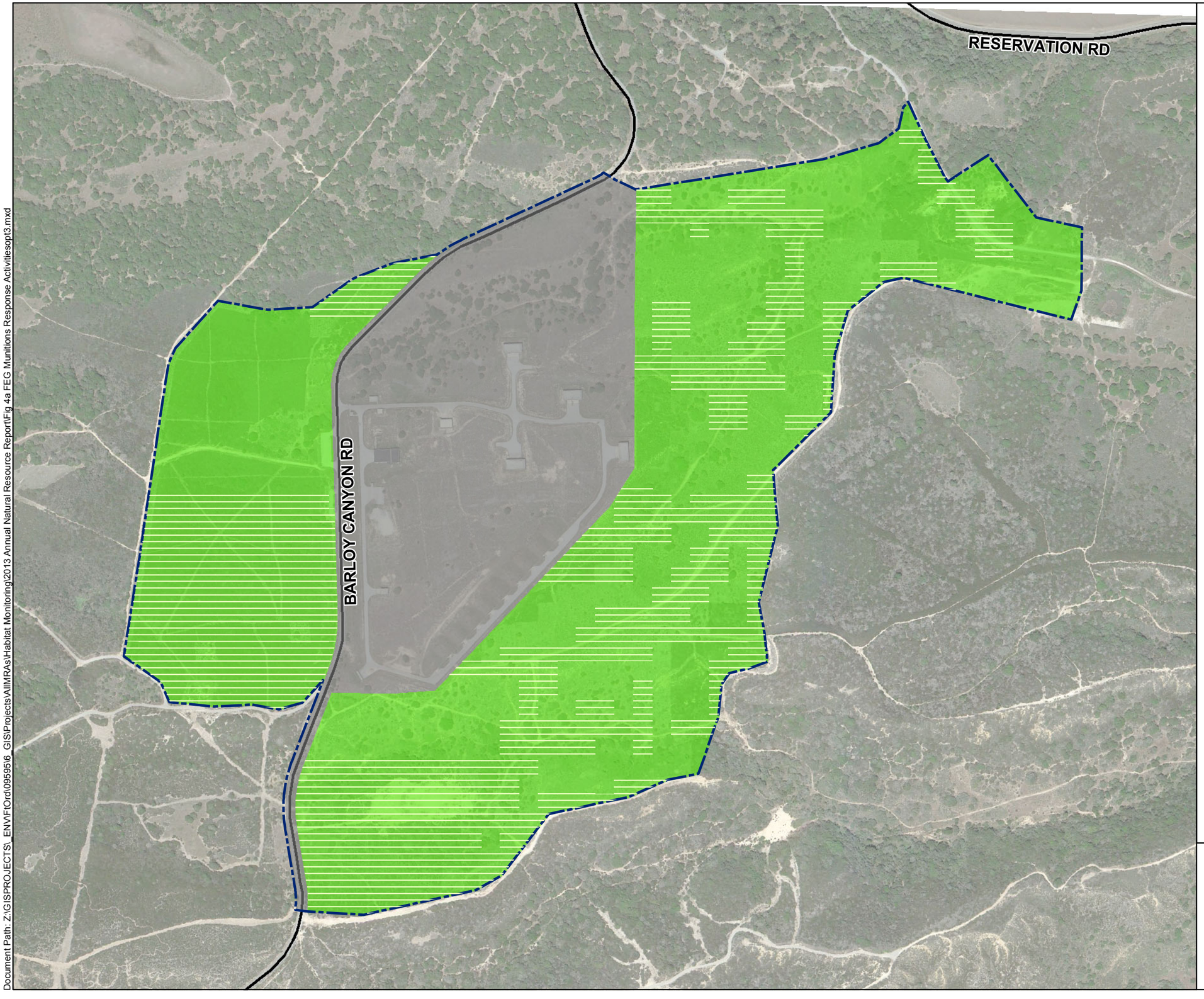
2013 Annual Natural Resource Report

Munitions Response Areas with Habitat Parcels Overview
Parker Flats MRA

FORA ESCA RP
Monterey County, California

Figure 3c

Document Path: Z:\GISPROJECTS_ENVFtOrd\09595\6_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 3c Parker Flats MRA Phase I and II Areas.mxd

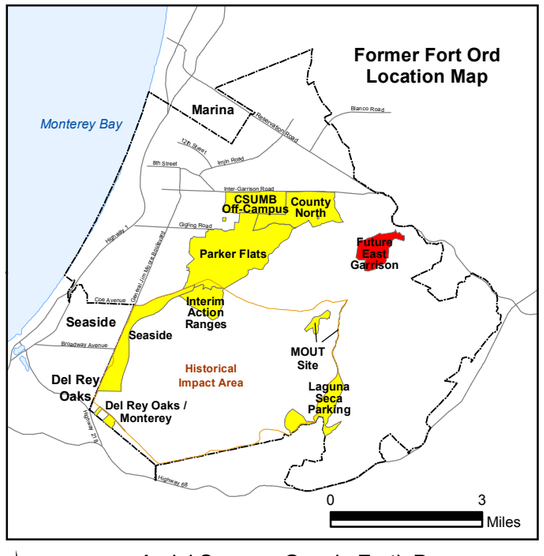


Legend

- Munitions Response Area
- Major Road
- Habitat Reserve
- Development Parcel

Areas of Munitions Investigation Activities During Reporting Period:

- 16 October 2012 through 31 December 2013



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 500 1,000 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

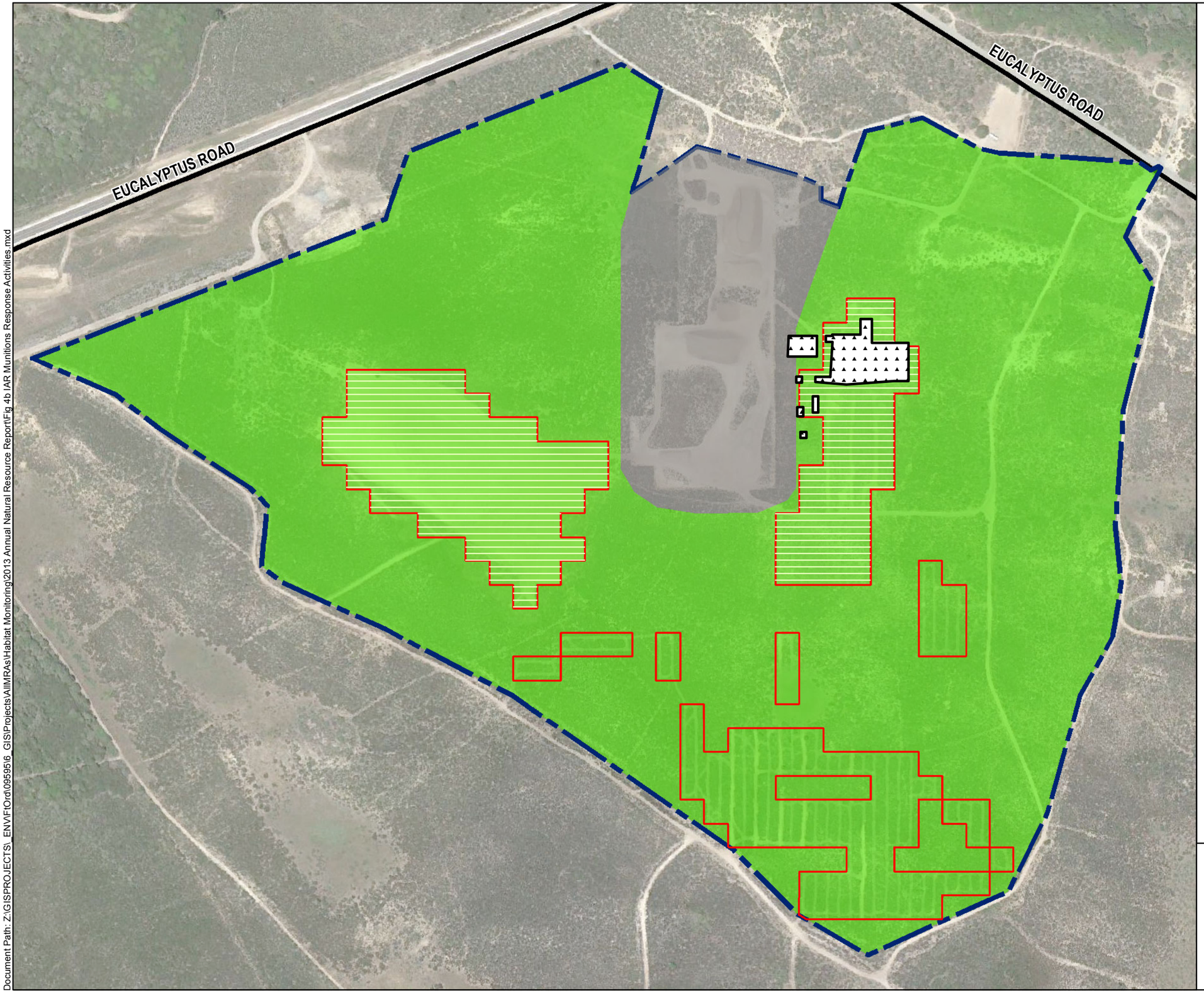
2013 Annual Natural Resource Report

Munitions Investigation Activities
Future East Garrison MRA
Habitat Parcels

FORA ESCA RP
Monterey County, California

Figure 4a

Document Path: Z:\GIS\PROJECTS_ENV\FtOrd\09595\6_GIS\Projects\AIIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 4a FEG Munitions Response Activitiesopt3.mxd

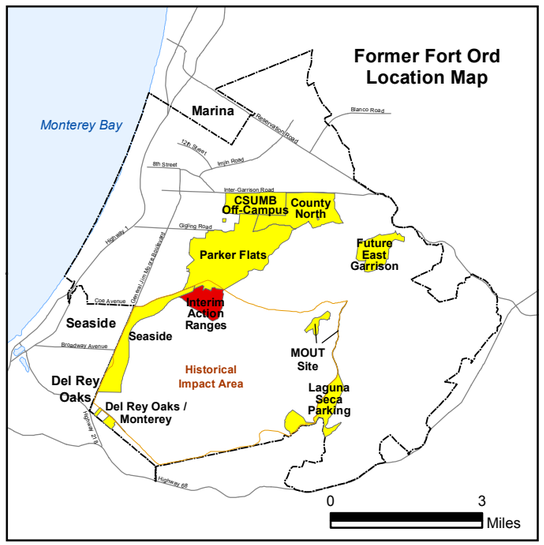


Legend

- Munitions Response Area
- Major Road
- Special Case and Non-Completed Areas (Work Areas)
- Site 39 (HA-44) U.S. Army Actions
- Habitat Reserve
- Development Parcel

Area of Munitions Investigation Activities During Reporting Period:

- 16 October 2012 through 31 December 2013



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 400 800 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE | ENGINEERS

2013 Annual Natural Resource Report

Munitions Investigation Activities
Interim Action Ranges MRA
Habitat Parcels

FORA ESCA RP
Monterey County, California

Figure 4b

Document Path: Z:\GIS\PROJECTS_ENV\FtOrd\095956_GIS\Projects\AIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 4b IAR Munitions Response Activities.mxd

Monterey Bay

BLANCO ROAD

RESERVATION ROAD

12TH STREET

IMJIN ROAD

8TH STREET

3RD AVENUE

ABRAMS ROAD

INTER-GARRISON ROAD

CSUMB Off-Campus

County North

GIGLING ROAD

PARKER FLATS ROAD

Parker Flats

Future East Garrison

MONTEREY ROAD

COE AVENUE

EUCALYPTUS ROAD

Interim Action Ranges

EUCALYPTUS ROAD

GARLAND RANCH ROAD

Seaside

MOUT Site

DEL MONTE BOULEVARD

FREMONT STREET

BROADWAY ROAD

GENERAL JIM MOORE BOULEVARD

WATKINS GATE ROAD

Del Rey Oaks/ Monterey

Laguna Seca Parking

1

218

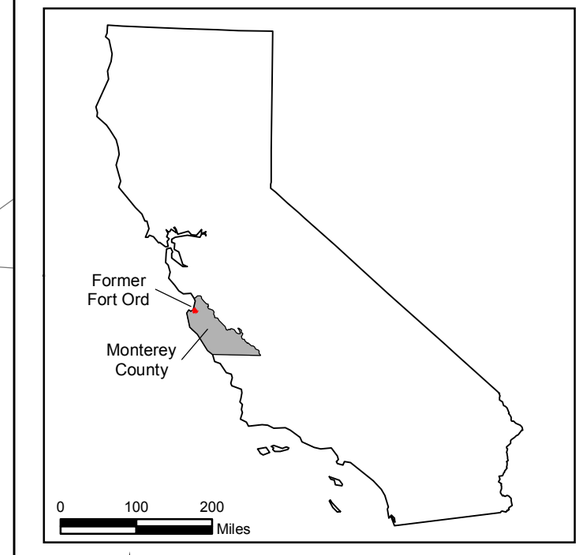
68

68

Legend

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

Source: USFWS. 2002. Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F25-R)



N

0
4,500
9,000
Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

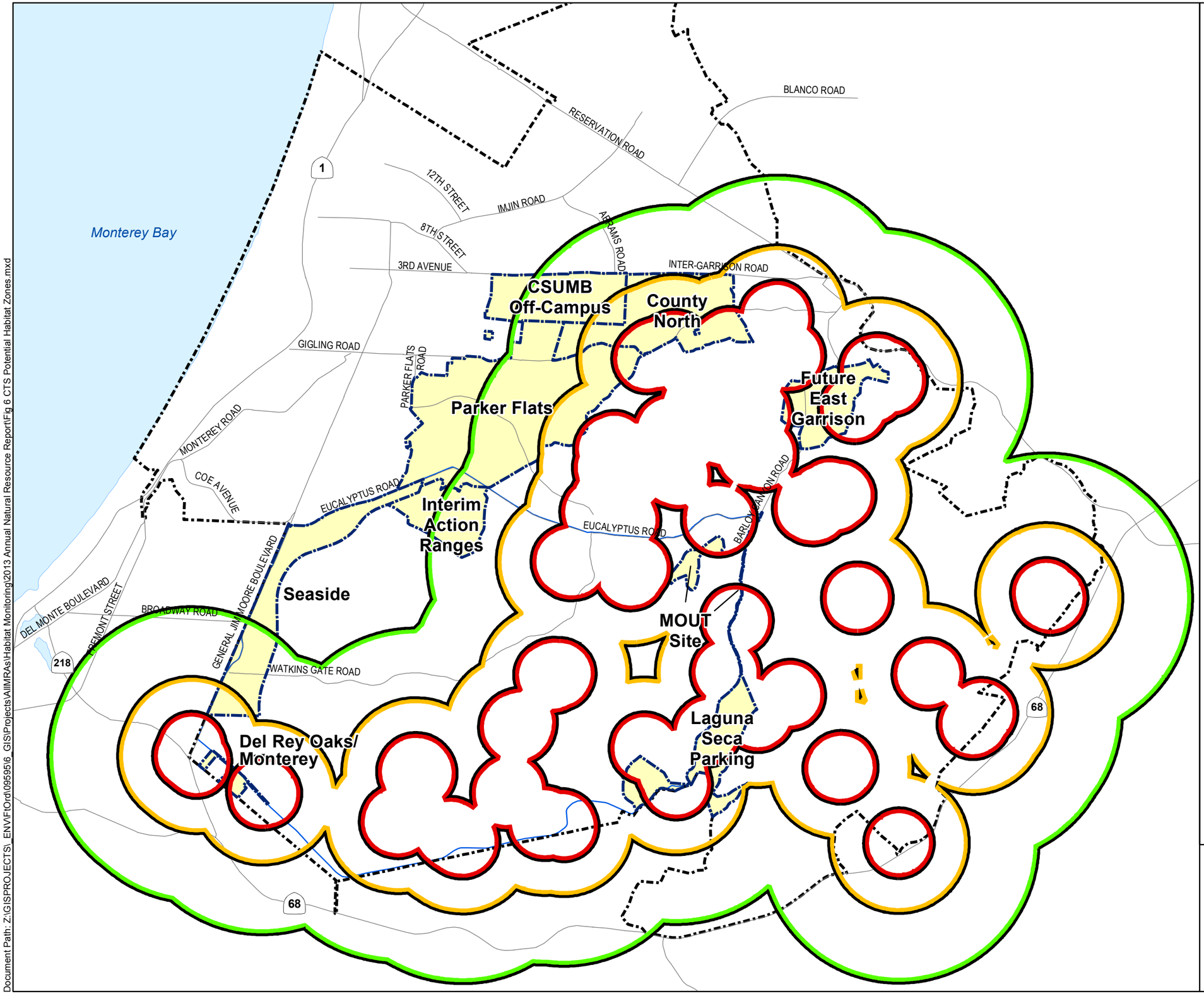
2013 Annual Natural Resource Report

Fomer Fort Ord Monterey Spineflower Critical Habitat Locations

FORA ESCA RP
Monterey County, California

Figure 5

Document Path: Z:\GISPROJECTS_ENVFtOrd\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 5 Monterey Spineflower Critical Habitat Location.mxd



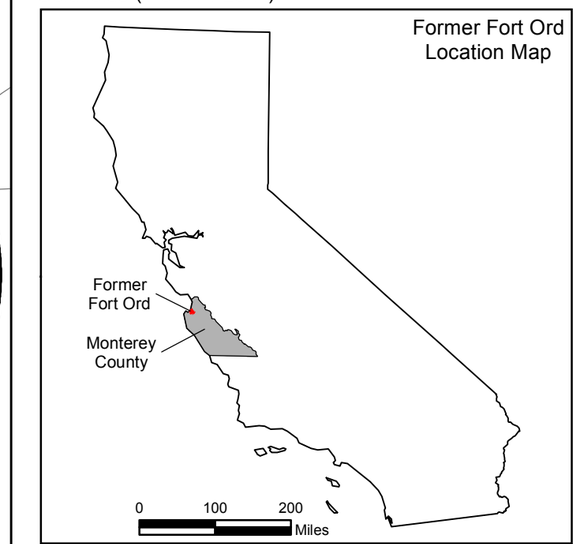
Legend

- Major Roads
- Former Fort Ord Boundary
- ESCA Munitions Response Areas
- Historical Impact Area Boundary

California Tiger Salamander - Habitat Zones

- 500 M
- 1 KM
- 2 KM

Source: USFWS. 2005. 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-F25-R)



N

0 4,500 9,000 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

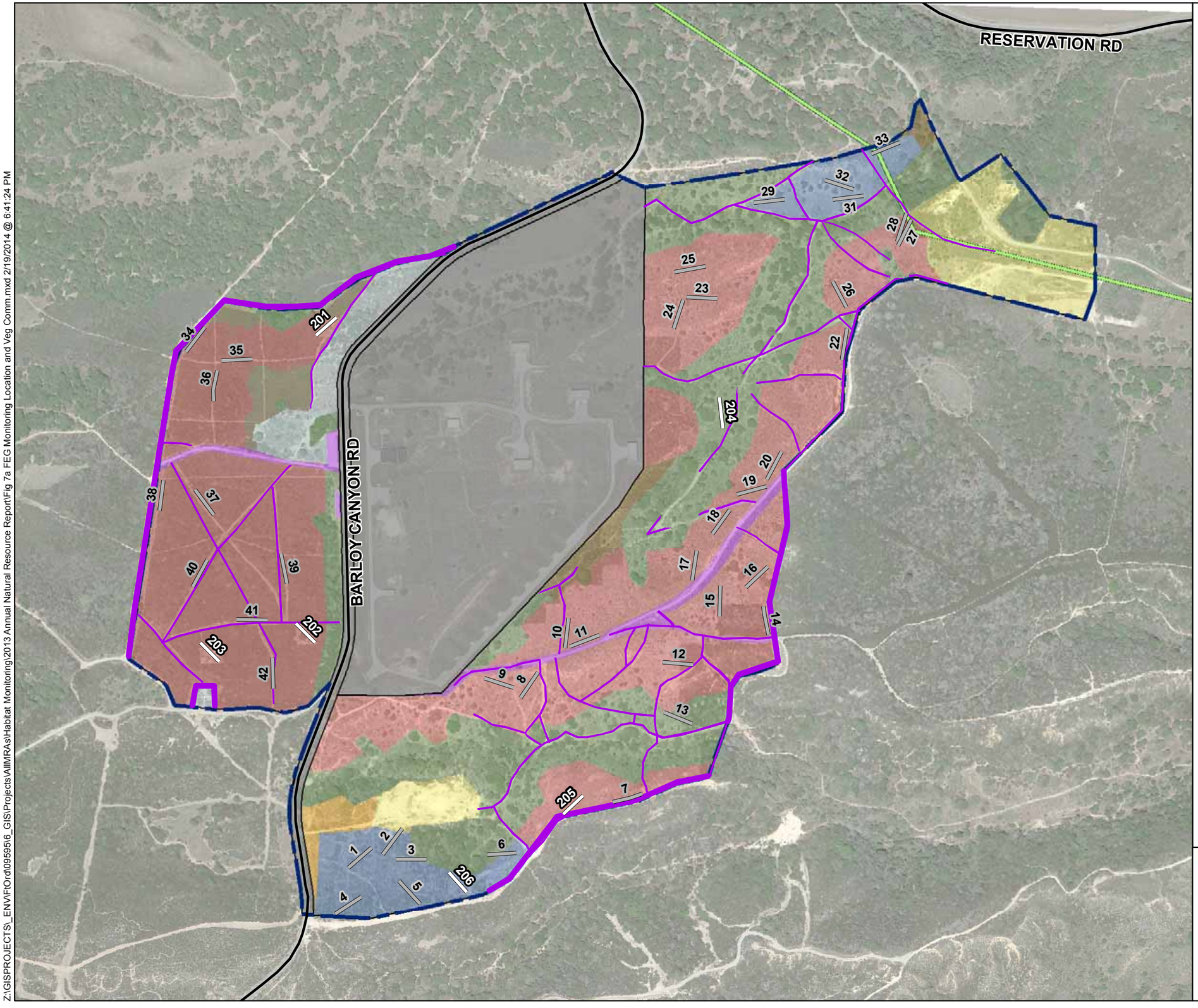
2013 Annual Natural Resource Report

California Tiger Salamander Habitat Buffer Zones

FORA ESCA RP
Monterey County, California

Figure 6

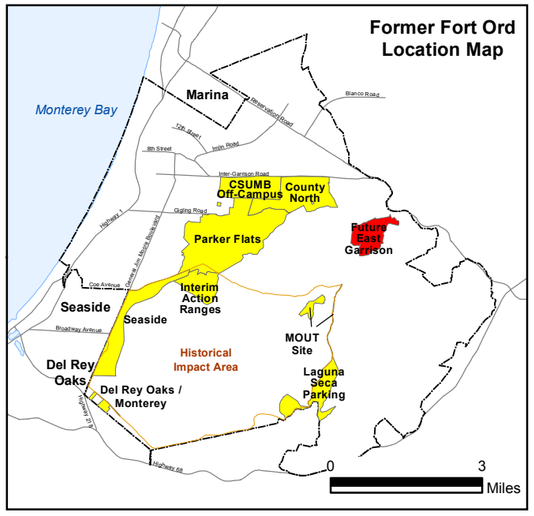
Document Path: Z:\GIS\PROJECTS_ENVFtOrd\0959\6_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 6 CTS Potential Habitat Zones.mxd



Legend

- Munitions Response Area
- Major Road
- Natural Gas Pipeline
- Development Parcel
- 2013 Vegetation Transects
- Additional Ongoing Transect Monitoring Locations
- Grassland
- Chamise-dominated Chaparral
- Low Quality Disturbed Chaparral
- Central Maritime Chaparral
- Coast Live Oak Woodland
- Ruderal and Cleared Areas (includes several aquatic features)
- Low Recruitment Area
- Trails and Fuel Breaks

Note: Vegetation mapping modified from ESCA RP Annual Resources Monitoring Report 2011.



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 500 1,000 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

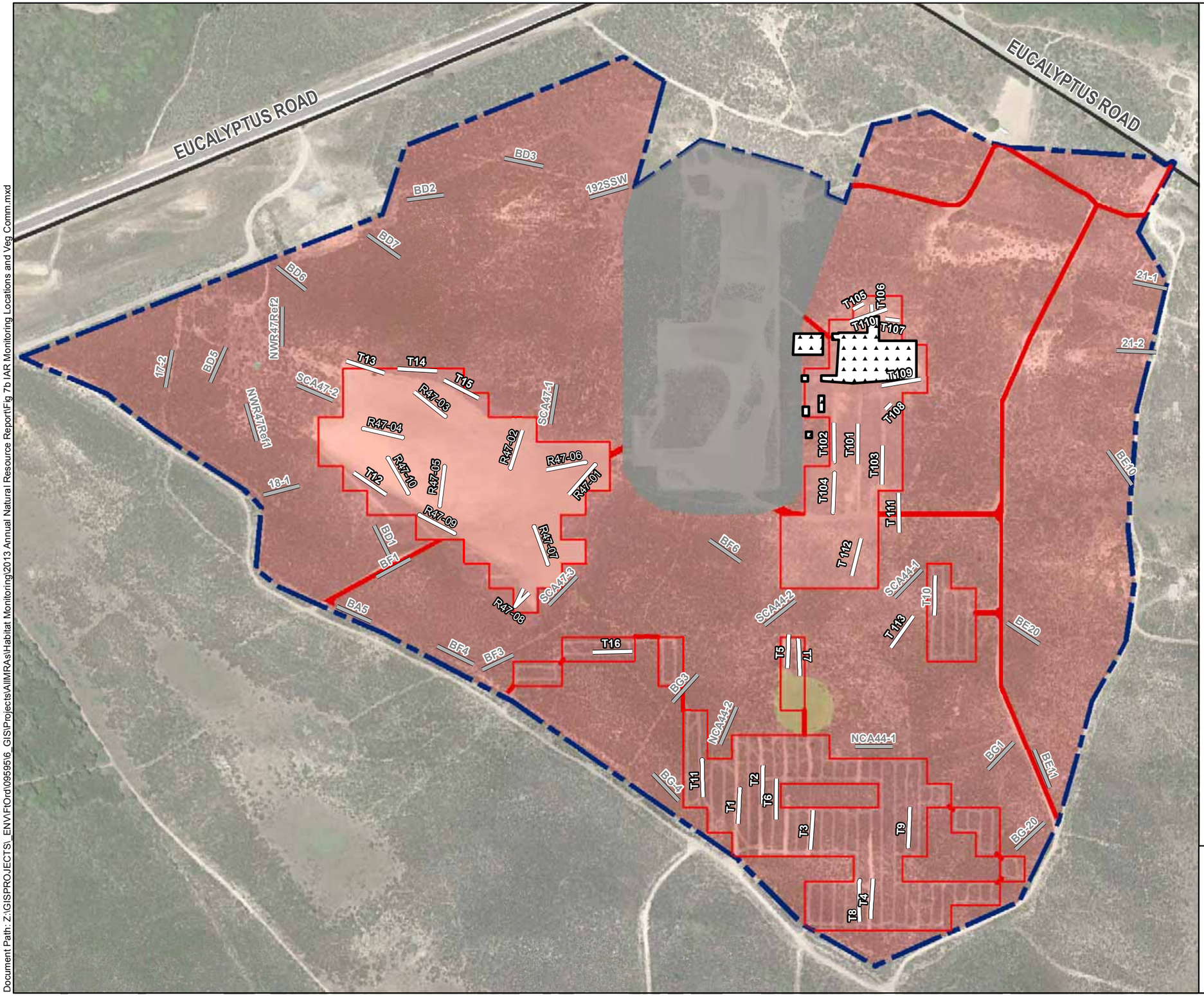
2013 Annual Natural Resource Report

Vegetation Monitoring Locations
Future East Garrison MRA

FORA ESCA RP
Monterey County, California

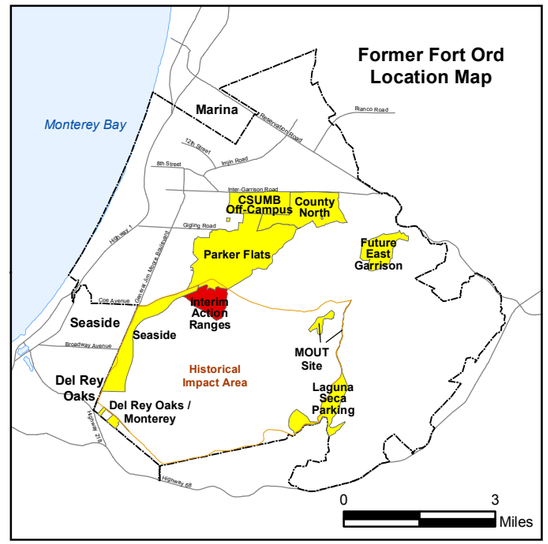
Figure 7a

Z:\GISPROJECTS_ENV\FtOrd\095956_GIS\Projects\All\MRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 7a FEG Monitoring Location and Veg Comm.mxd 2/19/2014 @ 6:41:24 PM



Legend

- Munitions Response Area
- Major Road
- Development Parcel
- Ingress/Egress Routes
- Site 39 (HA44) US Army Action
- Special Case and Non-Completed Areas (Work Areas)
- 24 — 2013 Vegetation Transects
- 24 — Additional Ongoing Transect Monitoring Locations
- Grassland
- Central Maritime Chaparral



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 400 800 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

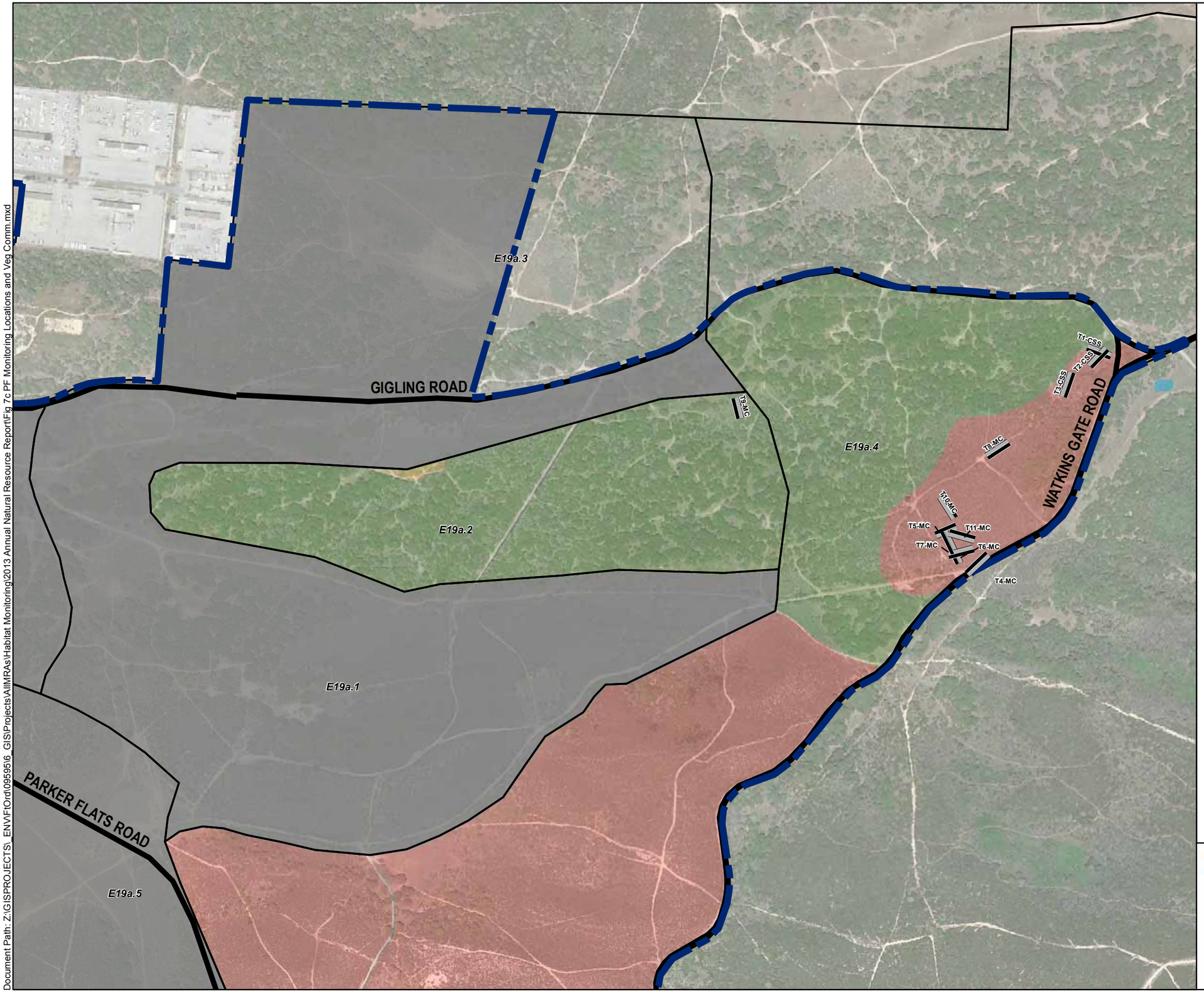
2013 Annual Natural Resource Report

Vegetation Monitoring Locations
Interim Action Ranges MRA

FORA ESCA RP
Monterey County, California

Figure 7b

Document Path: Z:\GISPROJECTS_ENV\FtOrd\09595\6_GIS\ProjectsAllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 7b IAR Monitoring Locations and Veg Comm.mxd



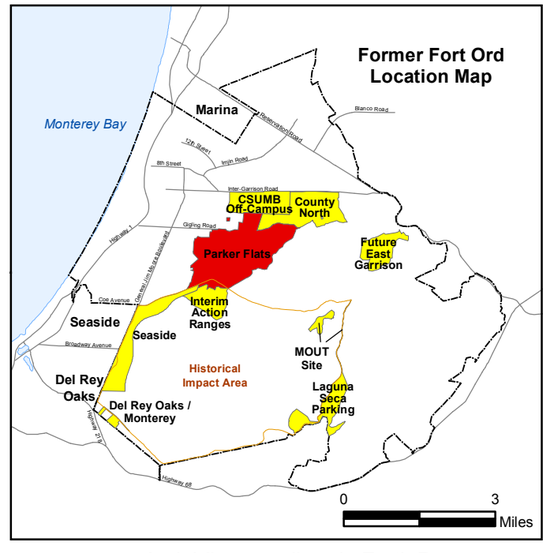
Legend

- Munitions Response Area
- Major Road
- E19a.4 — USACE Parcel
- Development Parcel
- Additional Ongoing Transect Monitoring Locations
- 2012 Transect (Monitoring)

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.



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 600 1,200 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report

Vegetation Monitoring Locations
Parker Flats MRA

FORA ESCA RP
Monterey County, California

Figure 7c

Document Path: Z:\GIS\PROJECTS_ENV\FtOrd\095956_GIS\Projects\AIIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 7c PF Monitoring Locations and Veg Comm.mxd

8TH STREET
3RD AVENUE
ABRAMS ROAD
INTER-GARRISON ROAD
WATKINS GATE ROAD
PARKER FLATS ROAD
EUCALYPTUS ROAD
BARLOY CANYON ROAD

Legend

- Munitions Response Area
- Major Road
- Habitat Reserve

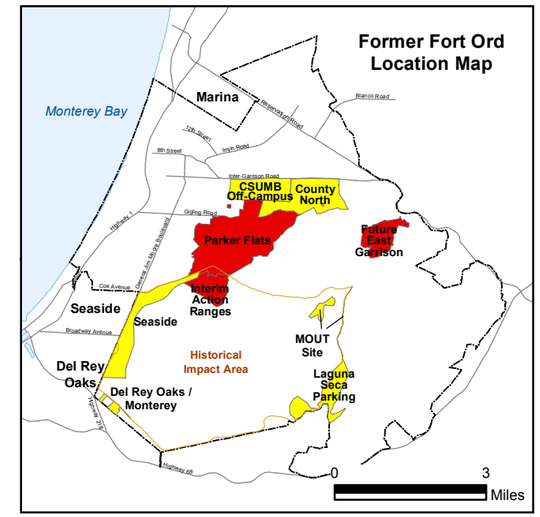
Species Density (Approx. # per 10,000 sq. ft., 1992)

- 0-50 - Low*
- 51-500 - Medium*
- > 500 - High*

Species Density (# per Grid Cell, 2013)

- 1-50
- 51-100
- 101 - 500
- > 500

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



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 2,000 4,000 Feet

ARCADIS
WESTON SOLUTIONS

2013 Annual Natural Resource Report

HMP Herbaceous Species in All Habitat Parcels - Monterey Spineflower

FORA ESCA RP
Monterey County, California

Figure 8a

Legend

- Munitions Response Area
- Major Road
- Habitat Reserve

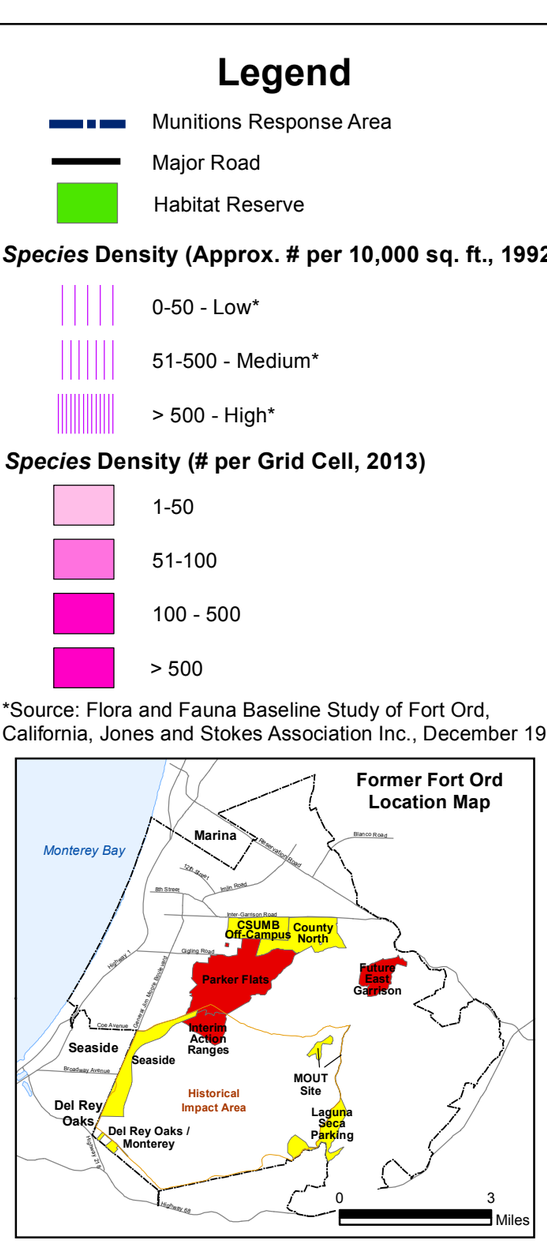
Species Density (Approx. # per 10,000 sq. ft., 1992)

- 0-50 - Low*
- 51-500 - Medium*
- > 500 - High*

Species Density (# per Grid Cell, 2013)

- 1-50
- 51-100
- 100 - 500
- > 500

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



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 2,000 4,000 Feet

ARCADIS
WESTON SOLUTIONS

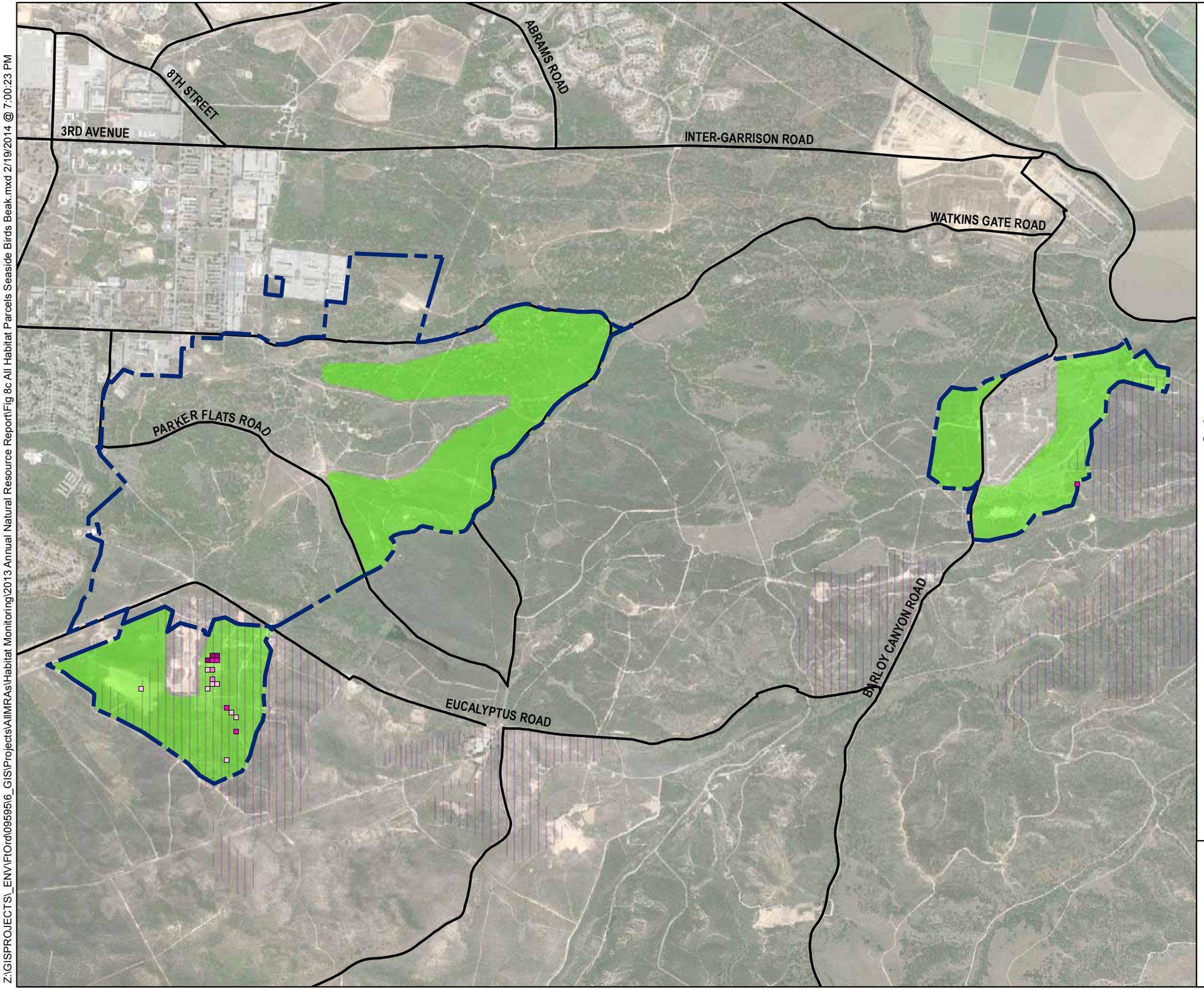
2013 Annual Natural Resource Report

HMP Herbaceous Species in All Habitat Parcels - Monterey Gilia

FORA ESCA RP
Monterey County, California

Figure 8b

Z:\GIS\PROJECTS_ENV\FtOrd\0959516_GIS\ProjectsAllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 8b All Habitat Parcels Monterey Gilia.mxd 2/19/2014 @ 6:59:30 PM



Legend

- Munitions Response Area
- Major Road
- Habitat Reserve

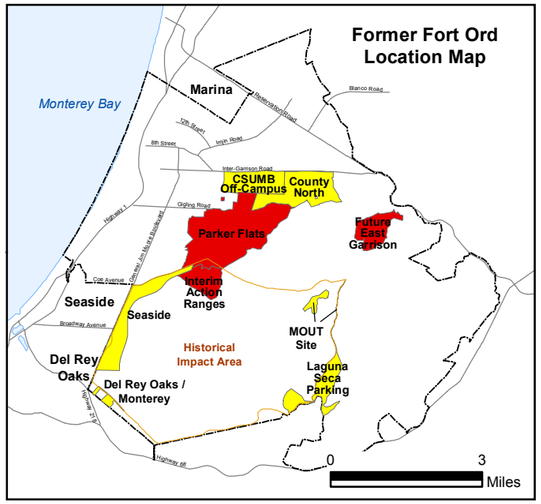
Species Density (Approx. # per 10,000 sq. ft., 1992)

- 0-50 - Low*
- 51-500 - Medium*

Species Density (# per Grid Cell, 2013)

- 1-50
- 51-100
- 101- 500
- > 500 - High

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



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 2,000 4,000 Feet

ARCADIS
WESTON SOLUTIONS

2013 Annual Natural Resource Report

HMP Herbaceous Species in All Habitat Parcels - Seaside Bird's-beak

FORA ESCA RP
Monterey County, California

Figure 8c

Z:\GISPROJECTS_ENV\FtOrd\09595\6_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 8c All Habitat Parcels Seaside Birds Beak.mxd 2/19/2014 @ 7:00:23 PM

8TH STREET
3RD AVENUE
ABRAMS ROAD
INTER-GARRISON ROAD
WATKINS GATE ROAD
PARKER FLATS ROAD
EUCALYPTUS ROAD
BYRLOY CANYON ROAD

Legend

- Munitions Response Area
- Major Road
- Habitat Reserve

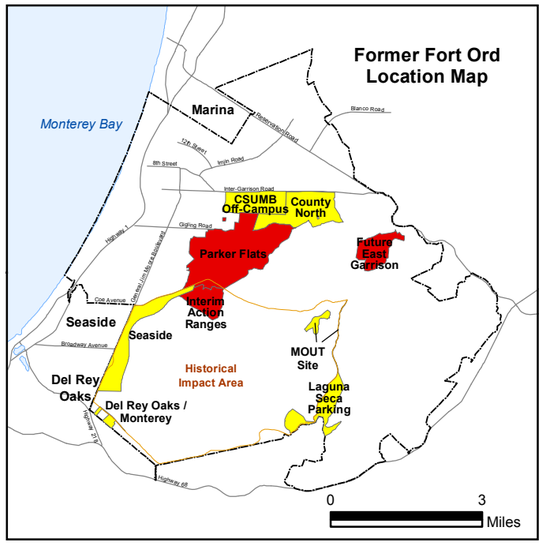
***Species* Density (Approx. # per 10,000 sq. ft., 1992)**

- 0-50 - Low*
- 51-500 - Medium*

***Species* Density (# per Grid Cell, 2013)**

- 1-50

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



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 2,000 4,000 Feet

ARCADIS
WESTON SOLUTIONS

2013 Annual Natural Resource Report

HMP Herbaceous Species in All Habitat Parcels - Coast Wallflower

FORA ESCA RP
Monterey County, California

Figure 8d

RESERVATION RD

BARLOY CANYON RD

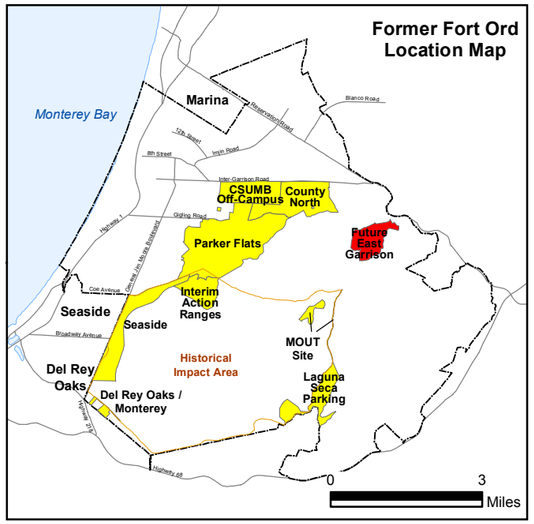
Legend

- Munitions Response Area
- Major Road
- Natural Gas Pipeline
- Development Parcel
- Grassland
- Chamise-dominated Chaparral
- Low Quality Disturbed Chaparral
- Central Maritime Chaparral
- Coast Live Oak Woodland
- Ruderal and Cleared Areas (includes several aquatic features)
- Low Recruitment Area
- Trails and Fuel Breaks

***Species* Density (# per Grid Cell, 2013)**

- 101-500

Note: Vegetation mapping modified from ESCA RP Annual Resources Monitoring Report 2011.



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 500 1,000 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

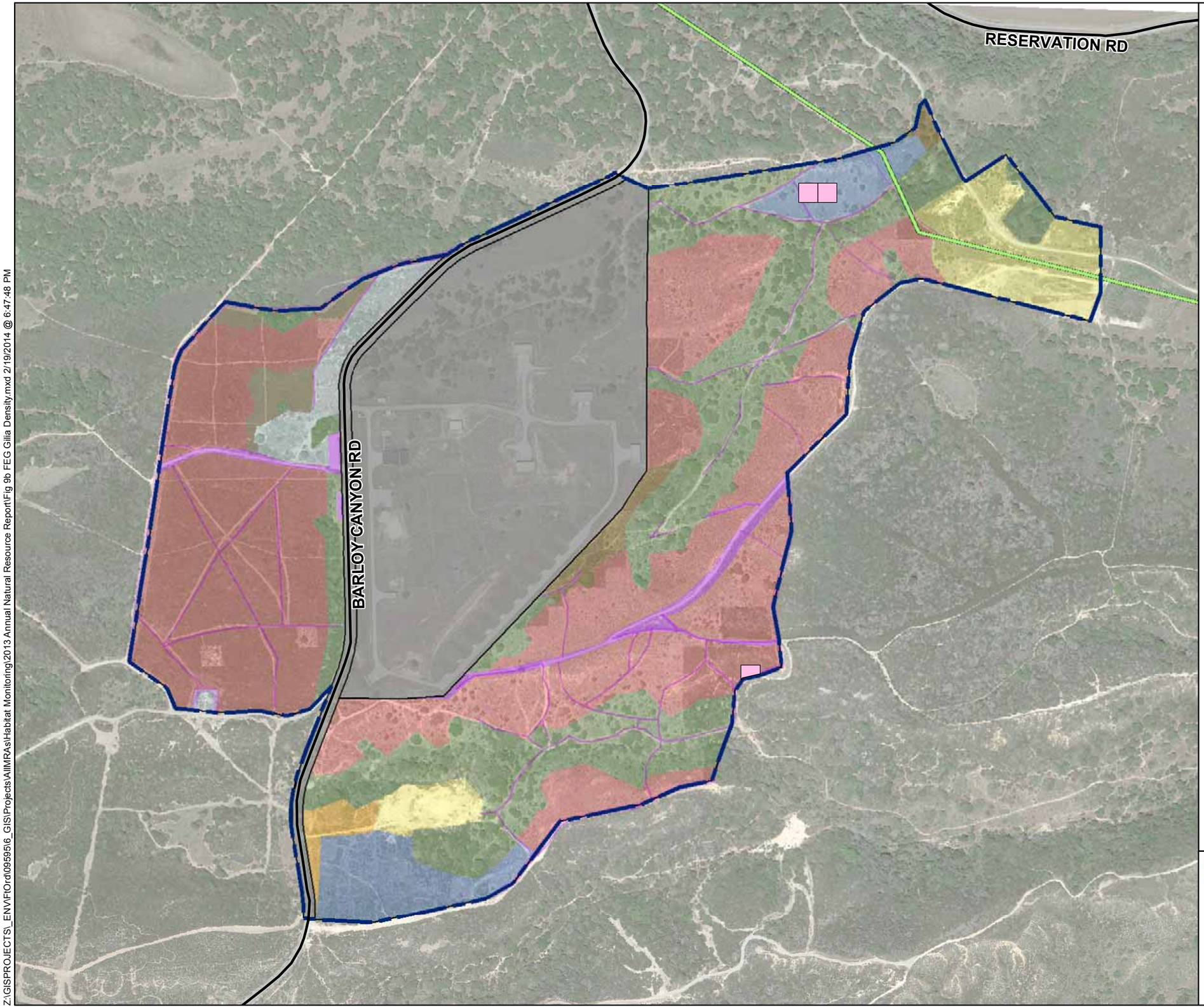
2013 Annual Natural Resource Report

HMP Annual Species in the Future East Garrison MRA - Monterey Spineflower

FORA ESCA RP
Monterey County, California

Figure 9a

Z:\GIS\PROJECTS_ENV\FtOrd\09595\6_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 9a FEG Spineflower Density.mxd 2/19/2014 @ 6:45:51 PM



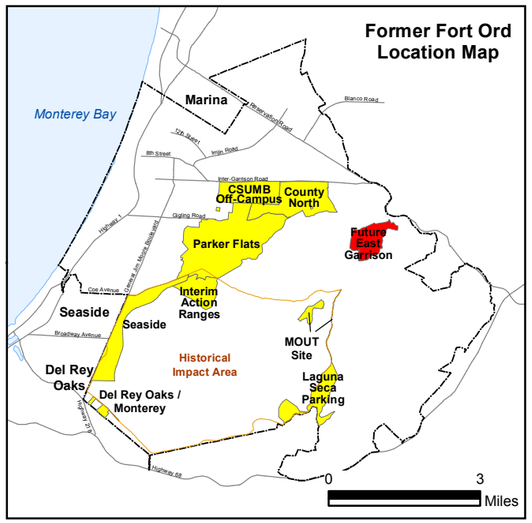
Legend

- Munitions Response Area
- Major Road
- Natural Gas Pipeline
- Development Parcel
- Grassland
- Chamise-dominated Chaparral
- Low Quality Disturbed Chaparral
- Central Maritime Chaparral
- Coast Live Oak Woodland
- Ruderal and Cleared Areas (includes several aquatic features)
- Low Recruitment Area
- Trails and Fuel Breaks

***Species* Density (# per Grid Cell, 2013)**

- 1-50

Note: Vegetation mapping modified from ESCA RP Annual Resources Monitoring Report 2011.



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 500 1,000 Feet

ARCADIS

WESTON SOLUTIONS

WESTOLIFFE ENGINEERS

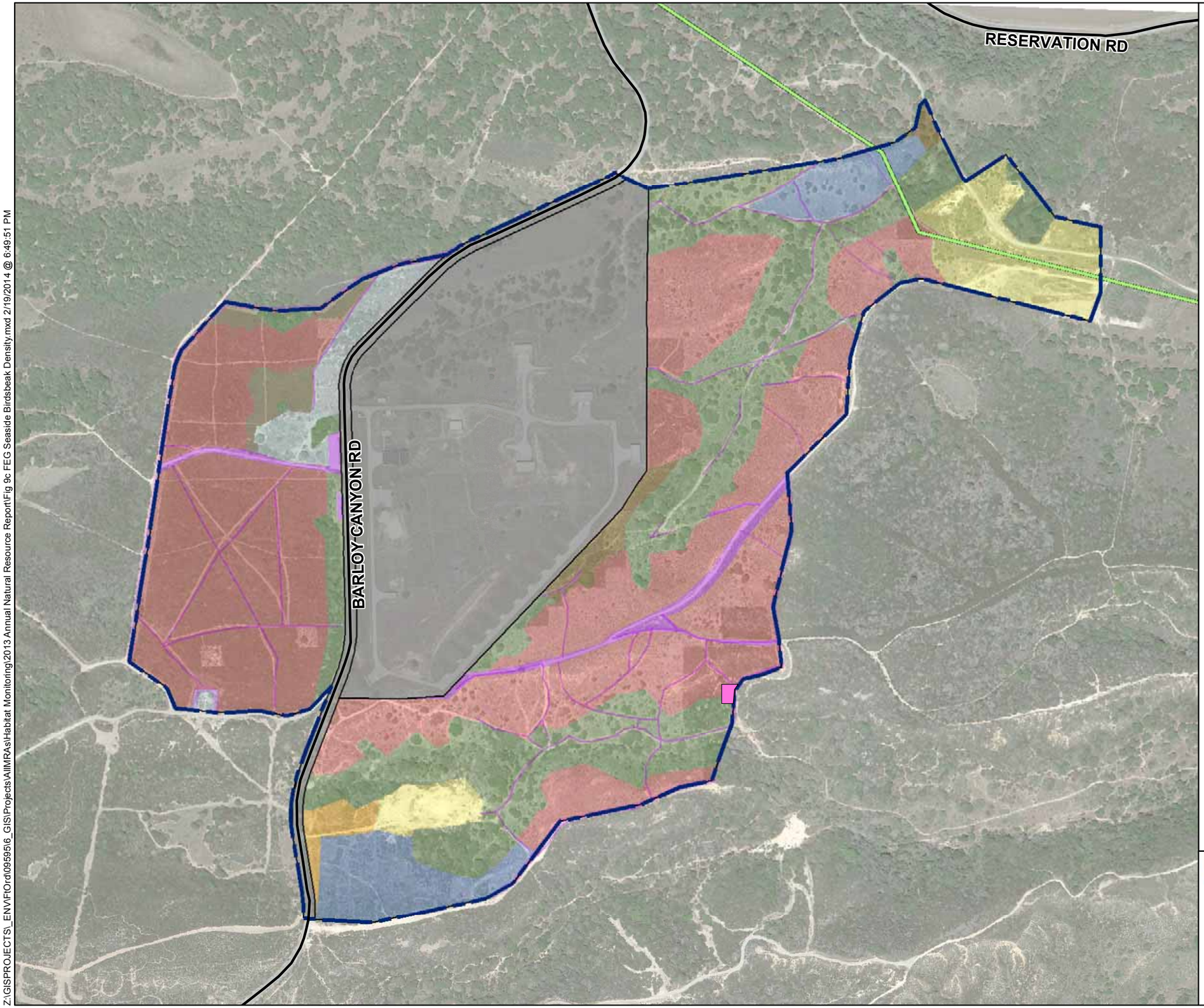
2013 Annual Natural Resource Report

HMP Annual Species in the Future East Garrison MRA - Monterey Gilia

FORA ESCA RP
Monterey County, California

Figure 9b

Z:\GISPROJECTS_ENV\FtOrd\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 9b FEG Gilia Density.mxd 2/19/2014 @ 6:47:48 PM



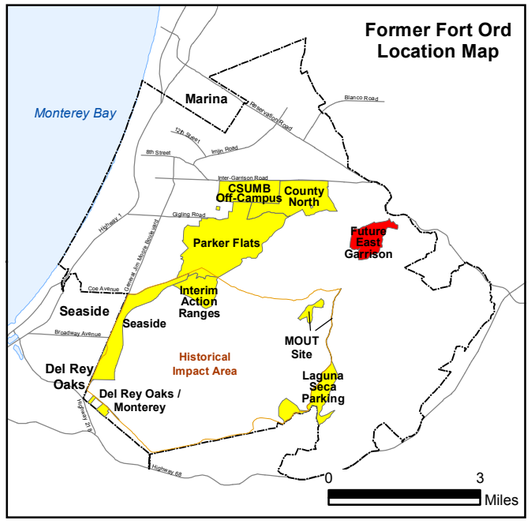
Legend

- Munitions Response Area
- Major Road
- Natural Gas Pipeline
- Development Parcel
- Grassland
- Chamise-dominated Chaparral
- Low Quality Disturbed Chaparral
- Central Maritime Chaparral
- Coast Live Oak Woodland
- Ruderal and Cleared Areas (includes several aquatic features)
- Low Recruitment Area
- Trails and Fuel Breaks

***Species* Density (# per Grid Cell, 2013)**

- 51-500

Note: Vegetation mapping modified from ESCA RP Annual Resources Monitoring Report 2011.



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 500 1,000 Feet

ARCADIS

WESTON SOLUTIONS

WESTOLIFFE ENGINEERS

2013 Annual Natural Resource Report

HMP Annual Species in the Future East Garrison MRA - Seaside Bird's Beak

FORA ESCA RP
Monterey County, California

Figure 9c

Z:\GISPROJECTS_ENV\FtOrd\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 9c FEG Seaside Birdsbeak Density.mxd 2/19/2014 @ 6:49:51 PM

Document Path: Z:\GIS\PROJECTS_ENVFtOrd\095956_GIS\Projects\AIIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 10a Spineflower IAR Habitat Density.mxd

Legend

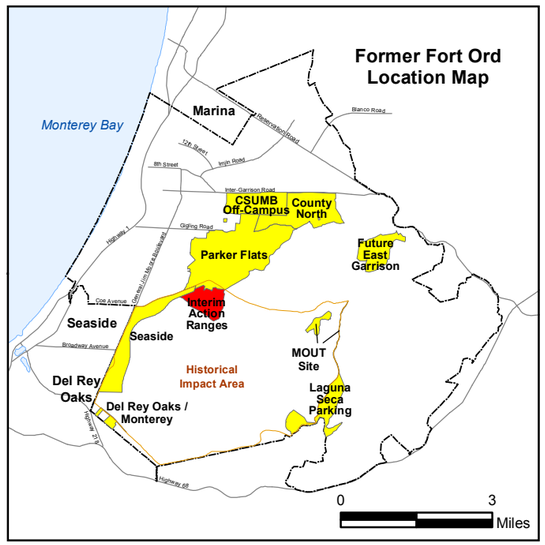
- Munitions Response Area
- Major Road
- Special Case and Non-Completed Areas (Work Areas)
- Site 39 (HA44) US Army Action
- Development Parcel

***Species* Density (# per Grid Cell, 2013)**

- 1-50
- 51-100
- 101-500
- 501-10000

Vegetation Type

- Grassland
- Central Maritime Chaparral



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 400 800 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report

HMP Annual Species in the Interim Action Ranges MRA Monterey Spineflower

FORA ESCA RP
Monterey County, California

Figure 10a

Document Path: Z:\GIS\PROJECTS_ENVFtOrd\095956_GIS\Projects\AIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 10b Sand Gilia IAR Habitat Density.mxd

Legend

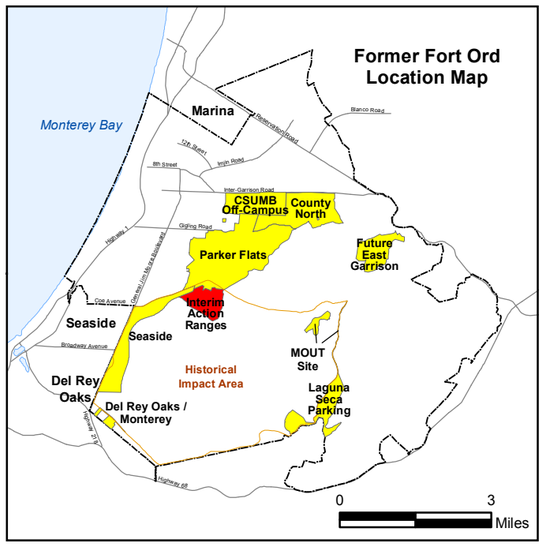
- Munitions Response Area
- Major Road
- Special Case and Non-Completed Areas (Work Areas)
- Site 39 (HA44) US Army Action
- Development Parcel

***Species* Density (# per Grid Cell, 2013)**

- 1-50
- 51-100
- 101-500
- 501-10000

Vegetation Type

- Grassland
- Central Maritime Chaparral



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 400 800 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report

HMP Annual Species in the Interim Action Ranges MRA Monterey Gilia

FORA ESCA RP
Monterey County, California

Figure 10b

Document Path: Z:\GIS\PROJECTS_ENVFtOrd\095956_GIS\Projects\AIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 10c Birds Beak IAR Habitat Density.mxd

Legend

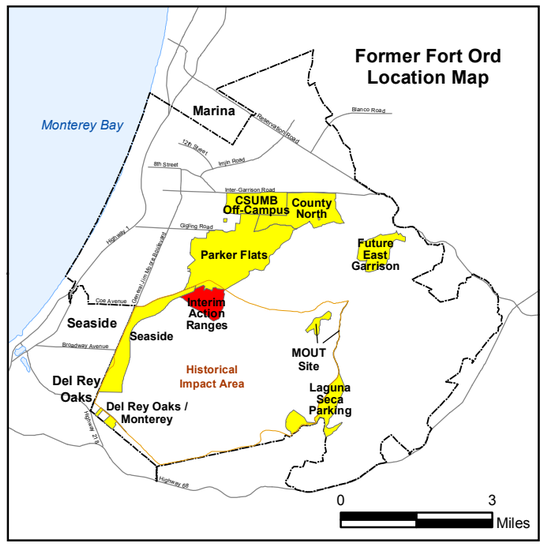
- Munitions Response Area
- Major Road
- Special Case and Non-Completed Areas (Work Areas)
- Site 39 (HA44) US Army Action
- Development Parcel

***Species* Density (# per Grid Cell, 2013)**

- 1-50
- 51-100
- 101-500
- 501-10000

Vegetation Type

- Grassland
- Central Maritime Chaparral



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 400 800 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report

HMP Annual Species in the Interim Action Ranges MRA Seaside Bird's-Beak

FORA ESCA RP
Monterey County, California

Figure 10c

Document Path: Z:\GIS\PROJECTS_ENVFtOrd\095956_GIS\Projects\AIMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 10d Wallflower IAR Habitat Density.mxd

Legend

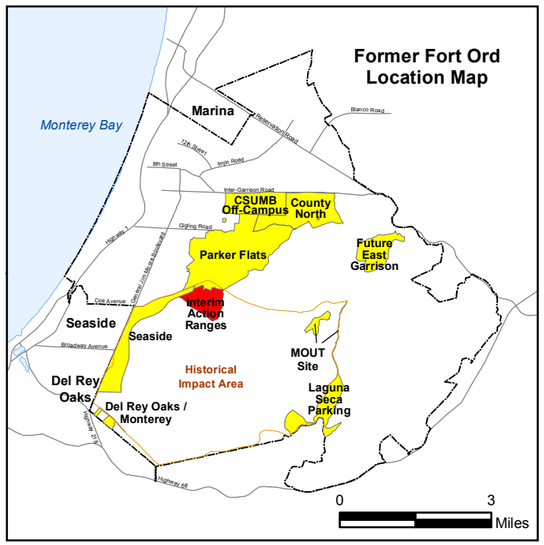
- Munitions Response Area
- Major Road
- Special Case and Non-Completed Areas (Work Areas)
- Site 39 (HA44) US Army Action
- Development Parcel

***Species* Density (# per Grid Cell, 2013)**

- 1-50

Vegetation Type

- Grassland
- Central Maritime Chaparral



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

0 400 800 Feet

ARCADIS
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report

HMP Annual Species in the Interim Action Ranges MRA Coast Wallflower

FORA ESCA RP
Monterey County, California

Figure 10d

GIGLING ROAD

WATKINS GATE ROAD

Legend

- Munitions Response Area
- Major Road
- E11b.8 — USACE Parcel
- Development Parcel

Vegetation Type

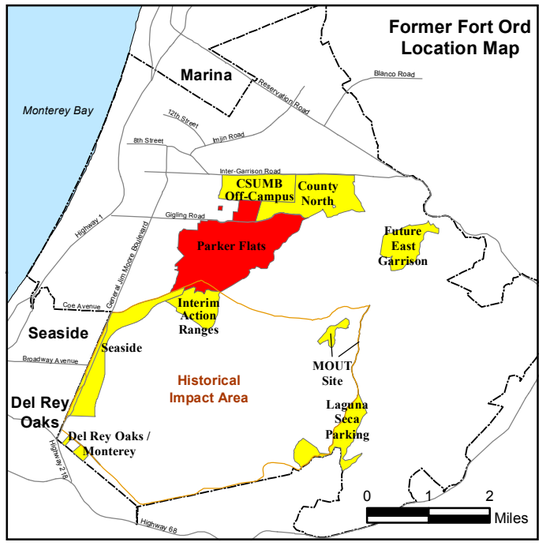
- Grassland*
- Maritime Chaparral*
- Coastal Coast Live Oak Woodland*
- Aquatic Feature*
- Developed / Disturbed

Species Density (# per Grid Cell, 2013)

- 1-50
- 51-100
- 101-500

NOTE: Monterey Gilia, and Seaside Bird's-Beak were surveyed but were absent.

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



Aerial Source: Google Earth Pro,
Accessed 12/2/2013 - Image Date: 5/5/2012

N

0 600 1,200 Feet

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

2013 Annual Natural Resource Report

HMP Annual Species in the Parker Flats MRA - Monterey Spineflower

FORA ESCA RP
Monterey County, California

Figure 11

Document Path: Z:\GIS\PROJECTS_ENV\FtOrd\0959516_GIS\Projects\AllMRAs\Habitat Monitoring\2013 Annual Natural Resource Report\Fig 11 PF Spineflower Density.mxd

Figure12. Vegetation Cover Before and After Vegetation-cutting in 2011 in the IAR MRA (Average of All Locations).

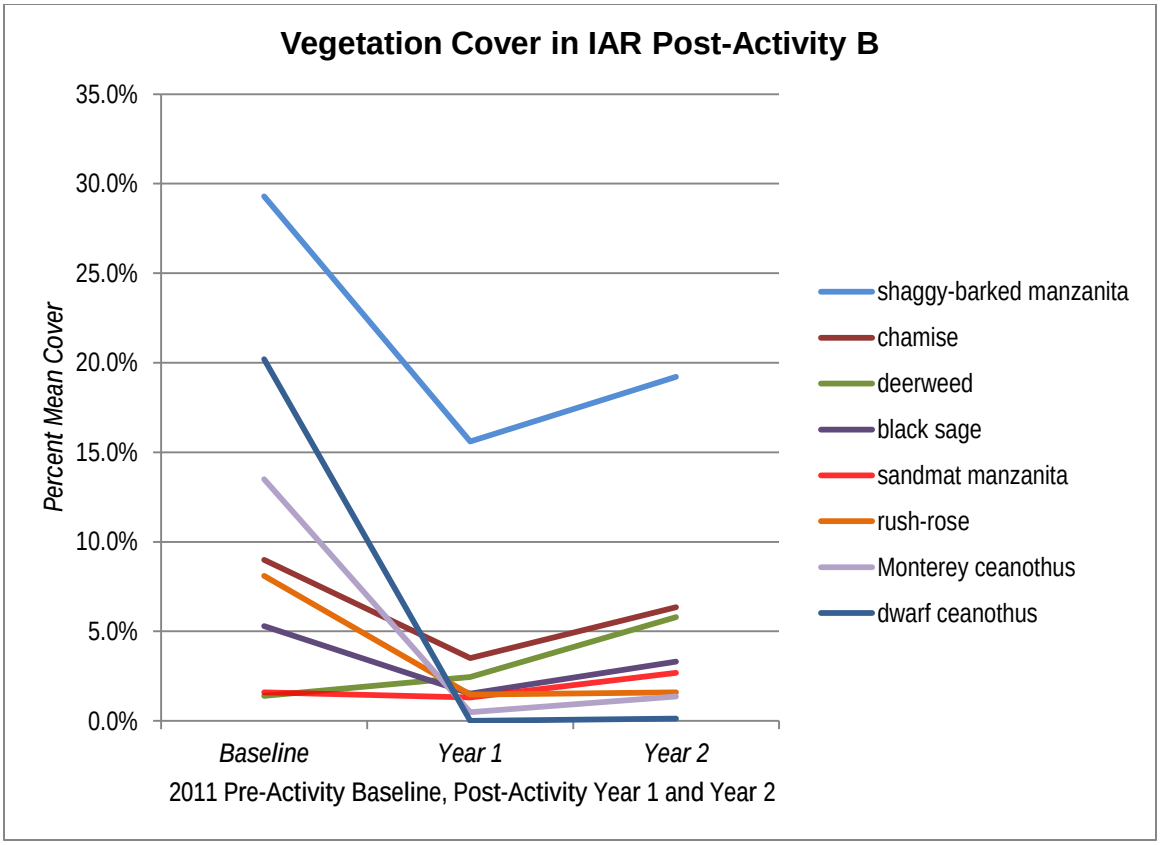


Figure 13. Vegetation Cover Before and After Small-scale Excavations in 2011 in the IAR MRA (Average of All Locations).

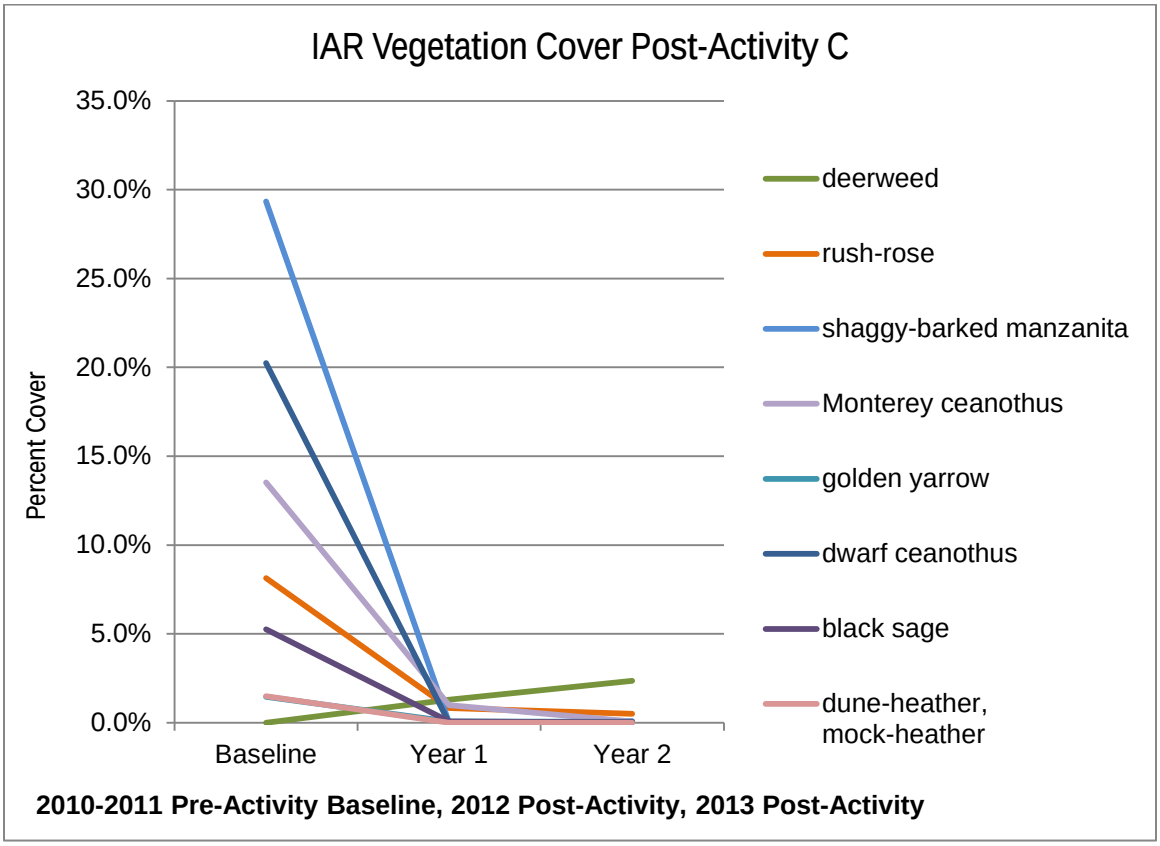


Figure 14. Principal Components Analysis Plotting Relative Cover of Plant Species in Vegetation Transects Based on Similarity

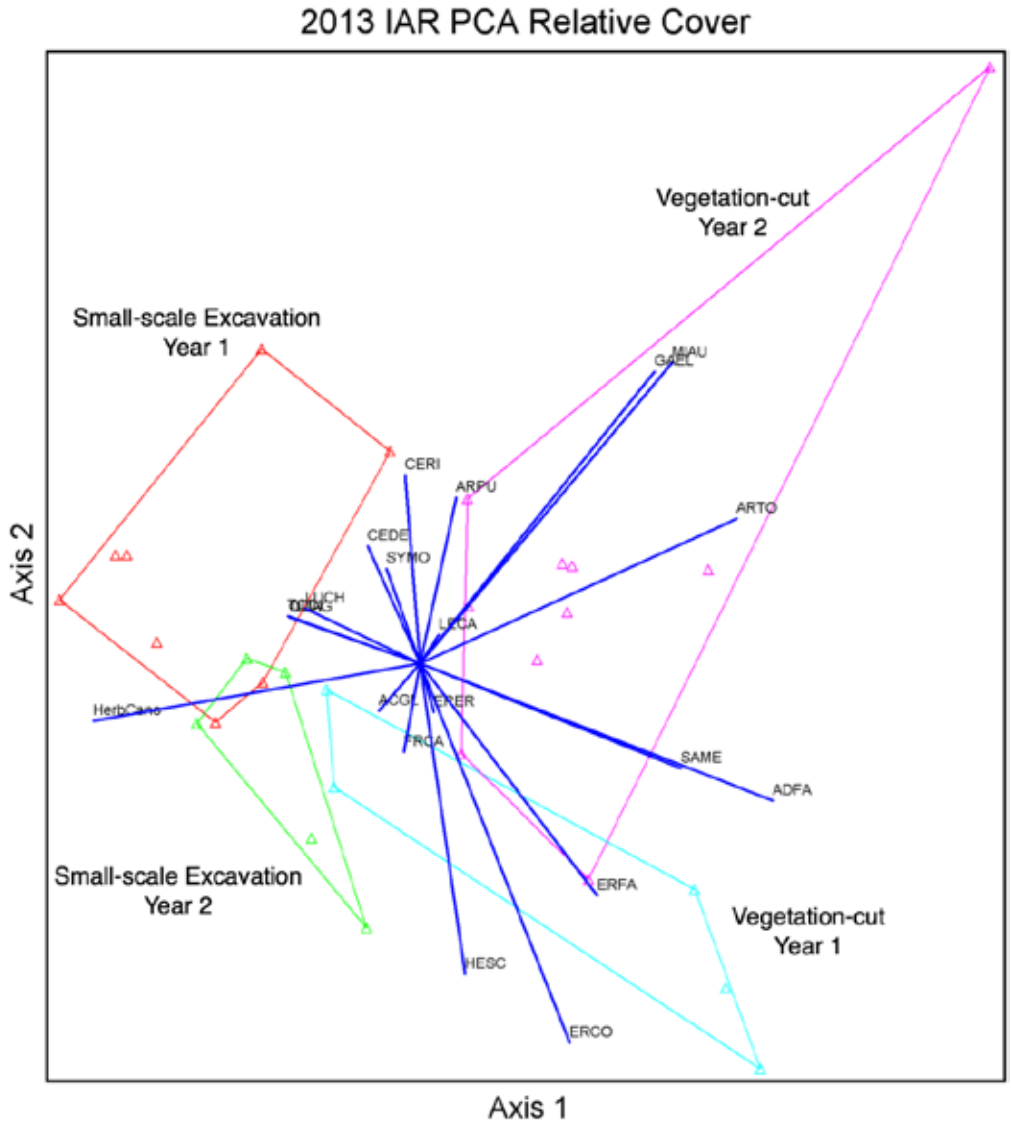


Figure 14. Principal Components Analysis Plotting Relative Cover of Plant Species in Vegetation Transects Based on Similarity

Code	Scientific Name	Common Name
ACGL	*Acmispon glaber*	deerweed
ADFA	*Adenostoma fasciculatum*	chamise
ARPU	*Arctostaphylos pumila*	sandmat manzanita
ARTO	*Arctostaphylos tomentosa* subsp. *tomentosa*	shaggy-barked manzanita
CEDE	*Ceanothus dentatus*	dwarf ceanothus
CERI	*Ceanothus rigidus*	Monterey ceanothus
ERCO	*Eriophyllum confertiflorum*	golden yarrow
ERER	*Ericameria ericoides*	dune-heather, mock-heather
ERFA	*Ericameria fasciculata*	Eastwood's ericameria
FRCA	*Frangula californica*	California coffeeberry
GAEL	*Garrya elliptica*	coast silk-tassel
HESC	*Helianthemum scoparium*	rush-rose
LECA	*Lepechinia calycina*	pitcher sage
LUCH	*Lupinus chamissonis*	silver bush lupine
MIAU	*Mimulus aurantiacus*	sticky monkeyflower
QUAG	*Quercus agrifolia*	coast live oak
SAME	*Salvia mellifera*	black sage
SYMO	*Symphoricarpos mollis*	creeping snowberry

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E

APPENDIX F