FORA ESCA REMEDIATION PROGRAM

2019 Annual Natural Resource Monitoring, Mitigation, and Management Report Covering Activities Conducted from 1 January 2019 through 31 December 2019

Environmental Services Cooperative Agreement Remediation Program Munitions Response Areas

Former Fort Ord
Monterey County, California

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FORT ORD REUSE AUTHORITY

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WESTCLIFFE | ENGINEERS

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AOC	Administrative Order of Consent
Arcadis	Arcadis U.S., Inc.
Army	United States Department of the Army
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
BRAC	Base Realignment and Closure
CDFW	California Department of Fish and Wildlife (formerly CDFG, California Department of Fish and Game)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter(s)
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Ranking
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
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)

LUCs	Land Use Controls
m	meter(s)
MD	munitions debris
MEC	munitions and explosives of concern
MOU	Memorandum of Understanding
MOUT	Military Operations in Urban Terrain
MPC	Monterey Peninsula College
MRA	Munitions Response Area(s)
MRS	Munitions Response Site
NCA	Non-Completed Area
NRCS	Natural Resources Conservation Service
NRMA	Natural Resources Management Area
QB	Qualified Biologist
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCA	Special Case Area
SQB	Senior Qualified Biologist
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 ("ESCA RP Team", consisting of Arcadis U.S., Inc. [Arcadis], Weston Solutions, Inc., and Westcliffe Engineers, Inc.) during the period from 1 January 2019 through 31 December 2019. This report includes 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 the Programmatic Biological Opinion (BO; USFWS 2017) issued to the United States Department of the Army (Army) by the United States Fish and Wildlife Service (USFWS). The HMP and BO 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 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 twelfth in a series of Annual Natural Resource Monitoring, Mitigation, and Management Reports produced for the ESCA RP. The eleven previous reports covered the 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2018 reporting periods (ESCA RP Team 2009, 2010a, 2011a, 2012a, 2013b, 2014, 2015, 2016, 2017, 2018, and 2019b).

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 United States 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 governing the remaining munitions and explosives of concern (MEC) removal activities required for the Army to provide FORA funding to complete munitions response actions required for remedy implementation. In accordance with the ESCA and an Administrative Order on Consent (AOC), FORA is responsible for completion of CERCLA response actions on approximately 3,300 acres (1351.6 hectares [ha]) of the former Fort Ord with funding provided by the Army, except for those responsibilities retained by the Army. 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 CERCLA Docket No. R9-2007-03). The underlying property was transferred to FORA in May 2009. The AOC was issued by EPA 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. 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 Corridors – lands within habitat reserve set aside for future road development; to be managed as habitat reserve until road development occurs

Development with Reserve or Development with Restriction – lands slated for development that contain inholdings of reserve or require specific restrictions to protect biological resources values; management of reserve inholdings must match that for habitat reserves, while management in development areas must proceed with certain specific restrictions identified in the HMP.

The nine ESCA MRAs are made up of entire or partial parcels. As defined by the HMP, the parcels 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 (Figures 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.

Most of the ESCA RP Team munitions investigation activities were completed in all MRAs by the end of 2013. Associated biological field activities continue to be performed in two MRAs that contain habitat reserve or habitat corridor parcels: FEG and IAR (Table 1-1, Figures 3a and 3b). As detailed in Appendix A, habitat restoration monitoring activities were conducted in the IAR MRA Range Restoration Areas during this period.

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 BO (USFWS 2017) 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 native 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. Following the HMP, a portion of the Interim Action Ranges MRA was subsequently identified as non-residential development in a proposal for land-use modifications titled Assessment East Garrison – Parker Flats Land Use Modifications ("the 2002 Land Use Modifications"; Zander 2002) and in the Memorandum of Understanding Concerning the Proposed East Garrison/Parker Flats Land-Use Modification Between the FORA, Monterey Peninsula College (MPC), County of Monterey, U.S. Bureau of Land Management (BLM), and U.S. Army as Parties to the Agreement ("the 2004 Memorandum of Understanding [MOU]"; Army 2004). The 2002 Land Use Modifications and 2004 MOU included revision to the position of the borderland interface.

The HMP and BO 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; USFWS 2017). 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 threatened 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 (CNPS), 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
- California Native Plant Society 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 team foot traffic, and on-site MEC detonation. The anticipated habitat acreage and number of plants of HMP species affected by munitions investigation activities were 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*), sand (Monterey) gilia (*Gilia tenuiflora* subsp. *arenaria*), seaside bird's beak (*Cordylanthus rigidus* subsp. *littoralis*), coast wallflower, Yadon's piperia (*Piperia yadonii*), 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: sand (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 sand (Monterey) gilia. The effects of Army munitions cleanup activities on the federally-listed Contra Costa goldfields (*Lasthenia conjugens*) are addressed in two Biological Opinions (USFWS 2005, 2017), as discussed in the next section; however, no known populations of Contra Costa goldfields occur on ESCA property.

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, and 8 after munitions investigation activities, and follow-up surveys for HMP annuals are conducted in Years 1, 3, and 5 after munitions investigation activities (Tetra Tech and EcoSystems West 2015). 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 shrub species, percent cover by non-native species, HMP annual species density, field notes and photographic documentation.

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 sand (Monterey) gilia, Monterey spineflower, seaside bird's beak, and California black legless lizard.

Post-disturbance restoration focusing on HMP annual species - sand (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 central 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 are then utilized for adaptive management of restoration activities to reflect changing conditions and continued progression toward success criteria specified in the Revisions of Protocol for Conducting Vegetation Monitoring for Compliance with the Installation-Wide Multispecies Habitat Management Plan, Former Fort Ord (protocol; Tetra Tech and EcoSystems West 2015), including supplemental weeding, planting, or seeding. Wetlands used by CTS, if disturbed, are also required to be restored (USFWS 2017). 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.

Follow-up monitoring of restored aquatic features occurs during each rainy season for five years after restoration. 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.

2.2 Biological Opinions

The USFWS has issued BOs to the Army, of which six are applicable to the ESCA (USFWS 1999, 2002, 2005, 2007, 2015, and 2017). All BOs related to the former Fort Ord are cited in the references of this report; the brief summary below focuses on the applicable BOs. 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, Chenega Support Services Wildlife Biologist supporting BRAC, to address natural resource compliance requirements and progress.

Of the 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). Monterey spineflower critical habitat exists in County North, IAR, Laguna Seca Parking, and FEG MRAs (USACE 1992).

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); it was amended in 2007 to address new findings of CTS north of Reservation Road as well as a Marina Coast Water District project ("Amendment to Biological Opinion 1-8-04-F-25R, for the Cleanup and Reuse of Former Fort Ord, Monterey County, California"; USFWS 2007). CTS occur within areas adjacent to County North, IAR, FEG, Laguna Seca Parking, MOUT Site, Parker Flats, and Seaside MRAs (USACE 1992). It should be noted that no critical habitat for Contra Costa goldfields occurs on former Fort Ord.

The 28 May 2015 BO titled "Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (8-8-09-F-74)" contains an updated analysis of the effects of Army cleanup and transfer activities on Contra Costa goldfields, CTS, Monterey gilia, Smith's blue butterfly, Yadon's piperia, and any relevant critical habitat. It should be noted that Contra Costa goldfields and Yadon's piperia have not been reported to occur within the ESCA RP MRAs and there is no designated critical habitat for Contra Costa goldfields or Yadon's piperia within the former Fort Ord site. In 2017, the Army re-initiated the Programmatic Biological Opinion (USFWS 2017). The 2017 BO superseded all previous BOs.

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

The four most frequently encountered vegetation types in MRA habitat parcels are central maritime chaparral, coast live oak woodland, grassland, and aquatic features. Other vegetation types, such as central coastal scrub, cover smaller areas; a brief description of coastal scrub is incorporated into the vegetation description for central maritime chaparral that follows. Observed plant and wildlife species are documented in each of the monitoring areas in the ESCA MRAs, especially those with habitat parcels where the ESCA RP biologists most frequently work (Tables 3-1, 3-2, and 3-3). 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 comprises 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 MRAs in which 2019 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 occurring 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 IAR 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. Several 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 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.

The primary vegetation alliance for this vegetation type is the Brittleleaf -Woolly Leaf Manzanita Chaparral, as characterized by CNPS and California Department of Fish and Wildlife (CDFW; Sawyer et. al 2009). *Arctostaphylos* (*crustacea*, *tomentosa*) Shrubland Alliance has a G3/S3 rarity ranking (21-100 viable occurrences and/or 6,400-32,000 acres [2,590-12,950 ha] worldwide and statewide), as listed in the CDFW Natural Communities Hierarchy (CDFW 2018) and in California Natural Diversity Database (CNDDB; CDFW 2019).

Central coastal scrub shares many shrub species with central maritime chaparral vegetation, although dominant species differ. Overall stature of mature chaparral vegetation is generally taller than that of coastal scrub vegetation and mature chaparral dominants tend to produce waxy sclerophyllous leaves that contrast with the softer, pubescent, or smaller leaves of many coastal scrub dominants such as black sage (*Salvia mellifera*). In addition, the wood of chaparral shrubs tends to be harder and the burls larger and more resistant to surface disturbance than the stems and burls of shrubs that predominate in coastal scrub vegetation.

Coastal scrub vegetation generally occurs in drier sites than chaparral, often on south-facing exposures at slightly lower elevations. Coastal scrub dominants frequently appear in chaparral vegetation immediately after disturbances such as burns or vegetation cutting but gradually get overtopped by the larger chaparral dominant shrubs. Central coastal scrub occurs in a small portion in northeastern Parker Flats MRA.

This vegetation type would be classified as the Black Sage Shrubland Alliance by CNPS and CDFW (Sawyer et. al 2009); the *Salvia mellifera* Shrubland Alliance has global and state ranks of G4/S4 (greater than 100 viable occurrences and/or greater than 32,000 acres [12,950 ha] worldwide and statewide), as listed in the CDFW Natural Communities Hierarchy (CDFW 2018) and in CNDDB (CDFW 2019).

3.1.2 Coast Live Oak Woodland

Coast live oak woodland is dominated by mixed-aged stands of coast live oak (*Quercus agrifolia*) that vary in density from concentrated bands of oaks along drainage bottoms to scattered trees on nearby slopes. Coast live oak is an evergreen tree ranging from 20 to 75 feet (6 to 25 m) in height, with a spreading crown, many massive branches, and a dense canopy of thick waxy leaves. Trees can live for 100 years or more. Although common in the hills surrounding Monterey, coast live oaks are restricted to a 50-mile (80-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 (*Clinopodium 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.

Coast live oak woodland is characterized as the Coast Live Oak Woodland Community in the CNDDB legacy community classification system (Holland 1986), and as the *Quercus agrifolia* Woodland Alliance in the CNPS Manual of California Vegetation (Sawyer, Keeler-Wolf, and Evens 2009). *Quercus agrifolia* Woodland Alliance has a G5 global rarity ranking (demonstrably secure because of its worldwide occurrence) and an S4 state rarity ranking (greater than 100 viable occurrences statewide, and/or more than 32,000 acres [12,950 ha]); some associations within the *Quercus agrifolia* Woodland Alliance have G3 and S3 rankings (21-100 viable occurrences worldwide/statewide, and/or more 6,400-32,000 acres [2,590-12,950 ha]), according to the CDFW (CDFW 2018).

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 (*Carpobrotu*s spp., especially *C. edulis*), and others. Degraded central maritime chaparral subjected to habitat disturbances often supports a mosaic of shrubs and weedy non-native grasses.

Limited annual grassland vegetation occurs in disturbed areas in the two MRAs containing habitat parcels where monitoring was conducted during 2019.

In general, the annual grassland areas would be classified as Non-Native Grasslands in the CNDDB legacy community classification system (Holland 1986) and as California Annual Grassland Series within the CNPS Manual of California Vegetation (Sawyer, Keeler-Wolf, and Evens 2009). Non-native Grassland has a global rank of G4 (apparently secure, but factors exist to cause some concern; i.e., there is some threat or somewhat narrow habitat) and a state rank of S4 (apparently secure, but factors exist to cause some concern; i.e., there is some threat or somewhat narrow habitat), as listed in the CNDDB (CDFW 2019).

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. Small stands of native perennial bunchgrass species such as purple needlegrass (*Stipa pulchra*) also are observed within central maritime chaparral in all MRAs. In all cases, perennial grassland colonies within MRAs are too small (< 0.2 acres [0.8 ha]) to be classified separately as perennial grassland.

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 submergent aquatic species to emergent species and then surrounding upland vegetation such as coast live oak woodland, central maritime chaparral, and grassland. Arroyo willow (*Salix lasiolepis*) occurs adjacent to some of the aquatic features in the northeast corner of the FEG MRA as well. 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 Natural Resource Monitoring, Mitigation, and Management Report (ESCA RP Team 2012a). Mostly bare sandstone surrounds the grenade range aquatic features 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 2019 is provided in the following sections. These MRAs are shown in Figures 3a and 3c.

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 252 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 252 acres (102 ha) within this MRA, 177 acres (71.6 ha) are designated as habitat reserve.

On September 25, 2018, the Army recorded the final remedial decision for the FEG MRA in the Record of Decision, Group 4, Future East Garrison Munitions Response Area ("FEG MRA ROD"; Army 2018), documenting the selected remedial alternative of Land Use Controls (LUCs) for managing the risk to future land users from MEC that potentially remain in the FEG MRA. The LUCs for the FEG MRA are described in the Final Group 4 Land Use Controls Implementation Plan / Operation and Maintenance Plan, Future East Garrison MRA (ESCA RP Team 2019a). The LUCs include but are not limited to: (1) access management measures in areas designated for habitat reserve; (2) restrictions prohibiting residential use in areas designated for non-residential development reuse or for habitat reserve; and (3) restrictions against inconsistent uses (applicable to the habitat reserve areas). Uses that are inconsistent with the HMP include, but are not limited to, residential, school and commercial /industrial development.

The Future East Garrison MRA was subjected to several munitions responses (e.g., investigations and removal actions). The actions performed by the Army and FORA resulted in the removal of subsurface MEC and other munitions to the depth of detection from the MRA, with the exception of isolated areas with steep terrain having no evidence of munitions use, and areas under existing roadways, structures, paved areas, and fences. Utility corridors were investigated to the depth of detection using best available and appropriate detection technology; however, utilities were not required to be removed and therefore were left in place. FORA also completed a Residential Quality Assurance Implementation Study in the approximately 58 acres designated for future residential reuse in the Future East Garrison MRA. The Implementation Study included a comprehensive review and assessment of data from previous munitions responses (e.g., investigations and removal actions) to identify residual MEC risks or uncertainties. The Implementation Study confirmed the reliability of the data and effectiveness of previous munitions responses (e.g., investigations and removal actions) and indicated no evidence of remaining military munitions hazards.

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 (amsl) and lower slopes to the north at 170 feet (52 m) amsl. 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) amsl; 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. A limited amount of grassland vegetation is present as well. The western portion of the MRA is designated as critical habitat for Monterey spineflower (Figure 4).

There are twelve aquatic features concentrated in two main areas within the FEG MRA (Figure 3a). Three aquatic features are located in the eastern portion of the former grenade range. The former grenade range has been repeatedly scraped; as a result, much of the terrain surrounding the aquatic features in the former 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.

Protocol aquatic larval surveys were completed in the FEG MRA during the 2009-2010 and 2010-2011 rainy seasons to determine whether CTS were present in advance of munitions investigations remediation activities, 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 (CDFW [CDFG] 2003); two CTS larvae were observed in 2011 by the ESCA RP Team in aquatic features located in northeast FEG MRA in the habitat parcel (ESCA RP Team 2011a and 2012a).

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 northwest, 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

ROD was produced by the Army in August 2002 for Interim Action Sites at the former Fort Ord, including MRS Ranges 43-48 (Army 2002). The remedial action selected for the Interim Action Sites was presented in the Interim Action ROD and included surface and subsurface MEC removal.

On January 18, 2017, the Army recorded the final remedial decision for the IAR MRA in the Record of Decision, Interim Action Ranges Munitions Response Area ("IAR MRA ROD": Army 2017), documenting the selected remedial alternative of LUCs for managing the risk to future land users from MEC that potentially remain in the IAR MRA. The IAR MRA ROD states: (1) construction and implementation of the IAR MRA restoration areas has been completed and restoration systems are in place, operational and functioning; (2) operation and maintenance to support the long-term success of restoration at the site is being implemented through a post-installation adaptive management process to evaluate and manage the restoration areas as described in the HRP; and (3) initiated restoration activities are currently on track to achieve the prescribed performance criteria in the IAR MRA restoration areas. The LUCs for the IAR MRA are described in the Final Land Use Controls Implementation Plan / Operation and Maintenance Plan, Interim Action Ranges MRA (ESCA RP Team 2018b). The LUCs include but are not limited to: (1) restrictions prohibiting residential use; and (2) restrictions against inconsistent uses (applicable to the habitat reserve areas). Uses that are inconsistent with the HMP include, but are not limited to, residential, school and commercial /industrial development.

Previous interim remedial actions conducted by the Army resulted in designation of areas, totaling approximately 235 acres (95 ha), within MRS Ranges 43-48 where subsurface MEC removal was not completed as SCAs or Non-completed Areas (NCAs). Approximately 35.9 acres (14 ha) of the SCAs and approximately 9.2 acres (4 ha) of NCAs within MRS Ranges 43-48 are located within the boundaries of the IAR MRA. An additional surface MEC removal was conducted in a portion of the Range 44 SCA in 2007. Range 44 SCA, Range 47 SCA, and Central Area NCAs are the focus of the ESCA RP Team's efforts. Two additional SCAs (Range 45 Trench SCA [approximately 1.2 acres] and a small portion of the Fenceline SCA [one partial 100-ft by 100-ft grid]) are also located within the IAR MRA; however, these areas were not included in the interim remedial action completed by the ESCA RP Team. 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, 202 acres (82 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) amsl, 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 mixed-aged stands of dense maritime chaparral. The MRA was subjected to a prescribed burn in 2003. 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 4).

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

- North Range 44: North Range 44 SCA;
- South Range 44: South Range 44 SCA/Central Area NCAs;
- Range 47 Subarea A: Includes a portion of Range 47 SCA 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 SCA, which was subject to large-scale excavation prior to restoration activities;
- Range 47 Subarea C: Includes a small portion of Range 47 SCA surrounding the large-scale excavation area in which vegetation cutting took place in 2012.

4.0 HMP SPECIES

The requirements outlined in the HMP (USACE 1997) and in the BO (USFWS 2017) 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, sand (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 percent 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 (CTS, *Ambystoma californiense*) – Federally Threatened 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 investigation activities. Two CTS larvae were observed by the ESCA RP Team in the FEG MRA during the 2011 aquatic surveys (ESCA RP Team 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 5. ESCA RP biologists did not observe CTS in ESCA MRAs during 2019.

California red-legged frog (*Rana draytonii*) – Federally Threatened and California Species of Special 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 the BLM 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 2019.

4.2 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 Special 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 2019.

4.3 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 Special 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.

4.4 HMP Mammals

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

Monterey ornate shrew (*Sorex ornatus salarius*) - California Species of Special 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 Off-Campus, 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 were observed by ESCA RP biologists in two aquatic features in habitat parcels in the FEG MRA during the 2010 aquatic surveys, but were not observed in any of these features in 2011 or subsequent years (ESCA RP Team 2011a).

Smith's blue butterfly (*Euphilotes enoptes smithi*) – Federally Endangered. Adults with a wingspan of one-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 MRAs in the Beach Ranges.

4.6 HMP Shrubs

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

Hooker's manzanita (*Arctostaphylos hookeri* subsp. *hookeri*) – CRPR 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-barked 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 (USACE 1992). Field 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*) – CRPR 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*) – CRPR 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*) – CRPR 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*) – CRPR 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 can 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*) – CRPR 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, 2014, 2015, 2016, 2017, and 2018 coast wallflower was observed by ESCA RP biologists in the IAR MRA North Range 44 and during 2013 and 2014 it was observed by ESCA RP biologists in Seaside MRA.

Yadon's piperia (*Piperia yadonii*) – Federally Endangered, CRPR 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 several locations to the east and south of the IAR MRA (David Styer, personal communication). 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 in past Annual Natural Resource Reports. These HMP species occur on some development parcels as well as some habitat parcels; a general summary is provided below, but the remainder of this report focuses on habitat parcel occurrences.

Monterey spineflower (*Chorizanthe pungens* var. *pungens*) – Federally Threatened, CRPR 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 Off-Campus, 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 4. During 2019, Monterey spineflower was observed by ESCA RP biologists in the FEG and IAR MRAs.

Robust spineflower (*Chorizanthe robusta* var. *robusta*) – Federally Endangered, CRPR 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 (USACE 1997). 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, CRPR 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 2019, seaside bird's beak was observed by ESCA RP biologists in the IAR MRA and in 2018 in the FEG MRA.

Sand (Monterey) gilia (*Gilia tenuiflora* subsp. *arenaria*) – Federally Endangered, California Threatened, CRPR 1B.2. Sand (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. Sand (Monterey) gilia generally occurs in maritime chaparral and has been observed in IAR, FEG, Parker Flats, and Seaside MRAs. During 2019, sand (Monterey) gilia was observed by ESCA RP biologists in the FEG and IAR MRAs.

5.0 METHODS FOR MUNITIONS INVESTIGATION ACTIVITIES AND HABITAT MONITORING

Methods used for ESCA RP munitions investigation activities and associated biological monitoring activities are summarized in this section. The ESCA RP munitions investigation activities addressed here are those that have resulted in disturbance to native vegetation in habitat parcels in the FEG and IAR MRAs. By the end of 2013, most of the munitions investigation activities were completed in all ESCA MRAs, and all munitions investigation activities in these MRAs were completed by the end of 2015.

Munitions investigation activities included analog or geomagnetic investigation, vegetation cutting, small- or large-scale soil disturbance, and other minor activities. These are defined more specifically in Section 5.1. A grid system developed by the Army was used to document all activities; each grid was assigned a unique number and covered 100 feet by 100 feet (30.5 m x 30.5 m).

Associated biological monitoring involved using established or modified protocols to document baseline conditions prior to munitions investigation activities as well as documenting post-activity vegetation recovery. Minimization and avoidance measures were also implemented to avoid or reduce impacts to sensitive biological resources.

5.1 Methods for Munitions Investigation Activities (Completed in 2015)

Munitions investigation activities often required vegetation removal to facilitate target investigation using visual and electromagnetic means. When surface targets were identified, they were generally removed by hand or with the use of handheld tools. When subsurface targets were identified, they were investigated individually or in larger contiguous areas (soil excavation and sifting). Subsurface investigation areas ranged 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 was typically used, although a backhoe was used for deeper targets. If MEC was identified but was unsafe to move, in situ detonation was sometimes conducted. During soil replacement field crews were directed to follow the same sequence in reverse, with replacement of subsoil and then topsoil replacement after munitions investigation activities were complete.

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

A summary of general methods for munitions investigation activities is provided below; munitions investigation activities were complete as of 2015 and are described in further detail in previous Annual Natural Resource Monitoring, Mitigation, and Management Reports.

Digital Geophysical Mapping (DGM) munitions investigation was conducted in areas subject to vegetation cutting. Personnel guided a sled containing DGM equipment along parallel transects through the work area. Data were evaluated, and target anomalies were selected for further investigation. Unexploded ordnance (UXO) technicians reacquired target anomalies based on Global Positioning System (GPS) coordinates and intrusively investigated targets to depth.

Analog munitions investigations were generally conducted on foot by technicians to locate and remove surface or subsurface MEC or munitions debris (MD). Technicians generally walked 3-foot (1-m)-wide search lanes through grid cells (grids) with a handheld magnetometer, which recorded the presence of ferrous metal targets. If potential MEC was

detected in an investigation area, subsurface investigation (excavation) was sometimes required.

Vegetation cutting in this report generally refers to removal of most vegetation to ground level by manual and/or mechanical means, leaving the root mass, soil seedbank, and associated microorganisms and nutrients intact.

Types of Excavation: In general, subsurface investigation areas (excavations) ranged in size from a single cubic foot to several cubic feet, depending on the type, location, and position of the target. Excavation work sometimes involved removal of root mass of individual native plant species and displacement of soil seedbank. A 'target-specific investigation' is a subsurface investigation that is smaller than 100 square feet [9.3 m^2]. A 'small-scale excavation' is a subsurface investigation that affected an area between 100 square feet and 1 acre [9.3 m^2]. A 'large-scale excavation' is a subsurface investigation that disturbed an area over 1 acre (0.4 ha) in size. For the habitat parcels, only one large-scale excavation was conducted in the IAR MRA in Range 47 SCA.

The Design Study was an investigative approach developed by the ESCA RP Team in 2011 to minimize impacts to intact central maritime chaparral vegetation and relatively high densities of associated HMP herbaceous species in the IAR MRA. The Design Study addressed locations where the Army had not previously conducted subsurface MEC removal - NCAs and SCAs. The Design Study confined vegetation cutting and subsurface investigations to 10-foot-wide (3-m-wide) linear transects placed in the NCAs and SCAs in the IAR MRA. The Design Study is described in the Phase II Interim Action Work Plan (ESCA RP Team 2011b).

A "step-out" approach was employed in the FEG MRA to minimize the areas that were initially cut and investigated. When it became necessary to do munitions investigation in a larger area, successive step-outs were performed on an as-needed basis in order to reduce vegetation cutting to only that required for munitions investigation activities.

Large-scale excavation in the Range 47 SCA, was required due to the high density of sensitively-fuzed munitions, small metallic debris, and ammunition links discovered within the soil in 2011 in an area encompassing 13.4 acres (5.4 ha). Excavated soils were removed with bulldozers or excavators, transported by dump trucks to an onsite mechanical sift plant, where potential MEC was removed from the soil by UXO technicians.

The excavation process consisted of a sequence of topsoil removal (top 6 to 12 inches [15 to 30 cm]), followed by removal of subsoil. Each soil layer was sifted and stockpiled separately. Soil replacement followed 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.

The habitat restoration requirements in the large-scale excavation area in Range 47 SCA are detailed in the Phase II Interim Action Work Plan Addendum Habitat Restoration Plan (HRP) for the IAR MRA (ESCA RP Team 2013a), in accordance with the HMP (USACE 1997). See Section 7.0 and Appendix A of the ESCA RP Team 2013 Annual Natural Resource

Monitoring, Mitigation, and Management Report (ESCA RP Team 2014) for details on restoration planning, implementation, and monitoring in the IAR MRA.

5.2 2019 Biological Monitoring Methods

Biological monitoring in 2019 was conducted in habitat parcels in which vegetation was disturbed as a result of ESCA RP munitions investigation activities to meet the requirements of the 1997 HMP and the BO; biological monitoring methodology adhered to the Revisions of Protocol for Conducting Vegetation Monitoring for Compliance with the Installation-Wide Multispecies Habitat Management Plan, Former Fort Ord (Tetra Tech EcoSystems West 2015).

The Army consulted with USFWS in 2017, which resulted in the issuing of the 2017 reinitiated Programmatic Biological Opinion (USFWS 2017), which supersedes all previous BOs. The 2017 BO contains a directive to apply revised monitoring protocol to all vegetation monitoring (*Revisions of Protocol for Conducting Vegetation Monitoring for Compliance with the Installation-Wide Multispecies Habitat Management Plan Former Fort Ord*; Tetra Tech and EcoSystems West 2015).

Pre-disturbance (i.e., "baseline") vegetation surveys were conducted to document species dominance and cover in shrub- and tree-dominated central maritime chaparral. In addition, baseline data are gathered on HMP herbaceous species distribution and density prior to munitions investigation activities. Post-remediation surveys are conducted in native shrub- and tree-dominated vegetation types in Years 3, 5, and 8. Post-remediation surveys for HMP annuals and herbaceous perennial species are completed in Years 1, 3, and 5.

Methods are also detailed below for post-rainfall CTS monitoring, monitoring of aquatic features, weed monitoring, and erosion monitoring. Monitoring related to restoration activities in the IAR MRA 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), the CDFW List of Vegetation Alliances and Associations (CDFW 2018), and the CNDDB (CDFW 2019).

5.2.1 Methods for Vegetation Monitoring

Line-intercept vegetation transects are used to measure shrub and herbaceous vegetation cover in areas subject to munitions investigation activities in project work areas. Both baseline and post-activity transects are monitored in central maritime chaparral vegetation, along with a limited number of transects in central coastal scrub and oak woodland vegetation that consistently support central maritime chaparral species. Differences in stand age, species diversity, or other characteristics are documented to stratify transect placement into areas that are likely to have distinct species composition and distribution.

Vegetation transects are placed randomly on an MRA-by-MRA basis. A random number generator is used to A) select a grid (total number of grids in strata), B) select the quadrant of the grid for transect starting point (1-4), and C) 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. Transects are generally measured by using a 164-foot-long (50-m-long) tape, although a shorter transect length may be used if it is placed in a single isolated grid; diagonal placement in a grid enables monitoring of a transect that is 141 feet (43 m) long, as in the FEG MRA. Some shorter transects have also been placed in small-scale excavation areas in Range 44 in the IAR. GPS waypoints and the transect survey direction (e.g., north to south) are recorded so that the same transect can be revisited in subsequent years. Additionally, each year a photograph is taken from one end of each transect. Locations of 2019 transects are shown on Figures 6a and 6b.

Aerial cover by shrub and tree species is recorded on electronic data sheets for all plants that intercept the 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. Cover by herbaceous species in the absence of shrub or tree overstory is recorded by species; per the Tetra Tech and EcoSystems West revised protocol (Tetra Tech and EcoSystems West 2015).

Frequency data are represented here as the percentage of total transects containing at least one rooted individual of a given species.

Bare ground and/or thick layers of masticated vegetation are recorded in transect segments devoid of vegetation; prior to 2014, the “bare ground” category often included both bare ground and loose masticated vegetative material.

Table 1-1 presents all monitoring effort to date.

5.2.1.1 Future East Garrison MRA Vegetation Transect Monitoring

As previously described, a “step-out” approach was employed in the FEG MRA to minimize the areas that were initially cut and investigated. When it became necessary to perform munitions investigation in a larger area, successive step-outs were performed on an as-needed basis. This reduced vegetation cutting to only those areas that required munitions investigation activities.

Baseline Transects:

A total of 43 baseline transects were established by the Army in the FEG MRA prior to ESCA RP munitions investigation activities (HLA 1996, 1998). ESCA RP baseline transects are described below:

2010-2011 - Thirty-nine baseline transects were installed in central maritime chaparral.

2012 - Two baseline transects were installed in oak woodland at the edge of the former grenade range; this oak woodland vegetation supported many dominants of central maritime

chaparral in the understory and likely represented a seral stage in mature chaparral development.

Baseline data from these 41 transects were gathered during the year of installation, and post-activity data were collected from transects, per the 2009 protocol schedule (Burleson 2009). If there were no previously established transects in an area in which monitoring was required, new transects were established. In 2013, there were no baseline transects in grids subject to activities in 2010, and 6 new transects were installed in these grids. These data were then compared to the 39 original baseline transects.

Munitions Investigation Activities Dates:

2010

- West habitat parcel in the FEG MRA: vegetation cutting took place in four isolated grids and along the single roadway/maintained fuel break.
- East habitat parcel in the FEG MRA: vegetation cutting occurred in 23 scattered grids, along the single roadway/maintained fuel break, and along narrow strips scattered throughout the parcel.

2011

- West habitat parcel in the FEG MRA: vegetation cutting was confined to narrow strips scattered throughout the parcel.
- East habitat parcel in the FEG MRA: vegetation cutting occurred in most grids that had not been previously cut, except for the former grenade range/MRS-11, as well as a few grid clusters around the perimeter of the parcel.

2012

- West habitat parcel in the FEG MRA: vegetation cutting occurred in all remaining uncut area.
- East habitat parcel in the FEG MRA: vegetation cutting occurred in the former grenade range/MRA-11 and in clusters of grids around the perimeter of the parcel.

2013

- West habitat parcel in the FEG MRA: no vegetation cutting occurred.
- East habitat parcel in the FEG MRA: less than an acre (0.4 ha) of vegetation cutting occurred in portions of four grids along the southeast side of the ASP or Explosive Storage Location, which is located in the middle of the MRA.

2015

- East habitat parcel in the FEG MRA: Vegetation pruning was conducted in approximately ¼ acre (0.1 ha) of central maritime chaparral habitat south of the ASP in preparation for munitions investigation. Arcadis Senior Biologist and certified arborist, Mary Carroll, assessed the vegetation on January 28, 2015 and gave

vegetation crews authorization to cut some live plant material as follows: No removal of individual shrubs and restrict pruning to less than 25% of living branches by limbing-up plants in active work areas to improve access for munitions investigation teams.

Post-activity Transects (Shown in Figure 6a):

2013 - Six Year 3 post-activity transects were established in order to monitor vegetation establishment in areas subject to vegetation cutting in 2010; three transects were placed in the west habitat parcel and three in the east habitat parcel (ESCA RP Team 2014).

2014 - Seventeen Year 3 post-activity vegetation transects in central maritime chaparral were monitored in areas that had been subject to munitions investigation activities, including vegetation cutting, in 2011; all of these transects were located in the east habitat parcel. Monitoring events were conducted on 28-30 April and 5-6 May 2014 (ESCA RP Team 2015).

2015 – A total of 32 post-activity vegetation transects were monitored on 4-8 and 11-15 May 2015, including 26 Year 3 (24 in vegetation cutting and 2 in small-scale excavation areas) and six Year 5 post-activity vegetation transects in central maritime chaparral and oak woodland vegetation; these transects were located in areas that had been subject to munitions investigation activities in 2010 and 2012 (ESCA RP Team 2016).

2016 – A total of 23 post-activity vegetation transects were monitored on 4-8, 25, and 26 April and 3-5 May 2016 (ESCA RP Team 2017). All transects monitored were Year 5 post-activity transects in central maritime chaparral and oak woodland vegetation; these transects were located in areas that had been subject to vegetation cutting and munitions investigation activities in 2011.

2017 - Seventeen Year 5 transects were monitored on 30 March; 11, 13, 17-19 April; and 2-4 May 2017 (ESCA RP Team 2018a) in areas where vegetation was cut in 2012 as well as two Year 5 transects in the Grenade Range where small-scale excavation occurred in 2012.

2018 – Six Year 8 transects were monitored on 24, 25, and 26 April 2018 in areas where vegetation was cut in 2010.

2019 – Twenty-three Year 8 transects were monitored on 23, 24, 25, and 26 April 2019 in areas where vegetation was cut in 2011.

All ESCA RP vegetation monitoring transects in the FEG MRA are shown in Figure 6a.

5.2.1.2 Interim Action Ranges MRA Vegetation Transect Monitoring

Baseline Transects:

1999-2000 – Baseline transects established by the Army in the Range 44, Range 45, and Range 47 in 2000, prior to the 2003 prescribed burn (HLA 2001, Parsons 2005).

2008 – Thirty transects established by the Army were monitored by the ESCA RP Team (ESCA RP Team 2009).

2010-2011 – Twenty-three baseline transects were designated by the Army in central maritime chaparral and selected as "proxy" baseline transects for upcoming munitions activities, excluding the Range 47 SCA large-scale excavation area. An additional nine new "proxy" baseline transects were designated by the ESCA RP Team near the proposed ESCA RP munitions investigation areas; three of these transects were located immediately west of Range 47 SCA to serve as proxy baseline transects for the large-scale excavation.

As of 2011, no further monitoring of Army transects outside of the IAR MRA NCAs and SCAs was indicated due to vegetation recovery reflecting an appropriate and sustainable trajectory associated with high quality habitat (ESCA RP Team 2012a).

Munitions Investigation Activities Dates:

2011 - Vegetation cutting and small-scale excavations were completed in linear scrapes in South Range 44. Limited ingress-egress routes were cut for access to work areas.

2011-2012 - Large-scale excavation was conducted in 14.4 acres (5.8 ha) in Range 47 SCA and completed in December 2012. A small amount of vegetation cutting was conducted around the edges of Range 47 SCA in 2012. Limited ingress-egress routes were cut for access to work areas.

2012-2013 - Vegetation cutting in North Range 44 SCA was conducted in 2012 and completed in early 2013; in addition, small-scale excavations in targeted areas and along scrapes were also conducted in 2012 and completed in early 2013.

Post-activity Transects (Shown in Figure 6b):

2012 - Sixteen Year 1 post-activity transects were established in the South Range 44 SCA/NCAs, a small portion of North Range 44, and areas outside the large-scale excavation in Range 47 SCA (ESCA RP Team 2013).

2013 - Thirteen Year 1 post-activity transects were established in North Range 44 SCA. Ten new transects were established in the Range 47 SCA large scale excavation. One of these 10 grids was placed in Subarea A, one was placed in the deer exclusion control area (deer present), and one was placed in the irrigation control area. The remaining seven were in Subarea B (ESCA RP Team 2014).

All 29 transects were monitored in 2013 (Years 1 and 2).

2014 – Twenty-nine transects were monitored on 8 and 13-14 May, 26 and 30 June, and 1-3 and 14-15 July 2014 (ESCA RP Team 2015).

2015 – Thirty-eight transects were monitored on 16 and 24 April and 18, 19, 20, 21, 26, 27, and 28 May 2015. These included five Year 3 transects in vegetation-cut areas in North

Range 44; seven Year 4 transects in vegetation-cut areas in South Range 44; and three Year 4 transects in vegetation-cut areas in Range 47 Subarea C. An additional 13 transects were monitored in areas subject to small-scale excavations in the IAR MRA; these data are presented in Appendix A. Ten transects were also monitored in the large-scale excavation area in the IAR MRA (ESCA RP Team 2016).

2016 – Twenty transects were monitored on 27, 28, and 29 April and 2 and 5 May 2016. These included seven Year 5 transects in vegetation-cut areas in South Range 44. An additional 13 Year 4 transects in areas subject to small-scale excavations -- eight in North Range 44 and five in South Range 44 (ESCA RP Team 2017).

2017 - Thirteen transects were monitored on 27, 28, and 29 April and 2 and 5 May 2017. These included seven Year 6 transects in vegetation-cut areas in South Range 44. An additional 13 Year 5 transects in areas subject to small-scale excavations -- eight in North Range 44 and five in South Range 44 (ESCA RP Team 2018a).

2018 – Twenty-nine transects were monitored on 26 April and on 7, 8, 9, and 10 May 2018. These included eight original and seven additional Year 6 transects in areas subject to small-scale excavations in North Range 44 SCA and five original and nine additional Year 7 transects in South Range 44 SCA and Central Area NCAs.

2019 – Twenty-nine transects were monitored on 29 and 30 April and on 1 May 2019. These included eight original and seven additional Year 7 transects established in 2018 in areas subject to small-scale excavations in North Range 44 SCA and five original and nine additional Year 8 transects established in 2018 in South Range 44 SCA and Central Area NCAs.

Monitoring results are presented in Appendix A.

Locations of all ESCA RP transects in the IAR MRA are shown in Figure 6b.

5.2.2 Supplemental Herbaceous Vegetation Monitoring

In 2019, no supplemental herbaceous vegetation monitoring was conducted in any MRA. Previous herbaceous vegetation monitoring is provided in past Annual Natural Resource Monitoring, Mitigation, and Management Reports (ESCA RP Team 2009, 2010a, 2011a, 2012a, 2013b, 2014, 2015, 2016, 2017, 2018a, and 2019b).

5.2.3 HMP Herbaceous Species Monitoring (Completed in 2018)

In 2019, no HMP herbaceous species monitoring was conducted in any MRA. Previous HMP herbaceous species monitoring is provided in past Annual Natural Resource Monitoring, Mitigation, and Management Reports (ESCA RP Team 2009, 2010a, 2011a, 2012a, 2013b, 2014, 2015, 2016, 2017, 2018a, and 2019b).

HMP herbaceous species monitoring in the Future East Garrison MRA was complete in 2018 (ESCA RP Team 2019b).

HMP herbaceous species monitoring in the Parker Flats MRA was complete in 2017 (ESCA RP Team 2018a).

In accordance with the HRP for the IAR MRA, HMP herbaceous species in the IAR MRA were counted in each monitoring plot every year for seven years after habitat disturbance or until performance targets are met. All HMP herbaceous species monitoring performance targets were met in the IAR MRA in 2015 (ESCA RP Team 2016).

Table 1-1 summarizes all monitoring effort to date.

5.2.4 Methods for Documenting Species Diversity

Documentation of native species presence in each MRA provides an overview of existing species richness and the suite of species that recolonize work areas over time, along with the relative abundance of HMP species in the site as a whole. A comprehensive list of species for each MRA is compiled and updated each year (Tables 3-1, 3-2, and 3-3).

Additionally, all native plant species occurring along a vegetation transect or within a quadrat were recorded to provide total species richness per sample. All native plant species within one meter of a transect tape measure were also recorded in order to capture a more comprehensive summary of native species in specific munitions investigation areas. Plant species diversity table for FEG is presented in Table 6-2. The diversity table also includes information on mean species richness per transect or quadrat, evenness, and summary cover data.

Mean species richness per transect or quadrat is calculated for each year and each activity type.

Diversity was determined using the Shannon-Wiener Index (H'), which is a function of the relative abundances of the species present, depending on both the number of species and their evenness (Pielou 1974). The following equation was used to calculate H'.

$$H' = -\sum p_i \ln p_i$$

Where:

H' = Shannon-Wiener Index

p_i = proportion of community that belongs to the *i*th species

Evenness (J') was calculated as the ratio of the observed H' to the maximum possible H' for a community with the same number of species (H'_{max}) (Pielou 1974). The maximum possible

value for evenness (i.e., 1) is achieved when H' = H'$_{max}$, which occurs when all species are present in equal abundance. The following equation was used to calculate J'.

$$J' = \frac{H'}{H'_{max}} = \frac{H'}{\log s}$$

Where:

J' = evenness

H' = Shannon-Wiener Index

H'max = maximum possible H' for a community with s species

s = total number of species present

Discussion of species diversity is incorporated into vegetation monitoring summaries for each MRA (Section 6.1).

5.2.5 Aquatic Feature Restoration (Completed in 2018)

One of three aquatic features in the FEG grenade range (AF09-1A) was subject to sifting during remediation activities that took place between October 2012 and January 2013 and was immediately restored thereafter. The required five years of monitoring was completed in 2018, as described in the 2018 Annual Natural Resource Monitoring, Mitigation, and Management Report (ESCA RP Team 2019b). Appendix C provides an overview of past monitoring and current conditions, including 2019 photo documentation.

5.2.6 Methods for Weed Monitoring and Management

During 2019, weed monitoring was conducted throughout the year using visual surveys, with focused attention on pampas and/or jubata grass (*Cortaderia selloana, C. jubata*), French broom (*Genista monspessulana*), and iceplant pursuant to the HMP (USACE 1997). Weed presence and cover was documented using vegetation transects in the FEG MRA, where required vegetation monitoring was conducted. In the IAR MRA, weed cover documentation was conducted using CNPS relevé vegetation monitoring protocol outlined in the *CDFW-CNPS Protocol for the Combined Vegetation Rapid Assessment and Relevé Field Form* (CNPS 2018). Survey plot locations were identified using a random stratified approach. The survey area was divided into five spatially separate areas and then a plot center was randomly selected using a random number generator placing the plot in the middle of the preestablished 100x100 foot grid cells.

Weed abatement was conducted where necessary, including in ESCA development parcels, to reduce the spread of these target weed species into and within habitat areas. In addition, any weedy species listed by the California Invasive Plant Council as highly invasive weeds were

also monitored if present in sufficient numbers to threaten sensitive species or habitats (California Invasive Plant Council 2006).

Weed monitoring and abatement documentation is summarized in Appendix C.

5.2.7 Methods for Erosion Monitoring and BMPs

During 2019, erosion monitoring was conducted in MRAs before and after rain events of 1 inch (1 to 2.5 cm) or more within 24 hours, depending on the intensity of rainfall. When necessary, the ESCA RP Team installs erosion control BMPs, such as burlap sandbags, silt fencing, biodegradable weed-free straw wattles, biodegradable coconut fiber erosion control blankets, and water bars (Figures 7a and 7b). Erosion monitoring events are summarized in Appendix D. Appendix D also includes erosion monitoring reports and photo documentation from 2019.

6.0 2019 BIOLOGICAL MONITORING RESULTS

Biological monitoring data have been gathered in habitat parcels subject to munitions investigation activities in the FEG and IAR MRAs in order to meet the requirements of the 1997 HMP and BOs; biological monitoring methodology adhered to the Revisions of Protocol for Conducting Vegetation Monitoring for Compliance with the Installation-Wide Multispecies Habitat Management Plan, Former Fort Ord (Tetra Tech and EcoSystems West 2015); methods and general locations of munitions investigation types are summarized in Section 5.1.

A summary of habitat monitoring activities completed by the ESCA RP Team during 2019 is shown in Table 1-1 and includes vegetation transects and associated herbaceous quadrats in shrub-dominated vegetation types, herbaceous quadrats in grassland vegetation, and HMP herbaceous species monitoring. Species richness data are also collected and reported below.

Tables 6-1 and 6-2 present the results from biological monitoring activities in habitat parcels in the FEG MRA.

6.1 Vegetation Monitoring in MRAs

2019 vegetation monitoring of habitat parcels that were subject to previous vegetation cutting during ESCA RP Team munitions investigation activities is summarized by MRA in this section. Vegetation monitoring was conducted in the FEG MRA and IAR MRA (Table 1-1); transect monitoring of areas subject to vegetation cutting as a component of munitions investigation activities was conducted in the FEG MRA. 2019 vegetation monitoring in the IAR MRA was confined to areas in Range 44 NCAs/SCAs subject to small-scale excavation during munitions investigation activities, and these results are reported in Appendix A.

6.1.1 Vegetation Monitoring in Future East Garrison MRA

Native vegetation in the FEG MRA is dominated by central maritime chaparral, with oak woodland vegetation in drainage bottoms and on some north-facing slopes. Munitions investigation activities took place in different locations in different years, as summarized in Section 5.2.1.1. As a result, it is possible to have more than one post-activity year represented in vegetation monitoring data in any given year.

During 2019, 23 transects were monitored in those areas subject to vegetation cutting (Figure 6a). All transects monitored are considered Year 8 post-activity vegetation transects, and are located in central maritime chaparral and oak woodland vegetation. Summary data are presented in Tables 6-1 and 6-2, as well as in Figures 8 to 12.

Data from 23 Year 8 transects in areas subject to vegetation cutting are compared with data obtained from 39 baseline transects in Table 6-1, along with comparisons to data from the same 23 Year 3 transects collected in 2014 and Year 5 transects collected in 2016. Section 5.2.1 summarizes transect monitoring methods and Figure 6a shows 2019 transect locations.

Mean 2010 baseline total shrub and subshrub cover in central maritime chaparral in the FEG MRA exceeded 100% due to dense and overlapping shrub canopies. Brittleleaf manzanita and chamise were the dominant shrubs in 2010, with 45.8% and 25.4% mean cover, respectively. This vegetation is characterized as the *Arctostaphylos* (*crustacea, tomentosa*) Shrubland Alliance (Brittleleaf - Woolly leaf Manzanita Chaparral) in the *California Manual of Vegetation*, Second Edition (Sawyer, Keeler-Wolfe, and Evens 2009) and is similar to Dominant Plant Association A, as described in the 2015 revised vegetation monitoring protocol for former Fort Ord (Tetra Tech EcoSystems West 2015). Both brittleleaf and shaggy-barked manzanitas are stump-sprouting species that become dominant in the later years of succession. The success criteria specified in the protocol for Plant Association A (shaggy-barked dominant) were adapted for brittleleaf manzanita in FEG by substituting shaggy-barked manzanita values with brittleleaf manzanita values.

In 2019, total mean native cover in Year 8 transects was 80.1%, with 0.7% mean tree cover, 75.5% mean shrub and subshrub cover, and 3.9 % mean herbaceous cover (Table 6-1). This vegetation is again dominated by brittleleaf manzanita and chamise eight years after vegetation cutting, as measured by mean cover, relative cover, and frequency data (Figure 9 and 10). Mean Year 8 cover of brittleleaf manzanita (32.5%) was 71% of the baseline cover (45.8%), and was higher than in any previous post-activity year. Chamise contributed an additional 15.4% mean shrub cover in 2019. The Year 8 performance criteria for Dominant Plant Association A in the 2015 revised vegetation monitoring protocol for former Fort Ord (Tetra Tech EcoSystems West 2015) states that the dominant stump-sprouting manzanita will have at least “30 percent of the baseline percent cover for shaggy bark manzanita.” 2019 cover by brittleleaf manzanita was 71% of baseline cover, or more than twice the Year 8 performance target.

Twenty-four associated woody species were present in one or more of the 2019 transects, reflecting shrub species richness in these areas. When the total native species within a meter

of transects are considered, 110 native plant species were observed in 2019, a robust recovery after vegetation cutting in this area (Table 6-2).

Distribution and abundance of HMP shrub species in the FEG MRA vary based on environmental characteristics and site history; the most common HMP shrub species prior to vegetation cutting were Toro manzanita and Monterey ceanothus (Table 6-1). Mean absolute cover by obligate-seeding shrubs such as Toro manzanita declined after vegetation cutting, from 14.4% average cover in baseline transects to 2.8% in 2016 Year 5 post-activity data, but then rose to 5.2% in 2019 Year 8 post-activity data. Monterey ceanothus, on the other hand, recovered its relatively low pre-disturbance cover (1.5% cover) with 0.6% mean cover in 2016 and 1.8% in 2019 in Year 8 post-activity transects (Figure 9). Hooker's manzanita, which was absent in baseline surveys, exhibited 0.1% cover in Year 8 transects (Table 6-1).

Herbaceous mean native cover (native vegetated ground) was 2% in 2011 baseline transects and 3.9% in 2019 Year 8 transects, suggesting recovery of the native herbaceous layer (Table 6-1). Herbaceous cover was not subdivided into native and non-native cover during baseline surveys, but these data have been collected during post-activity surveys. There was less than 3% non-native cover in 2019 Year 8 post-activity transects.

Frequency data facilitate comparisons of species distributions in a given area, even for species with low cover; see Table 6-1. The one tree species, coast live oak, exhibited a mean frequency of 43.5%, occurring in almost half of all transects. Two dominant stump-sprouting shrubs, brittleleaf manzanita and chamise, are widespread, exhibiting frequencies greater than 85% before and after vegetation cutting (Figure 10). Seven shrubs and subshrubs have frequencies above 50%, including brittleleaf manzanita, chamise, Monterey ceanothus, rush-rose (*Crocanthemum scoparium*), golden yarrow (*Eriophyllum confertiflorum*), bush monkeyflower (*Diplacus aurantiacus*), and black sage. Both dwarf ceanothus and Monterey ceanothus have higher frequencies than in baseline transects.

Although the mean cover of two HMP shrubs, Toro manzanita and Monterey ceanothus, declined after vegetation cutting, frequency data indicate reestablishment of these germinating HMP shrub seedlings in many of the transects in which they were originally present. Toro manzanita was present in 64.1% of 2010 baseline transects and in 43.5% of 2019 Year 8 transects. Monterey ceanothus exhibited higher frequency in 2019 (60.9%) compared with 48.7% frequency in baseline transects. Hooker's manzanita was absent in baseline transects but had 4.3% frequency in 2019.

Openings between shrubs support a range of over 20 native herbaceous species, including fairy lanterns (*Calochortus albus* var. *albus*), California bedstraw (*Galium californicum* subsp. *californicum*), goldenback fern (*Pentagramma triangularis* subsp. *triangularis*), and round-fruited sedge (*Carex globosa*). Approximately 7% of baseline mean cover was categorized as "bare ground," which rose to 35% in Year 3 transects after vegetation cutting and gradually declined to 23.2 % in Year 8 transects as shrub cover increased.

Plant species richness increased after vegetation cutting in the FEG MRA (Table 6-2 and Figure 11). A total of 25 native plant species was recorded in 39 baseline transects in dense

chaparral vegetation in 2010-2011, 22 of which were shrub species, with an average of 5.7 native shrub species per transect.

In 2019, eight years after vegetation cutting, a total of 24 shrub and subshrub species were recorded in Year 8 transects, with a mean of 9.4 native shrub and subshrub species per transect and 76 total native species on all Year 8 transects combined (Table 6-2). The number of herbaceous species increased from one in 2010 to 50 in 2019 Year 8 transect data.

When all species within a meter of 2019 Year 8 transects were compiled, 110 native species were observed in Year 8 transects, including 1 native tree species, 27 native shrub and subshrub species, and 80 native herbaceous species, and 2 fern species (Table 6-2).

6.2 HMP Herbaceous Species Monitoring in MRAs

HMP herbaceous species monitoring was completed in 2018, so no further HMP herbaceous species monitoring was conducted in 2019 in the FEG MRA. No HMP herbaceous species monitoring was conducted in 2019 in the IAR MRA since performance criteria for HMP species in the IAR MRA were met in 2015; see Appendix A.

6.3 Aquatic Feature Monitoring in the Future East Garrison MRA

One of three aquatic features in the FEG grenade range (AF09-1A) was subject to sifting during remediation activities that took place between October 2012 and January 2013 and was immediately restored thereafter. The required five years of monitoring was completed in 2018, as described in the 2018 Annual Natural Resource Monitoring, Mitigation, and Management Report (ESCA RP Team 2019). The other two aquatic features in the same area, AF09-1B and AF09-2, were not disturbed during munitions investigation activities and have served as reference features to assess post-activity recovery of AF09-1A.

All of these features have been monitored between 2010 and 2019, including dip netting in some years to survey for the presence of sensitive aquatic wildlife such as CTS and California linderiella. CTS has never been observed or reported in the grenade range, despite protocol CTS surveys in 2010-2011 in the former grenade range and elsewhere in the FEG MRA (ESCA RP Team 2011a and 2012a). California linderiella was observed in AF09-1A and AF09-1B in 2010. However, it was not observed in any of the grenade range aquatic features in 2011 or the spring of 2012, prior to munitions investigate activities, nor has it been observed since.

During 2019 the aquatic features were visited during all weed and erosion monitoring events in the grenade range to ensure that conditions remained stable and no human disturbance had occurred. The restored aquatic feature AF09-1A continued to function normally during 2019 and no unusual disturbance was observed. Aquatic vegetation continued to increase cover as expected. As can be seen in the photo documentation (Appendix C) the restored aquatic feature held water during the wet season as expected. AF-01A was observed inundated on January 15, 2019, the first monitoring event of 2019, and almost dry by June 17, 2019, the

last monitoring event before summer. In the fall the aquatic features were still dry on October 21, 2019.

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

Habitat restoration implementation and monitoring activities for 2019 are summarized in Appendix A and are based on an HRP prepared by the ESCA RP Team 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, maintenance, and monitoring 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 were associated with vegetation disturbance in these areas, each with associated remediation, monitoring, and restoration requirements: ingress/egress corridors, vegetation cutting, small-scale excavation, and large-scale excavation. These activity types are associated with the following restoration strategies: monitoring only, passive restoration, and passive and active restoration.

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 7 are reported in Appendix A. Success criteria for all activity types except for small-scale excavation have been met in previous years in the IAR MRA.

8.0 MANAGEMENT AND MITIGATION ACTIVITIES SUMMARY

This section summarizes the habitat management and mitigation activities required by the HMP and the BO and performed by the ESCA RP Team through 2019.

8.1 Wildlife Relocation

ESCA RP Team members perform animal rescue and/or relocation as needed to avoid or reduce impacts of the fieldwork on wildlife. No CTS were observed in 2019 in any MRA. No wildlife species were relocated in 2019 in any MRA.

8.2 Environmental Awareness Training

Environmental awareness training (EAT) is conducted by a QB for field personnel prior to initiation of fieldwork in all MRAs, placing special emphasis on CTS awareness, requirements, and mitigation measures. During the training personnel are advised of the locations of ponds, vernal pools, and aquatic features within 2 km (1.24 miles) that may be potential breeding habitats for CTS, including aquatic features in and near the FEG, Parker Flats, SEA, and IAR MRAs (Figure 5). Trainings also introduce work crews to the HMP, the relevant habitats in the MRAs, measures to comply with the federal ESA, protection of HMP species and their habitats, and minimization of environmental impacts during munitions

investigation. Site requirements are reviewed, including restricting site access to established roads and paths whenever possible and limiting vegetation cutting and soil disturbance to the minimum feasible area required to conduct the field task. Where appropriate, the ESCA RP biologists communicate and/or mark out locations of HMP plant species and/or their habitats to assist avoidance by field crews. EAT training was conducted by ESCA RP Biologists in 2019 for two Arcadis biologists, Joseph Gamez and Alyssa Taylor, who were also trained as ESCA RP Team Qualified Biologists, although they are not certified by USFWS to rescue CTS.

8.3 Weed Management Activities

Monitoring and management activities for target weeds (iceplant, pampas grass, and French broom) are routinely conducted in ESCA RP parcels, consistent with the requirements of the HMP (USACE 1997) and the BO (USFWS 2017). 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.

During 2019, weed monitoring occurred periodically, particularly in areas where weeds could easily spread from a development parcel to a habitat parcel. Weed monitoring and abatement was conducted in the FEG MRA on 15 January, 13 February, 14 March, 17 June, 21 October 2019 and 17 December 2019, and in the IAR MRA on 15 January, 13 and 14 February, 14 March, 17 and 18 June, and 21, 22 October 2019 and 17 December 2019. Weed monitoring results indicate that iceplant has been reported most frequently in all MRAs and exhibits less than 5% cover in each MRA in areas where soil disturbance has occurred, meeting the weed cover performance target (see Section 6.1 and Appendix D).

All weed monitoring and removal activities are summarized in Appendix D.

8.4 Erosion Control Monitoring and Mitigation

Ongoing erosion control monitoring and installation of erosion control BMPs are implemented as needed in ESCA RP parcels, consistent with the requirements of the HMP (USACE 1997) and BOs relevant to ESCA RP activities (USFWS 1999, 2002, and 2005); 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.

Future East Garrison MRA - There were no erosion issues requiring repair in FEG during 2019. Broadcast and hydro-seeding efforts in 2013 and 2014 have been successful at vegetating much of the former grenade range, particularly on the steep eastern slope where native herbaceous and woody species have become widely established (Figure 7a).

Interim Action Ranges MRA - There were no major erosion issues in the IAR during 2019. No erosion control BMP maintenance was needed and all existing BMPs continue to function properly (Figure 7b).

ESCA RP erosion monitoring activities are summarized in Appendix E.

9.0 CONCLUSION

No munitions investigation activities were conducted in any ESCA MRAs during 2019. Biological monitoring in 2019 included completion of 52 vegetation transects; these monitoring events and associated data provide the ESCA RP Team with valuable information to guide in ongoing site management.

Baseline vegetation and herbaceous transects were installed by the ESCA RP Team in the FEG, Parker Flats, and IAR MRAs between 2008 and 2012 to document native shrub cover prior to munitions investigation activities. Recovery of native vegetation cover after vegetation cutting has been rapid in central maritime chaparral, with 80.1% native cover in Year 8 transects in the FEG MRA (Figure 8). Mean cover by brittleleaf manzanita (32.5%) was 71% of the baseline cover for this species (45.8%). The Year 8 performance criteria for Dominant Plant Association A in the 2015 revised vegetation monitoring protocol for former Fort Ord (Tetra Tech EcoSystems West 2015) states that the dominant stump-sprouting manzanita will have at least "30 percent of the baseline percent cover for shaggy bark manzanita" in Year 8. The success criteria specified in the protocol for Plant Association A (shaggy-barked dominant) were adapted for brittleleaf manzanita in FEG by substituting shaggy-barked manzanita values with brittleleaf manzanita values; 2019 cover by brittleleaf manzanita was 71% of baseline cover, or more than twice the Year 8 performance target. A range of native recruits of obligate-seeding shrubs in these vegetation-cut areas contribute to shrub diversity in chaparral stands in all areas, as evidenced by frequency and diversity data, including three HMP shrubs. Frequency values for Hooker's manzanita and Monterey ceanothus were higher than the baseline, and Toro manzanita frequency was 68% of the baseline.

Vegetation cover and species diversity data indicate recovery of all sensitive vegetation types subject to munitions response actions in ESCA MRAs. A combination of committed stewardship, including reductions in acreages potentially subject to vegetation cutting; retention of an average of 20.9 Toro manzanitas per acre in the FEG MRA; retention of over 880 coast live oak trees in the Parker Flats MRA development parcel; habitat restoration (see Appendix A); steady post-activity increases in vegetation cover, species diversity, and number of individual HMP herbaceous species; and weed and erosion control management activities all combine to promote habitat recovery after munitions investigation activities. The enhanced native species diversity and cover observed at all sites, along with wildlife usage and other indications of elevated ecological functionality, suggest all areas are on trajectories toward self-sustaining native plant communities equitable with the species richness and relative cover of species that were present on the site prior to the FORA ESCA RP Team munitions investigation and remedial efforts.

Appendix A provides details on the monitoring activities in the IAR MRA in 2019.

Habitat monitoring indicates that native vegetation establishment in the FEG MRA, IAR MRA, and remaining ESCA properties are on a trajectory for full recovery with natural recruitment, therefore we recommend monitoring of these areas cease after 2019.

There are no biological monitoring requirements for the remaining ESCA MRAs (Seaside MRA, CSUMB Off-Campus MRA, County North MRA (property transferred to County of Monterey), Laguna Seca Parking MRA, MOUT Site MRA, and Del Rey Oaks/Monterey MRA.

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Table 1-1
Vegetation Monitoring Activities in Habitat Parcels of MRAs
2008 - 2019

ESCA RP 2019 Annual Natural Resource 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[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019[1]			
		Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity			
Future East Garrison	Vegetation transects	-	-	-	-	-	-	39	-	2	-	6	17	32	23	19	6	23	**41**	**126**	**167**
	Herbaceous quadrats	-	-	-	-	-	-	-	-	-	-	-	18	18	6	0	0	0	**0**	**42**	**42**
	HMP herbaceous species plots	-	-	-	-	5	-	-	-	-	5	6	15	14	21	15	0	0	**5**	**76**	**81**
	HMP annual surveys (acres)*	-	-	-	-	-	-	-	-	-	-	64.7	71.6	138.2	227.1	217.6	2.9	0.0	**0**	**722**	**722.1**
	Toro manzanita surveys (acres)*	-	-	-	-	-	-	-	-	-	29	26.4	26.4	0	0	0	0	0	**0**	**82**	**81.8**
Interim Action Ranges-Army Remediation Areas	Vegetation transects	-	30	-	-	-	20	-	-	-	-	-	-	0	0	0	0	0	**0**	**50**	**50**
	Herbaceous quadrats	-	12	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	**0**	**12**	**12**
	HMP herbaceous species plots	-	63	-	-	-	63	-	-	-	-	-	-	0	0	0	0	0	**0**	**126**	**126**
Interim Action Ranges-ESCA Remediation Areas (SCAs/NCAs)	Vegetation transects	-	-	-	-	17	-	2	-	-	16	28	28	38	20	13	29	29	**19**	**201**	**220**
	Herbaceous quadrats	-	-	-	-	-	-	-	6	-	53	96	96	6	6	11	0	0	**0**	**274**	**274**
	HMP herbaceous species plots	-	-	-	-	187	-	-	-	-	44	173	161	263	0	0	0	0	**187**	**641**	**828**
	HMP annual surveys (acres)*	-	-	-	-	-	-	-	-	-	-	27.5	30.8	57.6	0	0	0	0	**0**	**116**	**115.9**
Parker Flats Phase II	Vegetation transects	11	-	-	-	-	-	-	-	-	11	-	11	0	0	11	0	0	**11**	**33**	**44**
	Herbaceous quadrats	-	-	-	-	-	-	-	-	-	6	-	6	0	0	0	0	0	**0**	**12**	**12**
	HMP herbaceous species plots	10	-	-	-	-	-	-	10	-	10	6	5	0	0	3	0	0	**10**	**34**	**44**
	HMP annual surveys (acres)*	-	-	-	-	-	-	-	-	-	-	16.8	87.5	0	0	77	0	0	**0**	**181**	**181.4**

Table 1-1
Vegetation Monitoring Activities in Habitat Parcels of MRAs
2008 - 2019

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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[1]	2014[1]	2015[1]	2016[1]	2017[1]	2018[1]	2019[1]			
		Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Baseline	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity	Post-activity			
Parker Flats Phase I	Vegetation transects	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	**0**	**0**	**0**
	Herbaceous quadrats	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	**0**	**0**	**0**
	HMP annual plots	-	-	-	-	-	-	-	-	-	-	-	32	0	0	0	0	0	**0**	**32**	**32**
	HMP annual surveys (acres)*	-	-	-	-	-	-	-	-	-	-	-	93.2	0	0	0	0	0	**0**	**93**	**93.2**
County North	HMP herbaceous species plots	-	-	15	-	-	-	-	-	-	-	-	-	0	0	0	0	0	**15**	**0**	**15**
Total Vegetation Transects		**11**	**30**	**0**	**0**	**17**	**20**	**41**	**0**	**2**	**27**	**34**	**56**	**70**	**43**	**43**	**35**	**52**	**71**	**410**	**481**
Total Herbaceous Quadrats		**0**	**12**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**59**	**96**	**120**	**24**	**12**	**11**	**0**	**0**	**0**	**340**	**340**
Total HMP Herbaceous Species Plots		**10**	**63**	**15**	**0**	**192**	**63**	**0**	**10**	**0**	**59**	**185**	**181**	**277**	**21**	**18**	**0**	**0**	**217**	**877**	**1094**
Total Acres for HMP Herbaceous Species Surveys*		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**109**	**283**	**196**	**227**	**295**	**3**	**0**	**-**	**1113**	**1113**
Total Acres for Toro Manzanita Surveys*		-	-	-	-	-	-	-	-	-	**29**	**26**	**26**	**0**	**0**	**0**	**0**	**0**	-	**82**	**82**

*Survey acreages are approximate, based on number of grid cells surveyed

[1] no baseline surveys conducted during this reporting period

HMP = Habitat Monitoring Plan; SCA = Special Case Area; NCA = Non-completed Area

Table 2-1
HMP Species Occurrence within Habitat Parcels of Munition Response Areas

ESCA RP 2019 Annual Natural Resource 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 Threatened/ 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 FEG

Table 2-1
HMP Species Occurrence within Habitat Parcels of Munition Response Areas

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Scientific Name	Common Name	Current Regulatory Status	Habitat	Recorded as Present or Habitat Present in MRAs[1]	Observed by ESCA RP
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, 2010-2019 FEG, 2008-2019 IAR, 2008-2017 PF, 2012-2016 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 subsp. *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	2013-2019 FEG, 2008-2019 IAR

Table 2-1
HMP Species Occurrence within Habitat Parcels of Munition Response Areas

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Scientific Name	Common Name	Current Regulatory Status	Habitat	Recorded as Present or Habitat Present in MRAs[1]	Observed by ESCA RP
Annuals					
Gilia tenuiflora subsp. *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	2008-2019 IAR, 2010-2019 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	2013-2019 IAR, 2013-2014 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 subsp. *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	2012-2019 FEG, 2012, 2014, 2016, 2017 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	2010-2019 FEG, 2008-2014 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	2008-2019 IAR, 2008-2014 SEA

Table 2-1
HMP Species Occurrence within Habitat Parcels of Munition Response Areas

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Scientific Name	Common Name	Current Regulatory Status	Habitat	Recorded as Present or Habitat Present in MRAs[1]	Observed by ESCA RP
Shrubs					
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	2010-2019 FEG, 2008-2019 IAR, 2013-2014 PF
Ericameria fasciculata	Eastwood's ericameria, Eastwood's goldenbush	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	2010-2019 FEG, 2008-2019 IAR

1 Occurrence records from 1992 Fort Ord Baseline Flora and Fauna
CNPS = California Native Plant Society
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 Munitions Response Areas 2008-2019

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	HMP species	CNPS Listing status (Rare Plant Ranking)	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA
Trees										
Acacia baileyana	Cootamundra wattle, Bailey's acacia						x			
Acacia melanoxylon	blackwood acacia			lim			x		x	
Acacia saligna	orange wattle						x			
Arbutus menziesii	**Pacific madrone**					**x**	**x**	**x**		
Eucalyptus camaldulensis	red river gum			lim			x			
Hesperocyparis macrocarpa	**Monterey cypress**		**1B.2**			**x**	**x**	**x**	**x**	
Juniperus sp.	Juniper						**x**			
Myoporum laetum	myoporum			mod			x		x	
Pinus radiata	**Monterey pine**		**1B.1**			**x**	**x**	**x**	**x**	**x**
Populus trichocarpa	**black cottonwood**					**x**	**x**			
Quercus agrifolia	**coast live oak**				**x**	**x**	**x**	**x**	**x**	**x**
Quercus wislizenii* var. *wislizenii	**interior live oak**						**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**
Baccharis pilularis* subsp. *pilularis	**coyote brush**					**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
Cistus salvifolius	rock-rose								x	
Crocanthemum scoparium	**rush-rose**				**x**	**x**	**x**	**x**	**x**	**x**

Table 3-1
Observed Plant Species in Munitions Response Areas 2008-2019

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Scientific Name	Common Name	HMP species	CNPS Listing status (Rare Plant Ranking)	Cal-IPC Invasiveness Status	IAR MRA Range 44	IAR MRA Range 47	FEG MRA	Parker Flats MRA	Seaside MRA	County North MRA
Shrubs and Subshrubs										
Diplacus aurantiacus	**bush monkeyflower**				x	x	x	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	x		
Eriogonum fasciculatum* var. *foliolosum	**California buckwheat**				x			x		
Eriophyllum confertiflorum	**golden yarrow**				x	x	x	x	x	x
Frangula californica* subsp. *californica	**California coffeeberry**				x	x	x	x	x	x
Frangula californica* subsp. *tomentella	**California coffeeberry**				x	x	x	x	x	x
Garrya elliptica	**coast silk-tassel**				x	x	x	x	x	
Genista monspessulana	French broom			high			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
Pyracantha sp.	firethorn			lim				x		
Ribes malvaceum	**chaparral currant**				x	x	x	x	x	x
Ribes speciosum	**fuchsia-flowered gooseberry**				x	x	x	x	x	x
Rosa californica	**California wild rose**						x			
Rosa gymnocarpa* var. *gymnocarpa	**dwarf wood rose**						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	
Symphoricarpos mollis	**creeping snowberry**				x	x	x	x	x	
Toxicodendron diversilobum	**poison-oak**				x	x	x	x	x	x
Vaccinium ovatum	**California huckleberry, evergreen huckleberry**						x			
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Acaena pinnatifida* var. *californica	**biddy biddy**							x		
Achillea millefolium	**common yarrow**				x	x	x	x	x	x
Acmispon americanus* var. *americanus	**Spanish lotus**							x		
Acmispon heermannii var. orbicularis	**wooly lotus**				x	x	x	x	x	
Acmispon parviflorus	**hill lotus**						x			
Acmispon strigosus	**Bishop's lotus**				x	x	x	x	x	

Table 3-1
Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Agoseris apargioides	**seaside dandelion**						**x**	**x**		
Agrostis exarata **var. *pacifica***	**spike bentgrass**						**x**	**x**		
Agoseris grandiflora **var. *leptophylla***	**giant mountain dandelion**						**x**			
Agrostis pallens	**thin grass**						**x**	**x**	**x**	
Aira caryophyllea	common silver-hair grass				x	x	x	x	x	
Allium hickmanii	**Hickman's onion**	**1B.2**					**x**			
Alopecurus saccatus	Pacific foxtail						**x**			
Amblyopappus pusillus	**amblyopappus**				**x**	**x**				
Amsinckia intermedia	**common fiddleneck**				**x**	**x**				
Amsinckia spectabilis **var. *microcarpa***	**small fruited seaside fiddleneck**						**x**			
Anagallis arvensis	scarlet pimpernel				x	x	x	x	x	x
Antirrhinum kelloggii	**Kellogg's snapdragon**						**x**			
Antirrhinum majus	snapdragon					x				
Aphanes occidentalis	**western lady's mantle**				**x**					
Apiastrum angustifolium	**wild celery**				**x**	**x**	**x**	**x**		**x**
Armeria maritima **subsp. *californica***	**California sea pink, sea thrift**				**x**					
Artemisia douglasiana	**mugwort**					**x**	**x**			
Artemisia dracunculus	**tarragon**								**x**	
Artemisia pycnocephala	**sandhill sagebrush, beach sagewort**								**x**	
Avena barbata	slender wild oat			mod	x	x	x	x	x	x
Avena fatua	wild oat			mod			x	x		
Briza maxima	rattlensnake grass			lim		x	x	x	x	x
Briza minor	little rattlesnake grass						x	x		
Brodiaea terrestris **subsp. *terrestris***	**dwarf brodiaea**						**x**			
Bromus carinatus	**California brome**						**x**	**x**	**x**	
Bromus diandrus	ripgut brome			mod	x	x	x	x	x	x
Bromus hordeaceus	soft chess			lim	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**	**x**	
Callitriche	**water starwort**						**x**			
Calochortus albus **var. *albus***	**fairy lanterns, globe lily**				**x**	**x**	**x**	**x**	**x**	
Calyptridium monandrum	**pussy paws**				**x**	**x**				

Table 3-1
Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Calystegia subacaulis	**hill morning -glory**				x		x	x		
Camissonia contorta	**contorted suncups**				x	x	x	x	x	
Camissonia strigulosa	**strigose suncups**				x		x			
Camissoniopsis cheiranthifolia **subsp. *cheiranthifolia***	**beach evening- primrose**					x				
Camissoniopsis micrantha	**small suncups**				x	x	x	x	x	
Cardionema ramosissimum	**sand mat**				x	x	x	x	x	
Carduus pycnocephalus	Italian thistle			mod					x	
Carex brevicaulis	**short-stemmed sedge**						x			
Carex globosa	**round-fruited sedge**				x	x	x	x	x	
Carex subbracteata	**small bract sedge**						x			
Carpobrotus edulis	hottentot fig/ice plant			high	x	x	x	x	x	x
Castilleja affinis **subsp. *affinis***	**coast Indian paint-brush**							x		
Castilleja attenuata	**valley tassels**						x			
Castilleja exserta **subsp. *latifolia***	**wideleaf purple owl's clover**				x	x			x	
Castilleja foliolosa	**wooly paintbrush**								x	
Caulanthus lasiophyllus	**California mustard**				x	x				
Centaurea melitensis	tocalote			mod	x	x	x	x	x	x
Cerastium glomeratum	mouse-eared chickweed						x	x		
Chenopodium californicum	**California goosefoot**					x	x	x	x	
Chlorogalum pomeridianum **var. *divaricatum***	**soap plant/amole**						x	x		
Chorizanthe diffusa	**diffuse chorizanthe**				x	x	x	x	x	
Chorizanthe douglasii	**Douglas' spineflower**						x			
Chorizanthe c.f. minutiflora	**small-flowered spineflower**							x		
Chorizanthe pungens **var. *pungens***	**Monterey spine-flower**	**HMP**	**1B.1**		x	x	x	x	x	
Cicendia quadrangularis	**Oregon timwort**						x			
Cirsium brevifolium	**clustered thistle, Indian thistle**						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				
Clarkia purpurea	**wine cup clarkia**							x		

Table 3-1
Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Claytonia perfoliata	**miner's lettuce**				**x**	**x**				
Clinopodium douglasii	**yerba buena**				**x**		**x**	**x**		
Collinsia heterophylla	**Chinese houses**					**x**				
Conium maculatum	poison-hemlock			mod			x			x
Cordylanthus rigidus* subsp. *littoralis	**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			
Crassula aquatica	**water pygmyweed**						**x**			
Crassula connata	**pygmy weed**				**x**	**x**	**x**	**x**	**x**	
Croton californicus	**California croton**				**x**	**x**	**x**	**x**	**x**	**x**
Cryptantha clevelandii* var. *florosa	**coastal cryptantha**				**x**	**x**	**x**		**x**	
Cryptantha micromeres	**small-flowered cryptantha**				**x**	**x**	**x**	**x**		
Cryptantha microstachys	**Tejon cryptantha**				**x**	**x**		**x**		
Danthonia californica	**California oat grass**						**x**			
Cyperus eragrostis	**tall flatsedge**						**x**			
Danthonia californica	**California oat grass**						**x**	**x**		
Daucus pusillus	**rattlesnake weed**				**x**	**x**	**x**	**x**		
Deinandra [Hemizonia] corymbosa subsp. corymbosa	**tarplant**						**x**			
Deinandra increscens* subsp. *increscens	**coast tarplant**				**x**	**x**	**x**	**x**	**x**	**x**
Delphinium parryi* subsp. *maritimum	**seaside larkspur**							**x**		
Deschampsia danthonioides	**annual hairgrass**						**x**		**x**	
Dichelostemma capitatum	**blue dicks, wild hyacinth**				**x**	**x**	**x**	**x**		
Distichlis spicata	**saltgrass**						**x**			
Dodecatheon clevelandii* var. *sanctarum	**padre's shooting stars**						**x**			
Drymocallis glandulosa* var. *glandulosa	**sticky cinquefoil**				**x**	**x**	**x**	**x**	**x**	
Dudleya lanceolata	**lance-leaved live-forever**						**x**	**x**	**x**	
Eleocharis acicularis var. acicularis	**slender spikerush**						**x**			
Eleocharis macrostachya	**common spikerush**						**x**	**x**		
Elymus glaucus	**western ryegrass**				**x**	**x**	**x**	**x**	**x**	**x**
Elymus triticoides	**alkali rye**							**x**		
Epilobium brachycarpus	**tall annual willowherb**					**x**			**x**	

Table 3-1
Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Epilobium canum	**California-fuchsia**					**x**	**x**			
Epilobium ciliatum* var. *ciliatum	**northern willowherb**					**x**				
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**					
Erigeron sumatrensis	tropical horseweed					x				
Eriogonum latifolium	**coast buckwheat**							**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		
Eryngium armatum	**coyote thistle**						**x**			
Erysimum ammophilum	**coast wallflower**	**HMP**	**1B.2**		**x**				**x**	
Eschscholzia californica	**California poppy**				**x**	**x**	**x**	**x**	**x**	
Euphorbia peplus	petty spurge					x				
Euthamia occidentalis	**western goldenrod**						**x**	**x**		
Festuca bromoides	brome fescue						x			
Festuca microstachya	**small fescue**				**x**	**x**	**x**			
Festuca myuros	rattail fescue			mod	x	x	x	x	x	
Festuca octoflora	**six-weeks fescue**				**x**	**x**	**x**	**x**	**x**	
Festuca perennis	Italian rye grass			mod			x			
Fritillaria affinis	**checker lily, Mission bells**				**x**		**x**		**x**	
Galium aparine	**bedstraw**							**x**		
Galium californicum* subsp. *californicum	**California bedstraw**				**x**	**x**	**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			lim			x	x		
Gilia achilleafolia var. *achilleafolia*	California gilia						x			
Gilia capitata* subsp. *abrotanifolia	**ball gilia**					**x**	**x**			
Gilia capitata* subsp. *capitata	**ball gilia**					**x**				
Gilia tenuiflora* subsp. *arenaria	**sand [Monterey] gilia**	**HMP**	**1B.2**		**x**	**x**	**x**		**x**	
Gilia tricolor	**bird's eyes gilia**					**x**				

Table 3-1
Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Helminthotheca echioides	bristly ox-tongue			lim		x				
Heliotropium curassivicum	**wild heliotrope**							**x**	**x**	
Herniaria hirsuta subsp. *cinerea*	hairy rupturewort					x	x	x		
Hesperevax acaulis var. ambusticola	**fire evax, stemless dwarf cudweed**							**x**		
Heterotheca grandifolia	**telegraph weed**				**x**	**x**	**x**	**x**	**x**	**x**
Holcus lanatus	velvet grass			mod				x		
Hordeum brachyantherum* subsp. *brachyantherum	**meadow barley**					**x**				
Hordeum marinum subsp. *gussoneanum*	Mediterranean barley			mod			x			
Hordeum murinum	foxtail barley			mod						
Horkelia californica* var. *frondosa	**Californica horkelia**					**x**				
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**			
Juncus capitatus	**leafy-bract dwarf rush**						**x**			
Juncus effusus* var. *pacificus	**bog rush**					**x**				
Juncus mexicanus	**Mexican rush**						**x**	**x**		
Juncus occidentalis	**western rush**						**x**			
Juncus patens	**common rush**							**x**		
Juncus phaeocephalus* var. *phaeocephalus	**brown-headed rush**						**x**	**x**		
Koeleria macrantha	**June grass**				**x**		**x**	**x**	**x**	
Lagurus ovatus	hare's tail grass						x	x		
Lasthenia glaberrima	**smooth goldfields**						**x**			
Lasthenia gracilis	**slender goldfields**						**x**			
Lathyrus vestitus* var. *vestitus	**wild sweet pea, Pacific pea**							**x**		**x**
Layia hieracioides	**tall layia**						**x**			
Layia platyglossa	**tidy tips**				**x**	**x**				
Lamarckia aurea	goldentop grass						x			
Lastarriaea coriacea	**leather spineflower**							**x**		
Lemna minor	**least duckweed**						**x**			
Leontodon saxatilis	hawkbit								x	
Lepidium nitidum	**common peppergrass**				**x**	**x**				

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Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Leptochloa fusca* subsp. *fascicularis	**bearded sprangletop**					**x**				
Leptosiphon parviflorus	**common linanthus**					**x**				
Leptosiphon pygmaeus* subsp. *continentalis	**pygmy linanthus**						**x**			
Lessingia pectinata* var. *pectinata	**common lessingia**				**x**	**x**	**x**	**x**		
Limonium sinuatum	wavyleaf sea-lavender, statice						x			
Lithophragma species	**woodland star**						**x**			
Logfia gallica	narrow-leaved filago				x	x	x	x	x	x
Logfia filaginoides	**California filago**				**x**	**x**	**x**	**x**	**x**	
Lomatium parvifolium	**coastal biscuitroot**		**4.2**		**x**		**x**		**x**	
Lupinus bicolor	**miniature lupine**				**x**		**x**			
Lupinus concinnus	**elegant lupine**					**x**	**x**			
Lupinus nanus	**sky lupine**				**x**	**x**	**x**	**x**		
Lupinus truncatus	**blunt-leaved lupine**					**x**	**x**		**x**	
Luzula comosa	**Pacific wood rush**						**x**	**x**		
Lysimachia (Centunculus) minima	**chaff weed**						**x**			
Lythrum hyssopifolium	hyssop-leaved loosestrife			lim			x			
Madia exigua	**small tarplant**				**x**	**x**	**x**			
Madia gracilis	**grassy tarweed**							**x**		
Madia sativa	**coast tarplant**							**x**		
Malva pseudolavatera	Cretan mallow						**x**			
Malvella leprosa	**alkali mallow**						**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	
Micropus californicus* var. *californicus	**cottontop**				**x**					
Mimulus cardinalis	**scarlet monkeyflower**					**x**				
Monardella sinuata* subsp. *nigrescens	**northern curly-leaved monardella**		**4.2**		**x**	**x**				
Monardella villosa* subsp. *obispoensis	**San Luis Obispo coyote mint**						**x**	**x**		
Muilla maritima	**sea muilla**							**x**		
Navarretia hamata subsp. parviloba	**hooked navarretia**				**x**	**x**	**x**		**x**	
Navarretia intertexta	**needle-leaved navarretia**				**x**		**x**			

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Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Navarretia squarrosa	**skunkweed**				**x**		**x**	**x**		
Nemophila menziesii	**baby blue-eyes**					**x**				
Nuttallanthus texanus	**toad-flax**				**x**	**x**	**x**	**x**	**x**	
Orobanche bulbosa	**chaparral broomrape**				**x**					
Orobanche californica* var. *grandis	**California broomrape**				**x**					
Orobanche fasciculata	**clustered broomrape**						**x**			
Oxalis micrantha	dwarf woodsorrel							x		
Oxalis pilosa	**hairy woodsorrel**					**x**				
Papaver californicum	**fire poppy**						**x**			
Parapholis incurva	sicklegrass					x				
Pectocarya penicillata	**winged combseed**				**x**	**x**	**x**	**x**	**x**	
Pedicularis densiflora	**Indian warrior**						**x**		**x**	
Petrorhagia dubia	hairypink				x	x	x	x		
Phacelia brachyloba	**short-lobed phacelia**						**x**			
Phacelia campanularia	**desert bluebells**					**x**				
Phacelia distans	**wild heliotrope**				**x**					
Phacelia douglasii	**Douglas' phacelia**				**x**	**x**				
Phacelia grisea	**grey phacelia, Santa Lucia phacelia**						**x**			
Phacelia malvifolia	**stinging phacelia**							**x**		
Phacelia ramosissima	**branching phacelia**								**x**	
Piperia michaelii	**Michael's rein-orchid**		**4.2**		**x**		**x**		**x**	
Plagiobothrys canescens	**valley popcorn flower**							**x**		
Plagiobothrys collinus* var. *fulvescens	**rusty-haired popcorn flower**				**x**	**x**	**x**			
Plantago coronopus	cut-leaved plantain				x		x	x	x	
Plantago erecta	**California plantain**				**x**	**x**	**x**	**x**	**x**	
Plantago lanceolata	English plantain			lim			x			
Poa annua	annual bluegrass					x				
Poa howellii	**Howell's bluegrass**						**x**			
Poa secunda	**one-sided bluegrass, pine bluegrass**				**x**			**x**		**x**
Pogogyne serpylloides	**thymeleaf mesamint**						**x**	**x**		
Polycarpon depressum	**California polycarp**						**x**			
Polygala californica	**California milkwort**						**x**			

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Polypogon interruptus	ditch beard grass					x				
Polypogon monspeliensis	rabbitsfoot grass			lim		x	x			
Polypogon viridis	water beard grass					x				
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**	**x**	**x**	
Pterostegia drymarioides	**fairy mist**				**x**	**x**	**x**	**x**	**x**	
Rafinesquia californica	**California chicory**						**X**			
Ranunculus californicus	**California buttercup**							**x**		
Rumex acetosella	sheep sorrel			mod	x	x	x	x	x	x
Rumex crispus	curly dock			lim			**x**			
Rumex salicifolius* subsp. *salicifolius	**willow dock**						**x**	**x**		
Sagina apetela	**sticky pearlwort**					**x**				
Sanicula arctopoides	**footsteps of spring**						**x**			
Sanicula crassicaulis	**Pacific sanicle**						**x**	**x**		
Sanicula laciniata	**coast sanicle**						**x**	**x**		
Schismus arabicus	Mediterranean grass			lim			x			
Scutellaria tuberosa	**scull cap**						**x**	**x**		
Senecio c.f. aphanactis	**chaparral ragwort**		**2B.2**		**x**					
Senecio glomeratus	cut-leaved fireweed			mod		x	x	x	x	x
Senecio vulgaris	common ragwort					x	x			
Sidalcea malviflora* subsp. *malviflora	**checkerbloom**							**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**	**x**			
***Solanum americanum* (herbaceous)**	**American nightshade**					**x**				
Solidago californica	**California goldenrod**							**x**		
Soliva sessilis	South American soliva						x			

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Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Sonchus asper subsp. asper	prickly sow-thistle				x	x	x	x	x	
Sonchus oleraceus	common sow-thistle				x	x	x	x	x	x
Spergula arvensis	corn spurrey					x		x	x	
Spergula bocconi	Boccone's sand spurry						x			
Spergularia rubra	red sand-spurrey					x	x			
Spiranthes romanzoffiana	**hooded ladies tresses**						**x**			
Stachys ajugoides	**hedge-nettle**						**x**			
Stachys bullata	**wood mint**				**x**		**x**			**x**
Stephanomeria virgata* subsp. *virgata	**tall milk aster**							**x**		
Stipa cernua	**nodding needlegrass**				**x**			**x**		
Stipa lepida	**foothill needlegrass**						**x**	**x**		
Stipa pulchra	**purple needlegrass**				**x**	**x**	**x**	**x**		
Stylocline gnaphaliodes	**everlasting neststraw**				**x**	**x**	**x**			
Taraxia [Camissonia] ovata	**suncups**				**x**	**x**	**x**	**x**		
Thysanocarpus curvipes	**lace pod**						**x**			
Toxicoscordion fremontii	**Fremont's star lily**				**x**		**x**		**x**	
*Tribolium obliterum**	cape grass						x			
Trichostema lanceolatum	**vinegar weed**						**x**			
Trifolium angustifolium	narrow-leaved crimson clover						x	x		x
Trifolium ciliolatum	**foothill clover**				**x**					
Trifolium dubium	shamrock clover						x	x		
Trifolium gracilentum	**pinpoint clover**				**x**		**x**			
Trifolium hirtum	rose clover			mod		x	x	x	x	
Trifolium microcephalum	**hairy clover, small-headed clover**				**x**	**x**		**x**		
Trifolium wormskoldii	**tomcat clover**						**x**			
Triteleia hyacinthina	**white brodiaea**							**x**		
Triteleia ixioides* subsp. *ixioides	**golden brodiaea, prettyface**						**x**			
Triglochin scillioides	**flowering quillwort**						**x**			
Triodanis perfoliata	**Venus' looking-glass**						**x**	**x**		
Typha domingensis	**southern cattail**						**x**			
Uropappus lindleyi	**silver puffs**				**x**	**x**	**x**	**x**		
Vicia americana* subsp. *americana	**American vetch**						**x**	**x**		

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Observed Plant Species in Munitions Response Areas 2008-2019

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Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)										
Viola cultivar	pansy					x				
Viola pedunculata	**Johnny jump-ups**						**x**	**x**		
Zeltnera davyi	**Davy's centaury**						**x**			
Ferns and Fern-relatives										
Dryopteris arguta	**coastal wood fern**						**x**	**x**		
Pellea mucronata **var. *mucronata***	**bird's nest fern**						**x**			
Pentagramma triangularis **subsp. *triangularis***	**goldenback fern**						**x**	**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 (mod) – substantial and apparent ecological impacts , moderate to high rates of dispersal, establishment dependent upon
• limited (lim) – invasive but impacts not widespread statewide, low to moderate rates of dispersal, may be locally persistent and

Table 3-2
Observed Wildlife Species in Munitions Response Areas 2008 - 2019

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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	Heermann'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 californiense	California tiger salamander	x				x			
Aneides lugubris	Arboreal salamander				x				
Anniella pulchra nigra	California black legless lizard	x	x				x		
Bufo boreas	Western toad					x			
Crotalus oreganus oreganus	Northern Pacific rattlesnake		x	x	x	x	x		
Ensatina eschscholtzii eschscholtzii	Monterey ensatina		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	

Table 3-2
Observed Wildlife Species in Munitions Response Areas 2008 - 2019

ESCA RP 2019 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									
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	
Asio otus	Long-eared owl			x					
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	x	x	x			
Chamaea fasciata	Wrentit		x	x	x	x	x	x	
Charadrius alexandrinus nivosus	Western snowy plover	x							
Charadrius vociferus	Killdeer		x	x	x	x	x		
Circus cyaneus	Northern harrier		x	x	x				
Colaptes auratus	Northern flicker		x		x	x		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		

Table 3-2
Observed Wildlife Species in Munitions Response Areas 2008 - 2019

ESCA RP 2019 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									
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			
Phalaropus lobatus	**Red-necked phalarope**					x			
Picoides nuttallii	**Nuttall's woodpecker**							x	
Pipilo crissalis	**California towhee**		x	x	x	x		x	
Pipilo maculatus	**Spotted towhee**		x		x	x		x	
Poecile rufescens	**Chestnut-backed chickadee**							x	
Psaltriparus minimus	**Bushtit**					x		x	
Sayornis saya	**Say's phoebe**							x	
Sturnella neglecta	**Western meadowlark**							x	
Tachycineta bicolor	**Tree swallow**							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			

Table 3-3
Future East Garrison MRA Grenade Range
Observed Plant Species in or Around Aquatic Features
2011-2019

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Wetland Indicator Status[1]	Aquatic Features		
			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		
***Callitriche* species**	**water starwort**	**OBL**	**x**		
Carex c.f. brevicaulis	**short-stemmed sedge**	**NL**		**x**	
Cicendia quadrangularis	**Oregon timwort**	**FAC**			**x**
Crassula connata	**pygmy weed**	**FAC**		**x**	
Crassula aquatica	**water pygmyweed**	**OBL**			**x**
Deschampsia danthonioides	**annual hairgrass**	**FACW**	**x**		**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

Table 3-3
Future East Garrison MRA Grenade Range
Observed Plant Species in or Around Aquatic Features
2011-2019

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Wetland Indicator Status[1]	Aquatic Features		
			AF09-1	AF09-1B	AF09-2
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**
Lasthenia glaberrima	**smooth goldfields**	**OBL**			**x**
Lasthenia gracilis	**slender goldfields**	**NL**			**x**
Lemna minuta	**least duckweed**	**OBL**	**x**		**x**
Logfia [Filago] gallica	narrow-leaved filago	NL	x	x	x
Luzula comosa	**Pacific wood rush**	**FAC**			**x**
Lysimachia (Centunculus) minima	**chaff weed**	**FACW**			**x**
Lythrum hyssopifolium	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**

Table 3-3
Future East Garrison MRA Grenade Range
Observed Plant Species in or Around Aquatic Features
2011-2019

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Wetland Indicator Status[1]	Aquatic Features		
			AF09-1	AF09-1B	AF09-2
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		
Spiranthes romanzoffiana	**hooded ladies tresses**	**FACW**			**x**
Triglochin scillioides	**flowering quillwort**	**OBL**	**x**	**x**	
Tribolium obliterum	cape grass	NL	x	x	
Typha latifolia	**broadleaf cattail**	**OBL**			**x**

Native species in bold

1. Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

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 6-1
Future East Garrison
MRA Vegetation Cover in Areas Subject to Vegetation Cutting

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Baseline Data 2010 - 2011				
		Thirty-nine Transects				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.7%	3.5%	0.9%	0.7%	12.8%
Total Mean Percent Native Tree Cover		***0.7%***			***0.7%***	
Shrub and Subshrub Species						
Acmispon glaber	deerweed	0.1%	0.4%	0.1%	0.1%	2.6%
Adenostoma fasciculatum	chamise	27.4%	22.4%	6.0%	25.0%	100%
Arctostaphylos crustacea subsp. *crustacea*	brittleleaf manzanita	45.8%	32.3%	8.7%	41.8%	89.7%
Arctostaphylos hookeri	**Hooker's manzanita**	**0.0%**	**--**	--	0.0%	**0.0%**
Arctostaphylos montereyensis	**Toro manzanita**	**14.4%**	**19.8%**	5.3%	13.1%	**64.1%**
Artemisia californica	California sagebrush	0.3%	1.4%	0.4%	0.2%	5.1%
Baccharis pilularis subsp. *consanguinea*	coyote brush	2.2%	4.1%	1.1%	2.0%	48.7%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.1%	0.0%	0.0%	2.6%
Ceanothus rigidus	**Monterey ceanothus**	**1.5%**	**2.2%**	0.6%	1.4%	**48.7%**
Ceanothus thyrsiflorus	blue blossom	0.3%	1.8%	0.5%	0.3%	5.1%
Crocanthemum scoparium	rush-rose	0.0%	0.0%	0.0%	0.0%	5.1%
Ericameria ericoides	dune-heather, mock-heather	0.7%	3.9%	1.1%	0.6%	5.1%
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.2%**	0.0%	0.0%	**2.6%**
Eriophyllum confertiflorum	golden yarrow	0.0%	0.1%	0.0%	0.0%	5.1%
Frangula californica subsp. *californica*	California coffeeberry	1.3%	3.5%	0.9%	1.2%	20.5%
Garrya elliptica	coast silk tassel	1.5%	3.9%	1.0%	1.4%	28.2%
Heteromeles arbutifolia	toyon	1.0%	2.7%	0.7%	1.0%	17.9%
Lepechinia calycina	pitcher sage	0.0%	0.3%	0.1%	0.0%	2.6%
Diplacus aurantiacus	bush monkeyflower	2.1%	4.1%	1.1%	1.9%	59.0%
Quercus wislizenii var. *wislizenii*	interior live oak	0.0%	0.0%	0.0%	0.0%	0.0%
Ribes malvaceum	chaparral currant	0.1%	0.6%	0.2%	0.1%	5.1%
Ribes speciosum	fuchsia-flowered gooseberry	0.0%	--	--	0.0%	0.0%
Rosa gymnocarpa var. *gymnocarpa*	wood rose	0.0%	--	--	0.0%	0.0%
Rubus ursinus	California blackberry	0.0%	--	--	0.0%	0.0%
Salvia mellifera	black sage	7.2%	15.5%	4.2%	6.6%	56.4%
Croton californicus	California croton	0.1%	0.3%	0.1%	0.1%	5.1%
Solanum umbelliferum	blue witch nightshade	0.0%	--	--	0.0%	0.0%
Symphoricarpos mollis	creeping snowberry	0.0%	--	--	0.0%	0.0%
Toxicodendron diversilobum	poison-oak	0.4%	1.4%	0.4%	0.4%	10.3%
Vaccinium ovatum	California huckleberry	0.0%	--	--	0.0%	0.0%
Total Mean Percent Native Shrub and Subshrub Cover		***106.3%***			***97.5%***	
Total Combined Mean Native Herbaceous Cover Between Shrubs and Subshrubs		***2.0%***	***4.4%***	***1.2%***	***--***	***51.3%***
Total Mean Cover of Target Weed Species (*Carpobrotus edulis*)		***0.4%***	***2.7%***	***0.7%***	***0.4%***	***2.6%***
Total Mean Non-native Herbaceous Species Cover		***na***	***na***	***na***	***na***	***na***
Total Mean Percent Native Vegetative Cover		***109.0%***				
Total Bare Ground (Including Masticated Vegetation)		***7.1%***				
Total Mean Percent Masticated Vegetation		***na***				
Total Mean Percent Bare Ground		***7.1%***	***10.7%***	***--***	***--***	***84.6%***

HMP Species in Bold
*A calculation error was discovered after report submission in 2015; updated values reported here.

Table 6-1
Future East Garrison
MRA Vegetation Cover in Areas Subject to Vegetation Cutting

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Post-activity Data 2015* (Year 3)				
		24 Transects (in Grid Cells Veg Cut in 2012)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.9%	2.7%	0.9%	1.3%	29.2%
Total Mean Percent Native Tree Cover		***0.9%***			***1.4%***	
Shrub and Subshrub Species						
Acmispon glaber	deerweed	0.4%	0.9%	0.3%	0.5%	25.0%
Adenostoma fasciculatum	chamise	16.2%	11.3%	4.0%	24.1%	100.0%
Arctostaphylos crustacea subsp. *crustacea*	brittleleaf manzanita	24.4%	15.1%	5.3%	36.3%	95.8%
Arctostaphylos hookeri	**Hooker's manzanita**	**0.0%**	**--**	--	0.0%	**0.0%**
Arctostaphylos montereyensis	**Toro manzanita**	**2.9%**	**5.3%**	1.9%	4.2%	**54.2%**
Artemisia californica	California sagebrush	0.1%	0.4%	0.1%	0.1%	4.2%
Baccharis pilularis subsp. *consanguinea*	coyote brush	2.3%	4.1%	1.4%	3.4%	54.2%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.1%	0.1%	0.1%	8.3%
Ceanothus rigidus	**Monterey ceanothus**	**0.5%**	**0.9%**	0.3%	0.8%	**54.2%**
Ceanothus thyrsiflorus	blue blossom	0.4%	1.7%	0.6%	0.6%	8.3%
Crocanthemum scoparium	rush-rose	1.5%	2.4%	0.8%	2.1%	62.5%
Ericameria ericoides	dune-heather, mock-heather	0.1%	0.3%	0.1%	0.1%	4.2%
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.0%**	0.0%	0.0%	**0.0%**
Eriophyllum confertiflorum	golden yarrow	2.0%	3.7%	1.1%	2.8%	45.8%
Frangula californica subsp. *californica*	California coffeeberry	0.5%	1.1%	0.4%	0.7%	20.8%
Garrya elliptica	coast silk tassel	0.5%	1.6%	0.6%	0.8%	16.7%
Heteromeles arbutifolia	toyon	1.1%	3.0%	1.1%	1.6%	16.7%
Lepechinia calycina	pitcher sage	0.4%	1.2%	0.4%	0.7%	29.2%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	87.5%
Quercus wislizenii var. *wislizenii*	interior live oak	3.1%	3.5%	1.2%	4.7%	4.2%
Ribes malvaceum	chaparral currant	0.2%	0.7%	0.2%	0.3%	20.8%
Ribes speciosum	fuchsia-flowered gooseberry	0.0%	--	--	0.0%	8.3%
Rosa gymnocarpa var. *gymnocarpa*	wood rose	0.0%	--	--	0.0%	4.2%
Rubus ursinus	California blackberry	0.7%	3.2%	1.1%	1.0%	4.2%
Salvia mellifera	black sage	1.8%	4.4%	1.6%	2.6%	45.8%
Croton californicus	California croton	0.0%	--	--	0.0%	0.0%
Solanum umbelliferum	blue witch nightshade	0.0%	--	--	0.0%	0.0%
Symphoricarpos mollis	creeping snowberry	0.3%	1.1%	0.4%	0.4%	6.7%
Toxicodendron diversilobum	poison-oak	0.6%	1.7%	0.6%	0.8%	25.0%
Vaccinium ovatum	California huckleberry	0.0%	--	--	0.0%	0.0%
Total Mean Percent Native Shrub and Subshrub Cover		***59.7%***			***94.9%***	
Total Combined Mean Native Herbaceous Cover Between Shrubs and Subshrubs		***2.3%***	***2.4%***	***0.8%***	***3.4%***	***100.0%***
Total Mean Cover of Target Weed Species (*Carpobrotus edulis*)		***1.0%***	***4.2%***	***1.5%***	***1.5%***	
Total Mean Non-native Herbaceous Species Cover		***4.9%***	***7.5%***	***2.6%***	***7.2%***	
Total Mean Percent Native Vegetative Cover		***62.9%***				
Total Bare Ground (Including Masticated Vegetation)		***38.3%***				
Total Mean Percent Masticated Vegetation		***19.2%***	***11.6%***	***4.1%***		***95.8%***
Total Mean Percent Bare Ground		***19.1%***	***13.2%***	***4.6%***		***87.5%***

HMP Species in Bold

*A calculation error was discovered after report submission in 2

Table 6-1
Future East Garrison
MRA Vegetation Cover in Areas Subject to Vegetation Cutting

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Post-activity Data 2016 (Year 5)				
		23 Transects (in Grid Cells Veg Cut in 2011)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.8%	2.5%	0.9%	0.8%	26.1%
Total Mean Percent Native Tree Cover		***0.8%***			***0.9%***	
Shrub and Subshrub Species						
Acmispon glaber	deerweed	3.6%	7.5%	2.7%	3.5%	43.5%
Adenostoma fasciculatum	chamise	12.8%	11.6%	4.2%	12.5%	91.3%
Arctostaphylos crustacea subsp. *crustacea*	brittleleaf manzanita	29.4%	21.9%	7.8%	28.5%	87.0%
Arctostaphylos hookeri	**Hooker's manzanita**	**0.0%**	--	--	0.0%	**0.0%**
Arctostaphylos montereyensis	**Toro manzanita**	**2.8%**	**6.9%**	2.5%	2.7%	**34.8%**
Artemisia californica	California sagebrush	0.0%	--	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	2.6%	4.1%	1.5%	2.5%	56.5%
Ceanothus dentatus	dwarf ceanothus	0.7%	1.7%	0.6%	0.7%	30.4%
Ceanothus rigidus	**Monterey ceanothus**	**0.6%**	**1.3%**	0.5%	0.6%	**39.1%**
Ceanothus thyrsiflorus	blue blossom	0.0%	--	--	0.0%	0.0%
Crocanthemum scoparium	rush-rose	2.3%	3.0%	1.1%	2.3%	87.0%
Ericameria ericoides	dune-heather, mock-heather	0.9%	2.9%	1.0%	0.9%	13.0%
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.2%**	0.1%	0.1%	**8.7%**
Eriophyllum confertiflorum	golden yarrow	1.1%	1.2%	0.4%	1.1%	73.9%
Frangula californica subsp. *californica*	California coffeeberry	2.2%	4.0%	1.4%	2.1%	34.8%
Garrya elliptica	coast silk tassel	0.4%	0.7%	0.3%	0.4%	26.1%
Heteromeles arbutifolia	toyon	0.8%	1.6%	0.6%	0.8%	30.4%
Lepechinia calycina	pitcher sage	0.5%	1.2%	0.4%	0.5%	30.4%
Diplacus aurantiacus	bush monkeyflower	2.5%	2.9%	1.0%	2.4%	69.6%
Quercus wislizenii var. *wislizenii*	interior live oak	0.0%	--	--	0.0%	0.0%
Ribes malvaceum	chaparral currant	0.0%	0.2%	0.1%	0.0%	4.3%
Ribes speciosum	fuchsia-flowered gooseberry	0.0%	--	--	0.0%	0.0%
Rosa gymnocarpa var. *gymnocarpa*	wood rose	0.1%	0.6%	0.2%	0.1%	4.3%
Rubus ursinus	California blackberry	0.9%	4.0%	1.4%	0.9%	13.0%
Salvia mellifera	black sage	6.6%	9.2%	3.3%	6.4%	56.5%
Croton californicus	California croton	0.0%	--	--	0.0%	0.0%
Solanum umbelliferum	blue witch nightshade	0.0%	--	--	0.0%	4.3%
Symphoricarpos mollis	creeping snowberry	1.0%	3.4%	1.2%	1.0%	17.4%
Toxicodendron diversilobum	poison-oak	1.0%	2.3%	0.8%	0.9%	30.4%
Vaccinium ovatum	California huckleberry	0.0%	--	--	0.0%	0.0%
Total Mean Percent Native Shrub and Subshrub Cover		***73.1%***			***84.9%***	
Total Combined Mean Native Herbaceous Cover Between Shrubs and Subshrubs		***12.3%***	***15.3%***	***5.5%***	***11.9%***	
Total Mean Cover of Target Weed Species (*Carpobrotus edulis*)		***1.3%***	***3.3%***	***1.2%***	***1.2%***	
Total Mean Non-native Herbaceous Species Cover						
Total Mean Percent Native Vegetative Cover		***86.2%***				
Total Bare Ground (Including Masticated Vegetation)		***21.3%***				
Total Mean Percent Masticated Vegetation		***11.7%***	***9.9%***	***3.5%***		***78.3%***
Total Mean Percent Bare Ground		***9.6%***	***7.3%***	***2.6%***		***96%***

HMP Species in Bold

*A calculation error was discovered after report submission in 2

Table 6-1
Future East Garrison
MRA Vegetation Cover in Areas Subject to Vegetation Cutting

ESCA RP 2019 Annual Natural Resource Report

Scientific Name	Common Name	Post-activity Data 2019 (Year 8)				
		23 Transects (in Grid Cells Veg Cut in 2011)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.7%	1.6%	0.6%	0.8%	43.5%
Total Mean Percent Native Tree Cover		***0.7%***			***0.8%***	
Shrub and Subshrub Species						
Acmispon glaber	deerweed	0.9%	1.8%	0.6%	1.1%	43.5%
Adenostoma fasciculatum	chamise	15.4%	14.5%	5.2%	18.5%	95.7%
Arctostaphylos crustacea subsp. *crustacea*	brittleleaf manzanita	32.5%	18.1%	6.5%	39.0%	87.0%
Arctostaphylos hookeri	**Hooker's manzanita**	**0.1%**	**--**	**--**	**0.1%**	**4.3%**
Arctostaphylos montereyensis	**Toro manzanita**	**5.2%**	**13.2%**	**4.7%**	**6.2%**	**43.5%**
Artemisia californica	California sagebrush	0.0%	--	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	3.0%	3.8%	1.4%	3.6%	73.9%
Ceanothus dentatus	dwarf ceanothus	0.4%	0.9%	0.3%	0.5%	30.4%
Ceanothus rigidus	**Monterey ceanothus**	**1.8%**	**1.9%**	**0.7%**	**2.2%**	**60.9%**
Ceanothus thyrsiflorus	blue blossom	0.0%	--	--	0.0%	0.0%
Crocanthemum scoparium	rush-rose	2.1%	3.0%	1.1%	2.5%	78.3%
Ericameria ericoides	dune-heather, mock-heather	0.5%	0.8%	0.3%	0.6%	8.7%
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**--**	**--**	**0.0%**	**0.0%**
Eriophyllum confertiflorum	golden yarrow	0.7%	0.7%	0.2%	0.8%	65.2%
Frangula californica subsp. *californica*	California coffeeberry	1.2%	2.5%	0.9%	1.5%	43.5%
Garrya elliptica	coast silk tassel	0.4%	2.4%	0.9%	0.5%	21.7%
Heteromeles arbutifolia	toyon	1.4%	4.3%	1.5%	1.6%	26.1%
Lepechinia calycina	pitcher sage	0.4%	1.2%	0.4%	0.5%	26.1%
Diplacus aurantiacus	bush monkeyflower	1.7%	1.6%	0.6%	2.0%	82.6%
Quercus wislizenii var. *wislizenii*	interior live oak	0.0%	--	--	0.0%	0.0%
Ribes malvaceum	chaparral currant	0.1%	1.0%	0.4%	0.2%	8.7%
Ribes speciosum	fuchsia-flowered gooseberry	0.0%	--	--	0.0%	0.0%
Rosa gymnocarpa var. *gymnocarpa*	wood rose	0.2%	--	--	0.3%	4.3%
Rubus ursinus	California blackberry	0.1%	1.4%	0.5%	0.2%	13.0%
Salvia mellifera	black sage	6.3%	8.0%	2.9%	7.6%	78.3%
Croton californicus	California croton	0.1%	0.8%	0.3%	0.1%	13.0%
Solanum umbelliferum	blue witch nightshade	0.0%	--	--	0.0%	0.0%
Symphoricarpos mollis	creeping snowberry	0.4%	2.9%	1.0%	0.5%	13.0%
Toxicodendron diversilobum	poison-oak	0.6%	1.8%	0.6%	0.7%	34.8%
Vaccinium ovatum	California huckleberry	0.1%	--	--	0.1%	4.3%
Total Mean Percent Native Shrub and Subshrub Cover		***75.5%***			***90.6%***	
Total Combined Mean Native Herbaceous Cover Between Shrubs and Subshrubs		***3.9%***	***6.4%***	***2.3%***	***4.6%***	***95.7%***
Total Mean Cover of Target Weed Species (*Carpobrotus edulis*)		***0.4%***	***0.8%***	***0.3%***	***0.5%***	
Total Mean Non-native Herbaceous Species Cover		***2.9%***	***6.2%***	***2.2%***	***3.5%***	
Total Mean Percent Native Vegetative Cover		***80.1%***				
Total Bare Ground (Including Masticated Vegetation)		***23.2%***				
Total Mean Percent Masticated Vegetation		***1.3%***	***2.5%***	***0.9%***	***--***	***21.7%***
Total Mean Percent Bare Ground		***21.9%***	***7%***	***3%***	***--***	***100%***

HMP Species in Bold

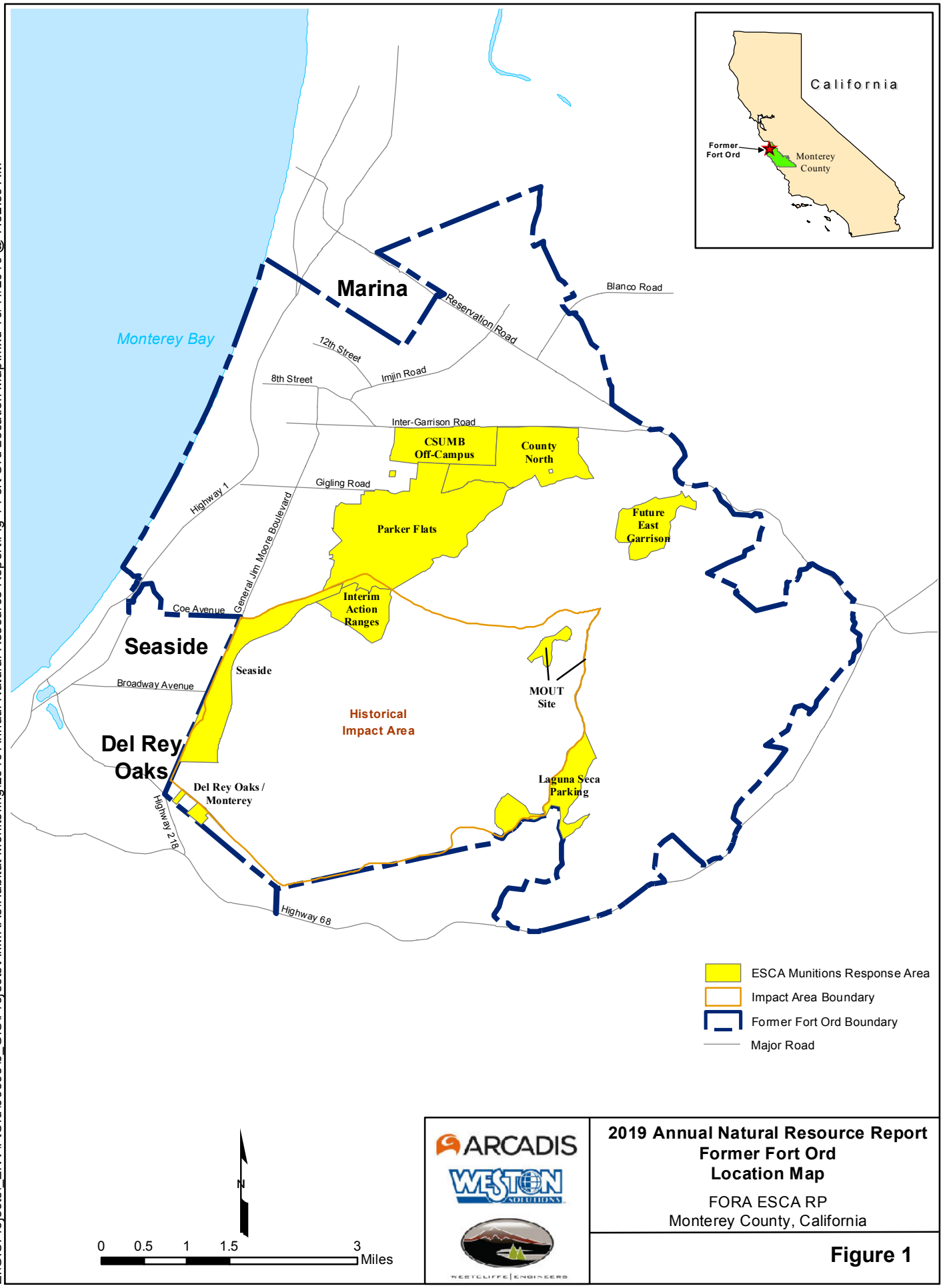
*A calculation error was discovered after report submission in 2

Table 6-2
Future East Garrison MRA
2019 Plant Species Richness and Diversity

ESCA RP 2019 Annual Natural Resource Report

Future East Garrison MRA							
Vegetation Cutting in Central Maritime Chaparral							
Activity Year	**Baseline (2011)**	**Year 3 (2014)**	**Year 3 with surrounding species included (2014)**	**Year 5 (2016)**	**Year 5 with surrounding species included (2016)**	**Year 8 (2019)**	**Year 8 with surrounding species included (2019)**
Number of Transects/Quadrats	39 Transects	17 Transects and 18 Quadrats		23 Transects and 6 Quadrats		23 Transects	
Total Number of Native Species	25	28	94	38	99	76	110
Total Number of HMP Species Present	3	3	5	3	3	3	4
Total Number of HMP Herbaceous Species Present	0	0	2	0	0	0	0
Total Native Tree Species in All Transects	1	1	1	1	2	1	1
Total Shrub Species in All Transects	22	22	27	22	27	24	27
Total Native Herbaceous Species in All Transects or Related Herbaceous Plots	1	5	64	15	69	50	80
Total Native Ferns and Fern Allies in All Transects or Related Herbaceous Plots	1	0	2	0	3	1	2
Mean Number Tree Species per Transect	0.1	0.3	0.6	0.2	0.8	0.4	0.5
Mean Number Shrub Species per Transect	5.7	8.4	11.6	8.0	12.0	9.4	10.8
Mean Number of Native Herbaceous Species per Transect[1]	0.05	0.3	10.7	7.4	14.3	6.7	9.7
Mean number of Native Ferns and Fern Allies per Transect	0.1	0.0	0.2	0.0	0.2	0.04	0.1
Diversity - Shannon Index	1.1	1.5	--	1.4	--	1.4	--
Evenness	0.2	0.2	--	0.2	--	0.2	--
Total Percent Mean Native Cover (Transects)	109.0%	66.5%	--	86.1%	--	80.1%	--
Total Percent Mean Native Shrub Cover (Transects)	106.3%	57.8%	--	73.1%	--	75.5%	--
Total Percent Mean Native Herbaceous Species Cover (Transects)	2.0%	8.4%	--	12.3%	--	3.9%	--
Total Percent Mean Native Cover (Herbaceous Quadrats)	0%[2]	6.3%	--	13.6%	--	--[3]	--

[1]Data collected from those transects in which herbaceous plots were monitored
[2]Quadrat data were not collected in baseline, due to lack of herbaceous cover
[3]Quadrat data were not collected in 2019, due to lack of herbaceous cover

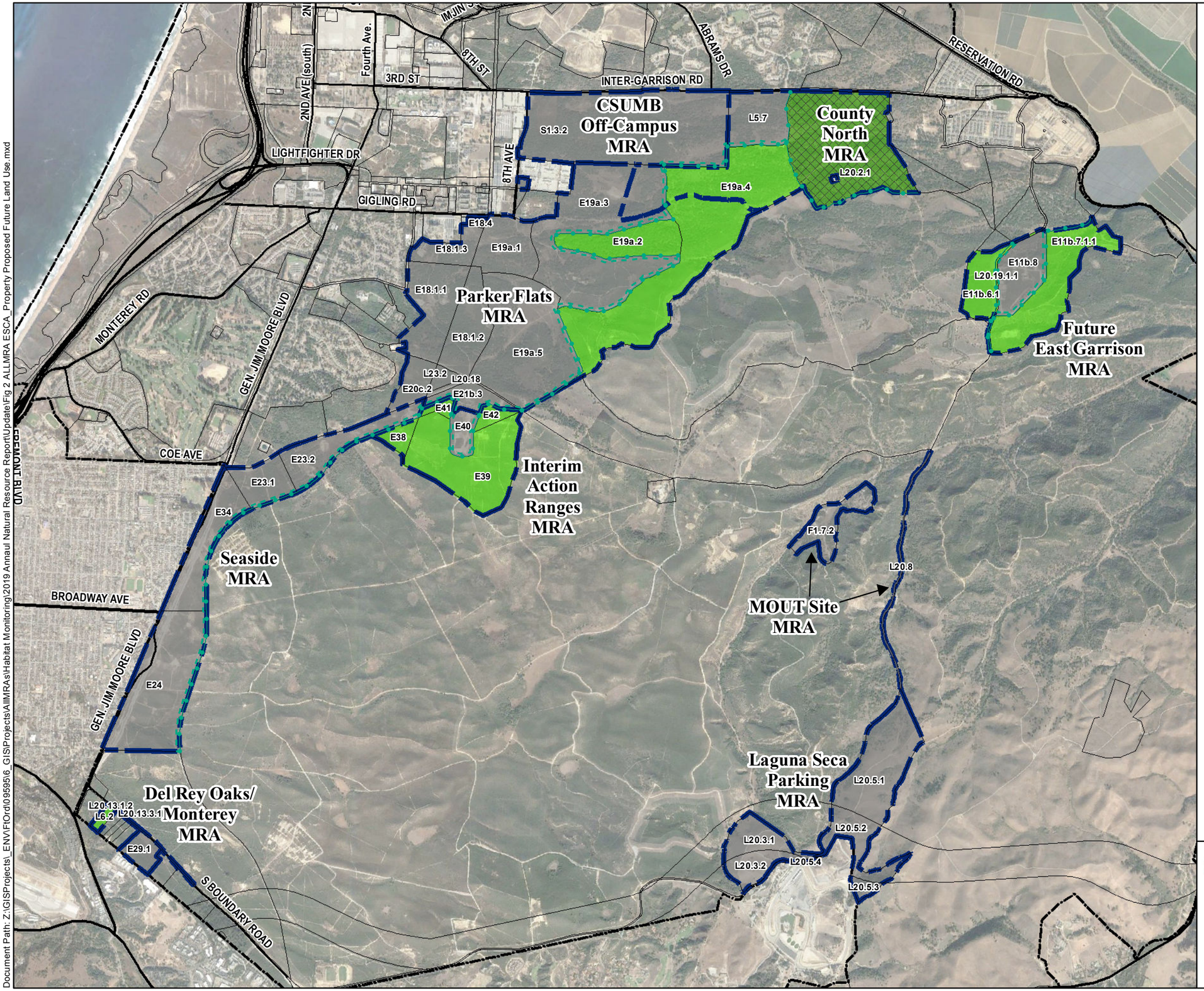


2019 Annual Natural Resource Report
Former Fort Ord
Location Map

FORA ESCA RP
Monterey County, California

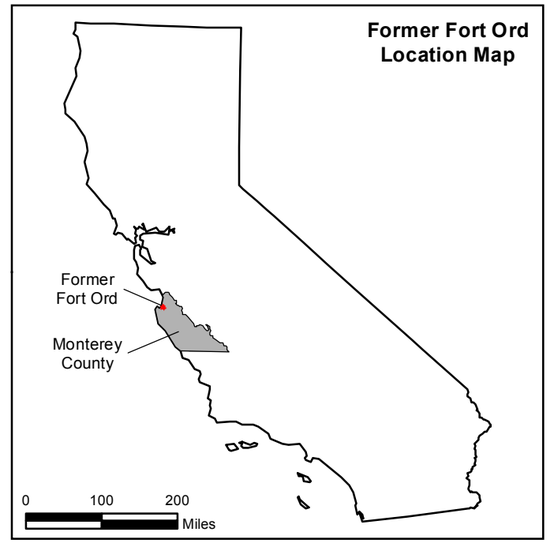
Figure 1

Z:\GIS\Projects_ENV\FtOrd\09595\6_GIS\Projects\AIMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Fig 1 Fort Ord Location Map.mxd 10/11/2019 @ 7:52:59 AM



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 10/21/2019 - Image Date: 11/15/2018

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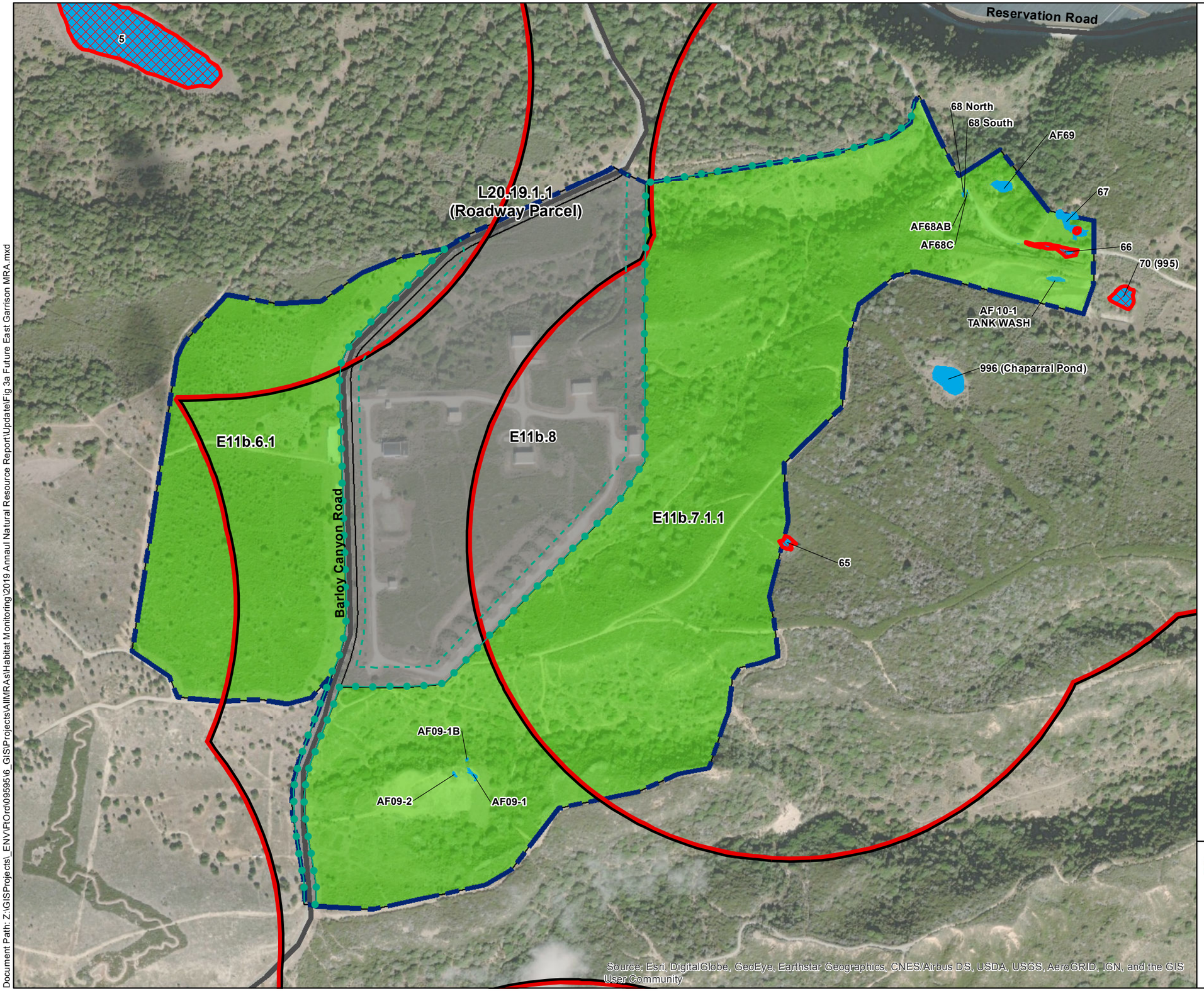
2019 Annual Natural Resource Report

ESCA RP
2019 Designated Future Land Use

FORA ESCA RP
Monterey County, California

Figure 2

Document Path: Z:\GISProjects_ENV\FtOrd\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\Fig 2 ALLMRA ESCA_Property Proposed Future Land Use.mxd

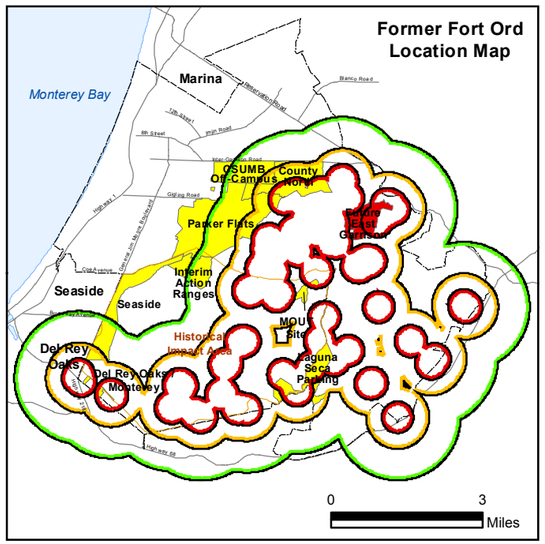


Legend

- Munitions Response Area
- Major Road
- E23.1 — USACE Parcel
- Aquatic Features
- Aquatic Feature with Documented CTS Presence
- Habitat Reserve
- Development Parcels
- Borderland Interface
- 100-Foot Buffer from Borderland Interface

California Tiger Salamander Buffer

- 500 m
- 1 km
- 2 km



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Accessed 11/4/2019 - Image Date: 12/02/2018

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2019 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:\GISProjects_ENV\FtOrd\095956\6_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\Fig 3a Future East Garrison MRA.mxd

EUCALYPTUS ROAD

EUCALYPTUS ROAD

E41

E42

E40

E38

E39

Range 47
SCA

North
Range 44
SCA

South Range 44 SCA/
Central Area NCAs

Subarea A - Topsoil Replacement, Erosion Control, and Seeding of Large-scale Soil Excavation Area

Subarea B - Topsoil Replacement, Erosion Control, Seeding and Container Planting of Large-scale Soil Excavation Area

Subarea C - Vegetation Cutting and Target-specific Areas, Erosion Control and Seeding of Small-scale Excavation Areas

Subarea C - Erosion Control of Low-recruitment Escarpment Subject to Small-scale and Target-specific Excavation Areas

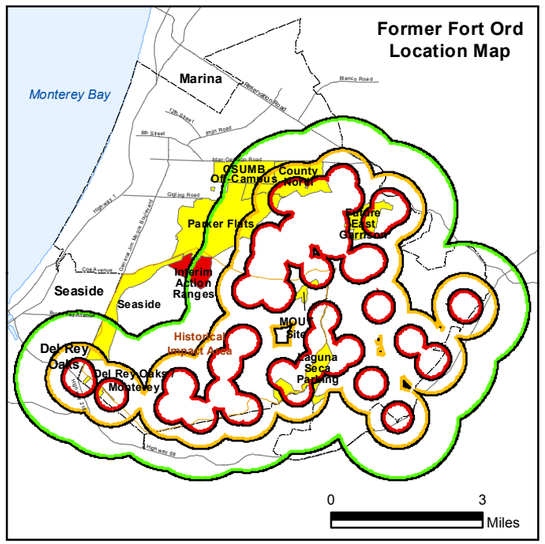
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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



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Accessed 11/14/2019 - Image Date: 10/25/2018

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2019 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:\GISProjects_ENV\FtOrd\095956\6_GIS\ProjectsAllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\Fig 3b IAR MRA.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 CUT OFF ROAD

PARKER FLAT ROAD

Parker Flats

Future East Garrison

MONTEREY ROAD

COE AVENUE

EUCALYPTUS ROAD

Interim Action Ranges

EUCALYPTUS ROAD

BARLOY CANYON ROAD

DEL MONTE BOULEVARD

FREMONT STREET

BROADWAY ROAD

GENERAL JIM MOORE BOULEVARD

Seaside

MOUT Site

WATKINS GATE ROAD

Del Rey Oaks/ Monterey

Laguna Seca Parking

1

218

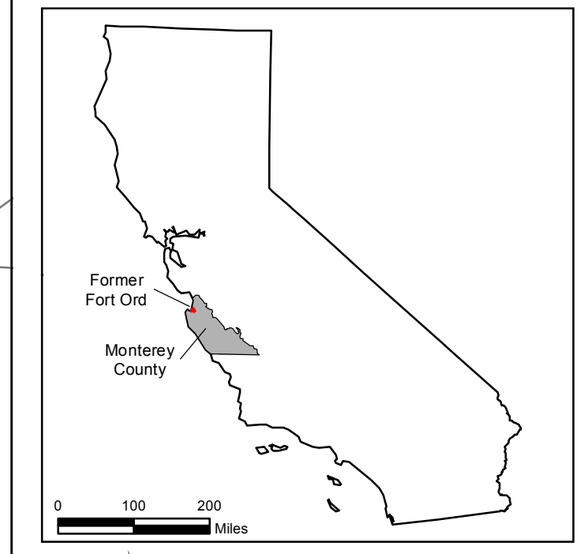
68

68

Legend

- Major Roads
- Former Fort Ord Boundary
- ESCA Munitions Response Areas
- 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)



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2019 Annual Natural Resource Report

Former Fort Ord Monterey Spineflower Critical Habitat Locations

FORA ESCA RP
Monterey County, California

Figure 4

Document Path: Z:\GISProjects_ENV\FtOrd\009595\6_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Fig 4 Monterey Spineflower Critical Habitat Location.mxd

Monterey Bay

BLANCO ROAD
RESERVATION ROAD
12TH STREET
IMJIN ROAD
8TH STREET
3RD AVENUE
ABRAMS ROAD
INTER-GARRISON ROAD
GIGLING ROAD
PARKER FLATS CUT OFF ROAD
PARKER FLAT ROAD
MONTEREY ROAD
COE AVENUE
EUCALYPTUS ROAD
BARLOW CANYON ROAD
DEL MONTE BOULEVARD
FREMONT STREET
BROADWAY ROAD
GENERAL JIM MOORE BOULEVARD
WATKINS GATE ROAD
1
218
68

CSUMB Off-Campus
County North
Parker Flats
Future East Garrison
Interim Action Ranges
Seaside
MOUT Site
Laguna Seca Parking
Del Rey Oaks/ Monterey

Legend

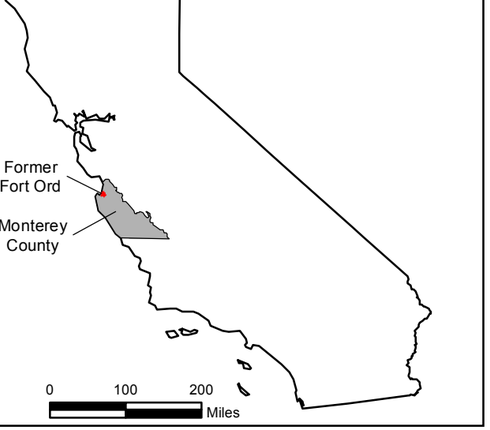
- Major Roads
- Former Fort Ord Boundary
- ESCA Munitions Response Areas
- Historical Impact Area Boundary

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)

Former Fort Ord Location Map



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2019 Annual Natural Resource Report

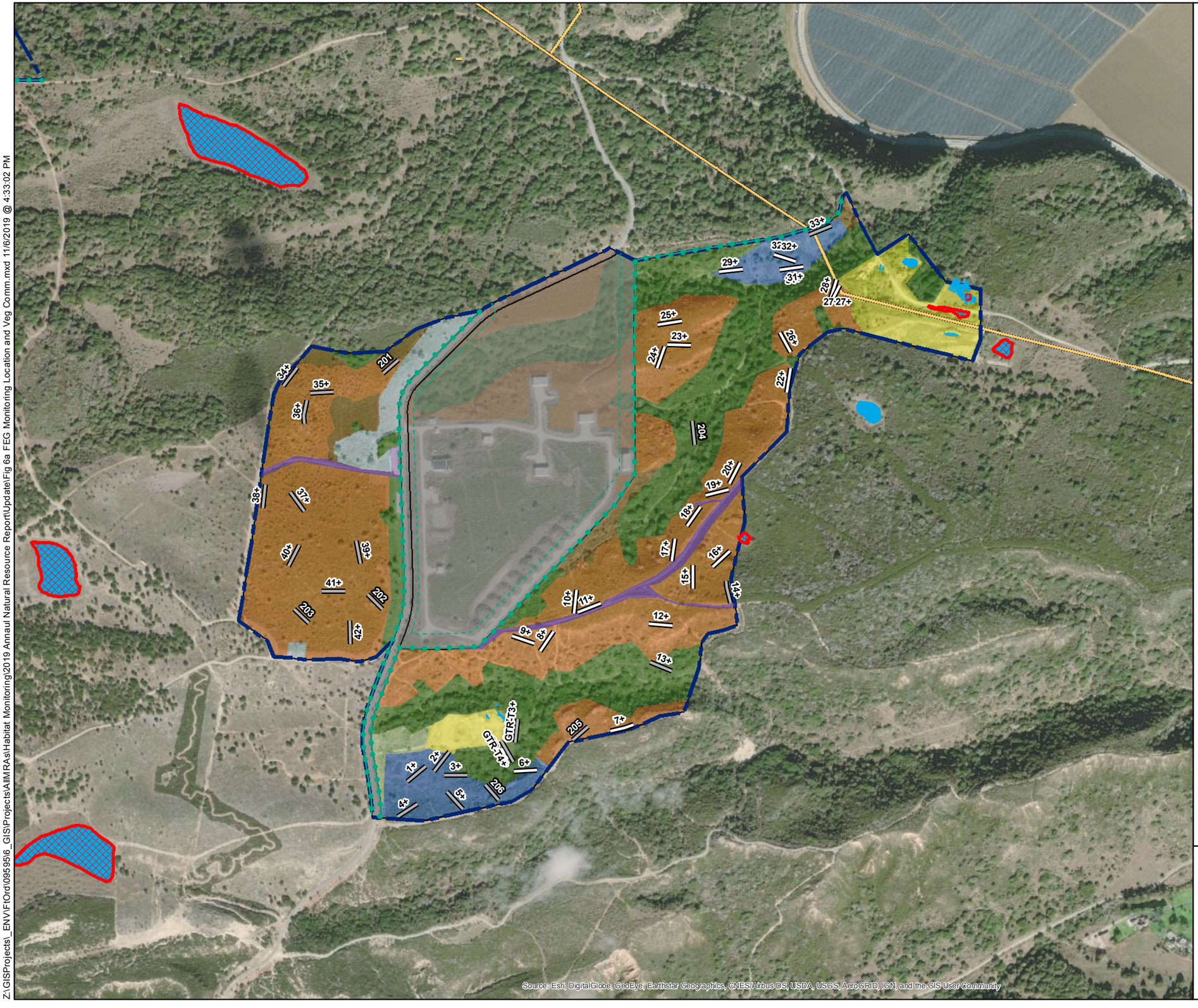
California Tiger Salamander Habitat Buffer Zones

FORA ESCA RP
Monterey County, California

Figure 5

Document Path: Z:\GISProjects_ENV\FtOrd\095951\6_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Fig 5 CTS Potential Habitat Zones.mxd

Z:\GISProjects_ENV\FtOrd\095956_GIS\Projects\AIMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\Fig 6a FEG Monitoring Location and Veg Comm.mxd 11/6/2019 @ 4:33:02 PM



Legend

- Munitions Response Area
- Natural Gas Pipeline
- Development Parcel
- 2019 Vegetation Transects (23)
- Previously Monitored Transects (24)

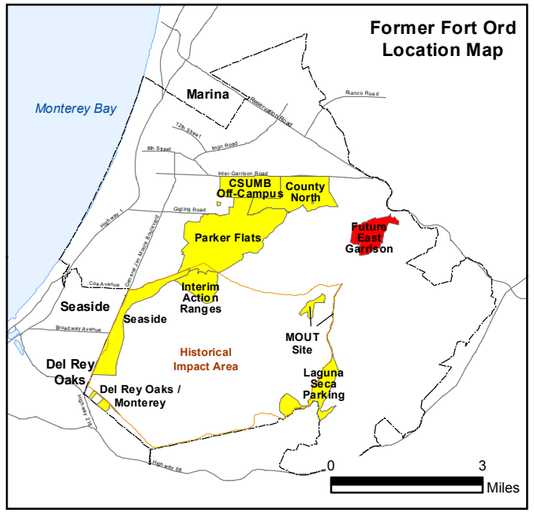
Note: + = baseline transect

- Borderland Interface
- 100-Foot Buffer from Borderland Interface
- Aquatic Features
- Aquatic Feature with Documented CTS Presence

Vegetation Types

- Central Maritime Chaparral
- Chamise-dominated Chaparral
- Low Quality Disturbed Chaparral
- Coast Live Oak Woodland
- Grassland
- Ruderal and Cleared Areas
- Low Recruitment Area
- Roadways and Fuel Breaks

Note: Vegetation mapping modified from 2011 Annual Natural Resource Report.



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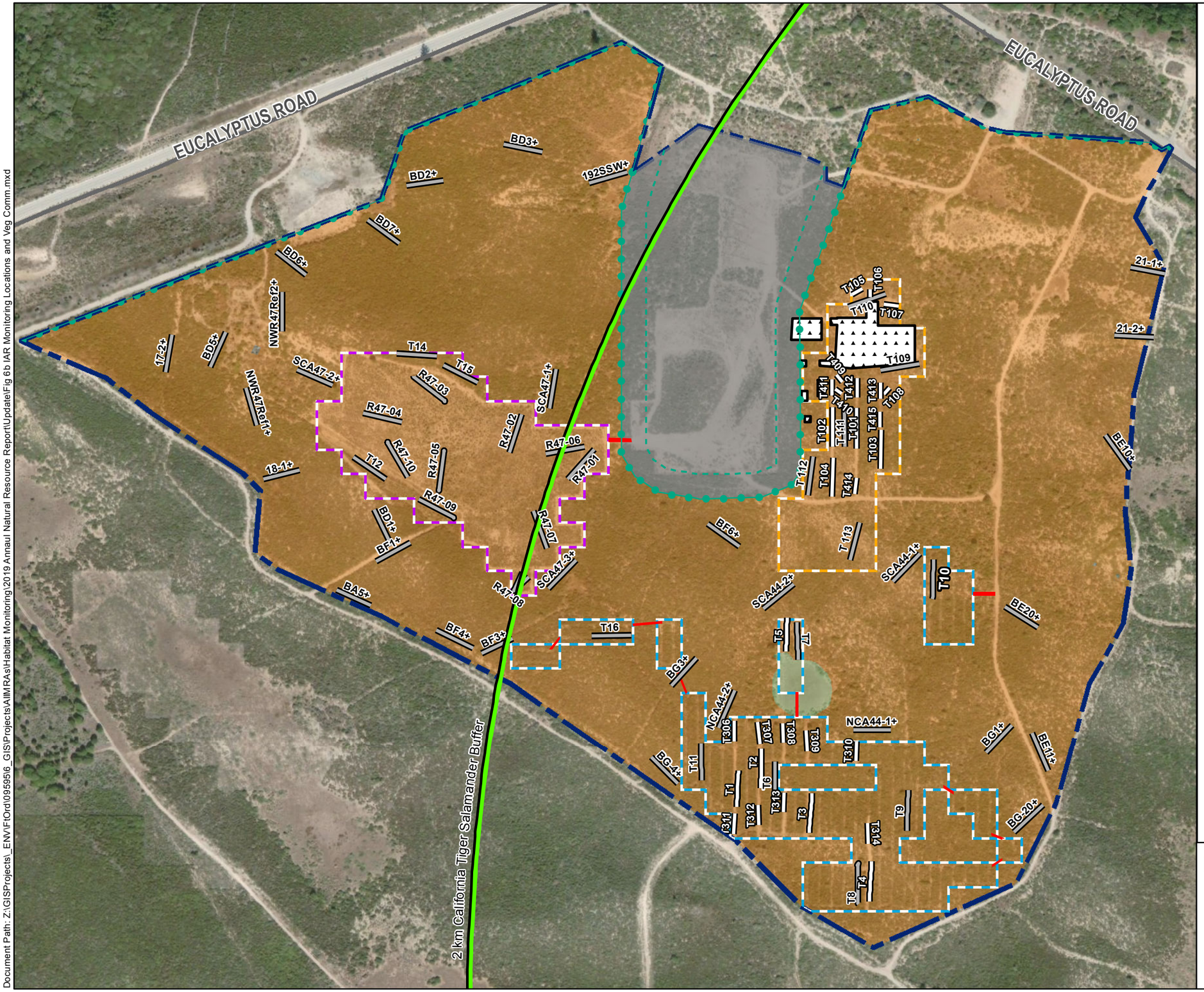
2019 Annual Natural Resource Report

Vegetation Monitoring Locations
Future East Garrison MRA

FORA ESCA RP
Monterey County, California

Figure 6a



Legend

- Munitions Response Area
- Major Road
- Development Parcel
- Improved Ingress/Egress Established by ESCA RP Team
- Site 39 (HA44) US Army Action
- North Range 44 SCA
- South Range 44 SCA/Central Area NCA
- Range 47 SCA
- 2019 Vegetation Transects (Monitored Annually per HRP)
- Baseline Transects

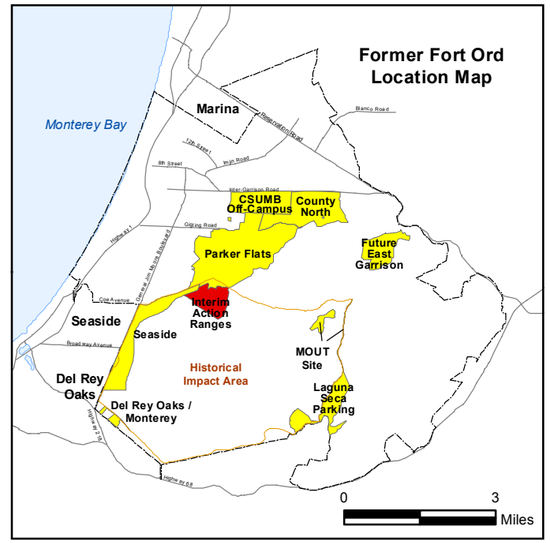
Note: + = baseline transect

- Borderland Interface
- 100-Foot Buffer from Borderland Interface

Vegetation Types*

- Grassland
- Central Maritime Chaparral

*Source: Flora and Fauna Baseline Study of Fort Ord, California, Jones and Stokes Association Inc., December 1992. Vegetation mapping modified from 2011 Annual Natural Resource Report.



Aerial Source: ArcGIS Online
Accessed 10/21/2019 - Image Date: 12/20/2018

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2019 Annual Natural Resource Report

Vegetation Monitoring Locations Interim Action Ranges MRA

FORA ESCA RP
Monterey County, California

Figure 6b

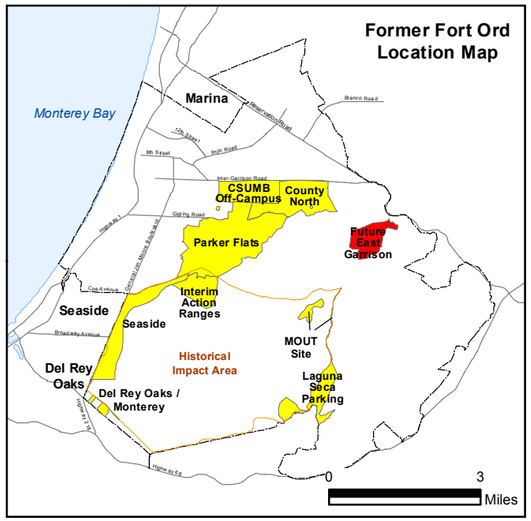
Document Path: Z:\GISProjects_ENV\Ft Ord\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annual Natural Resource Report\Update\Fig 6b IAR Monitoring Locations and Veg Comm.mxd

Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Aquatic Features
- Borderland Interface
- 100-Foot Buffer from Borderland Interface

Erosion Control Measures

- 2013 Silt Fencing
- 2013 Straw Wattles/Water Bars
- 2014 Straw Wattles/Water Bars
- 2013 Sand Bags/Straw Bales/ Erosion Control Blanket
- 2014 Sand Bags/Straw Bales/ Erosion Control Blanket
- 2013 Hydroseed Areas
- 2014 Hydroseed Areas
- 2015 Wood Mulch



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2019 Annual Natural Resource Report

Erosion Control BMPs in Future East Garrison MRA

FORA ESCA RP
Monterey County, California

Figure 7a

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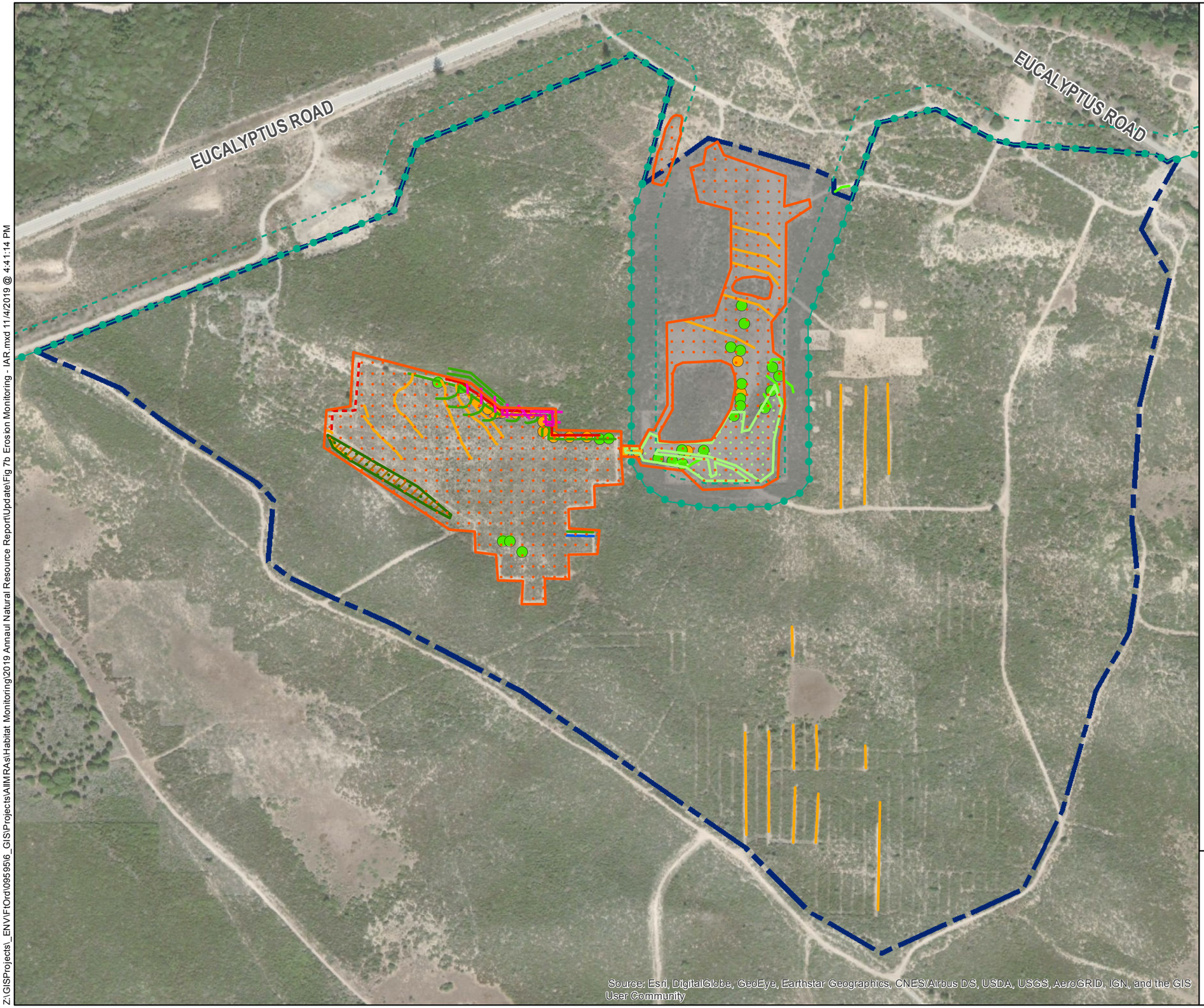

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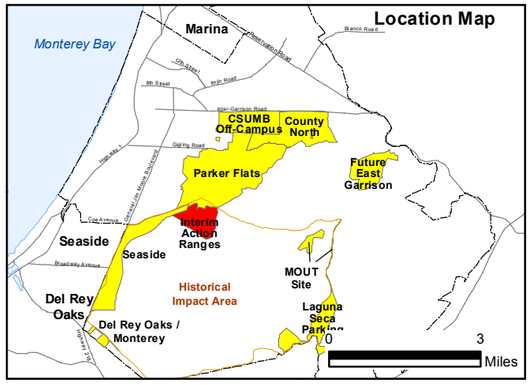
Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface
- 2018 Mulch, Straw Wattles and Water Bars

Erosion Control Measures

- 2013 Silt Fencing
- 2013 Wind Screen
- 2013 Straw Wattles/Water Bars
- 2014 Silt Fencing
- 2014 Straw Wattles/Water Bars
- 2016 Silt Fencing
- 2016 Straw Wattles
- 2013 Sand Bags/Straw Bales/ Erosion Control Blanket
- 2014 Sand Bags/Straw Bales/ Erosion Control Blanket
- 2013 Hydromulch Areas
- 2013 Erosion Control Blanket
- 2014 Hydromulch Areas
- 2014 Hydroseed Areas
- 2016 Erosion Blanket



Aerial Source: ArcGIS Online
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2019 Annual Natural Resource Report
Interim Action Ranges MRA

Erosion Control BMPs in Interim Action Ranges MRA

FORA ESCA RP
Monterey County, California

Figure 7b

Figure 8.
Future East Garrison MRA – Total Mean Native Shrub Cover after Vegetation Cutting 2012 - 2019

Figure 9.
Future East Garrison MRA – Mean Percent Cover of Shrub Species after Vegetation Cutting 2014 - 2019

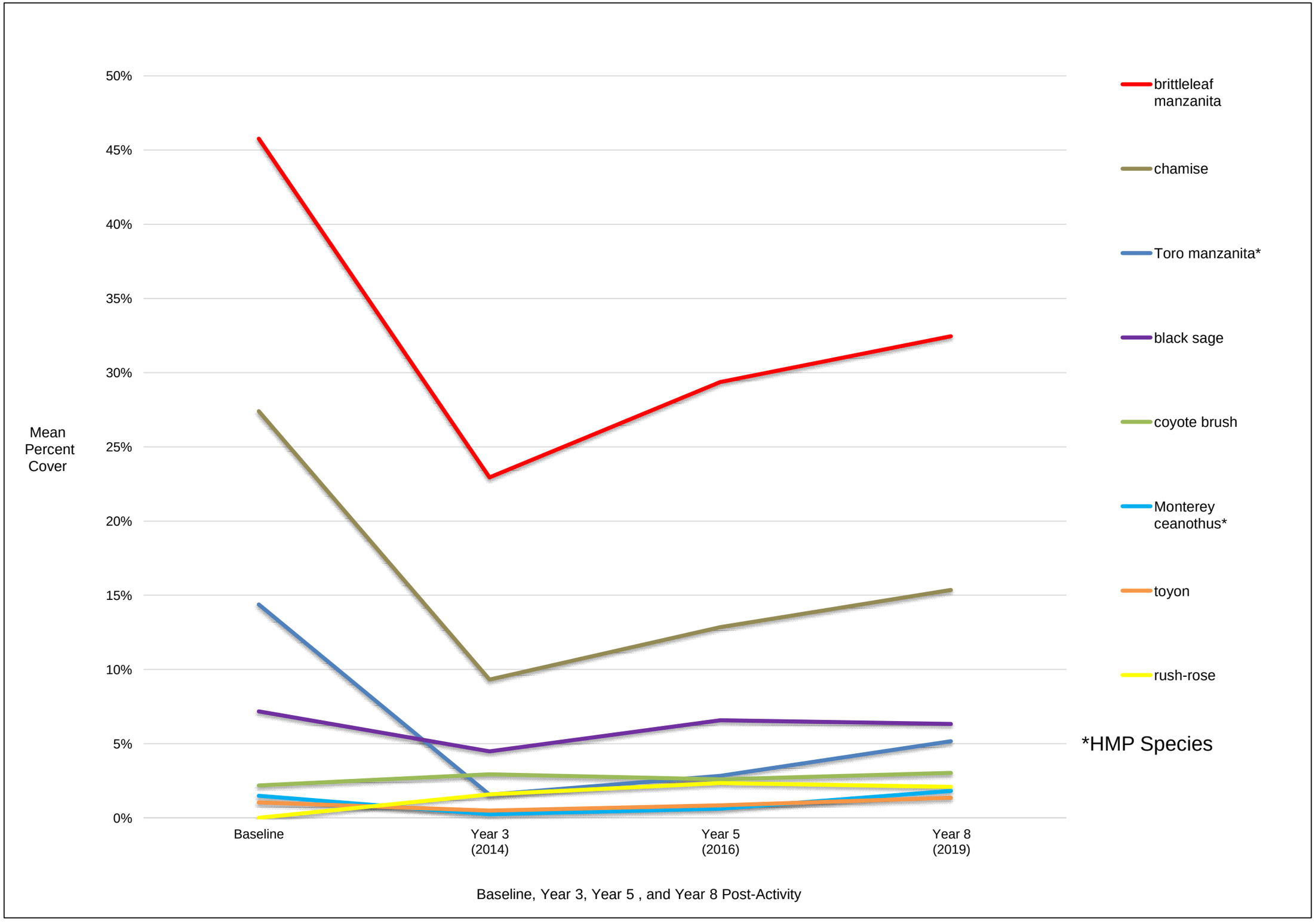

Figure 10.
Future East Garrison MRA – Mean Frequency of Shrub Species after Vegetation Cutting 2014 - 2019

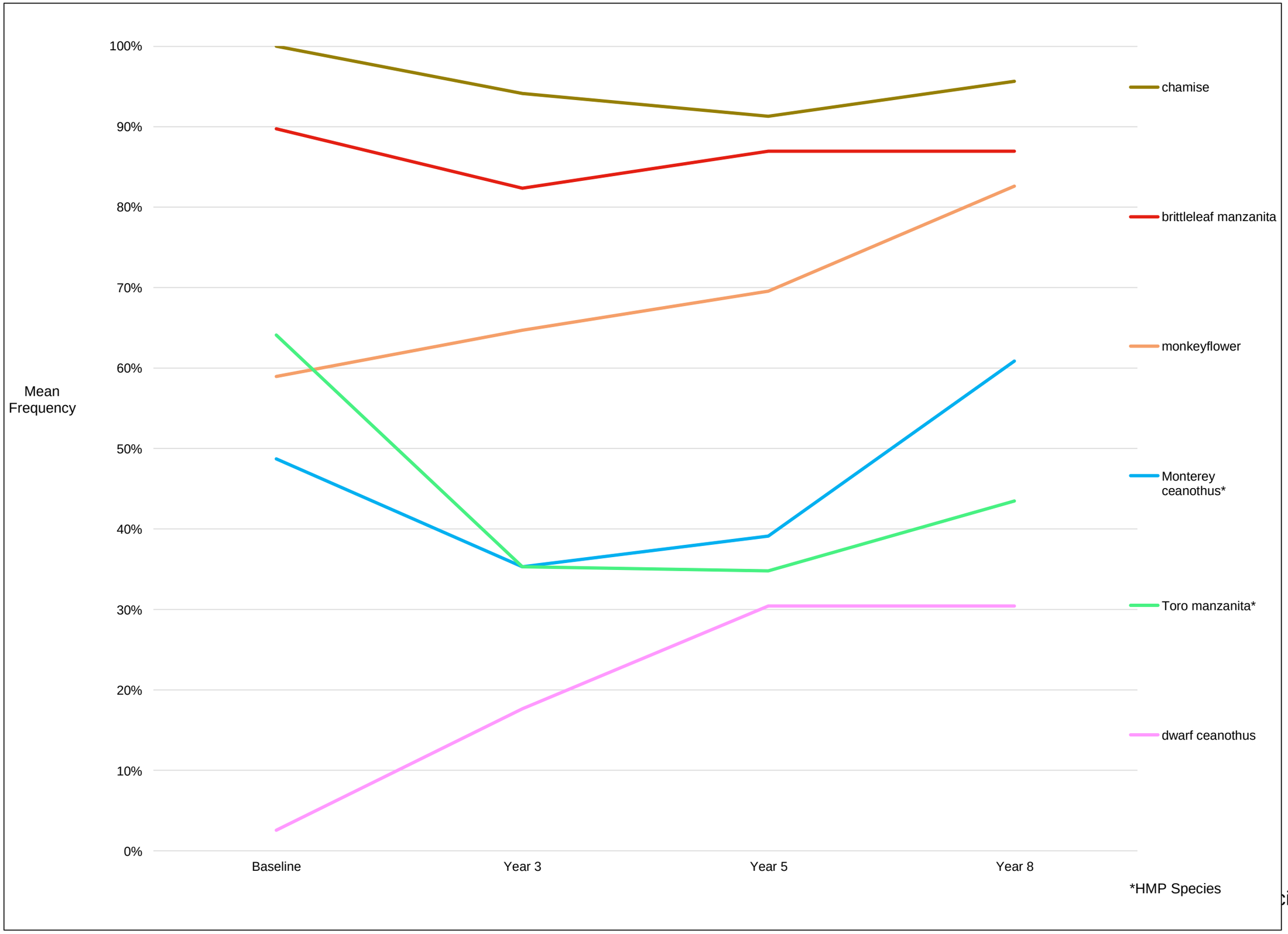

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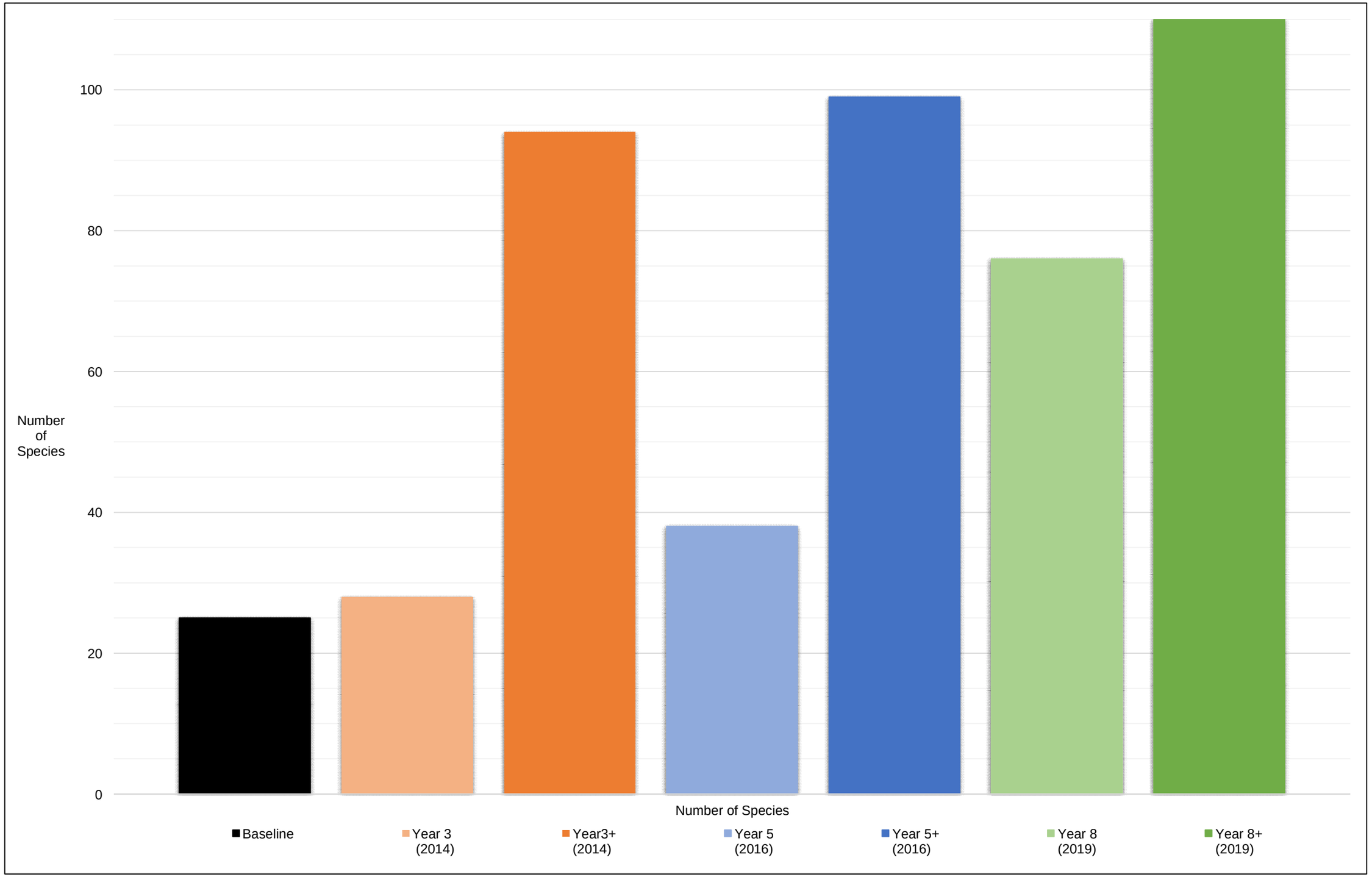
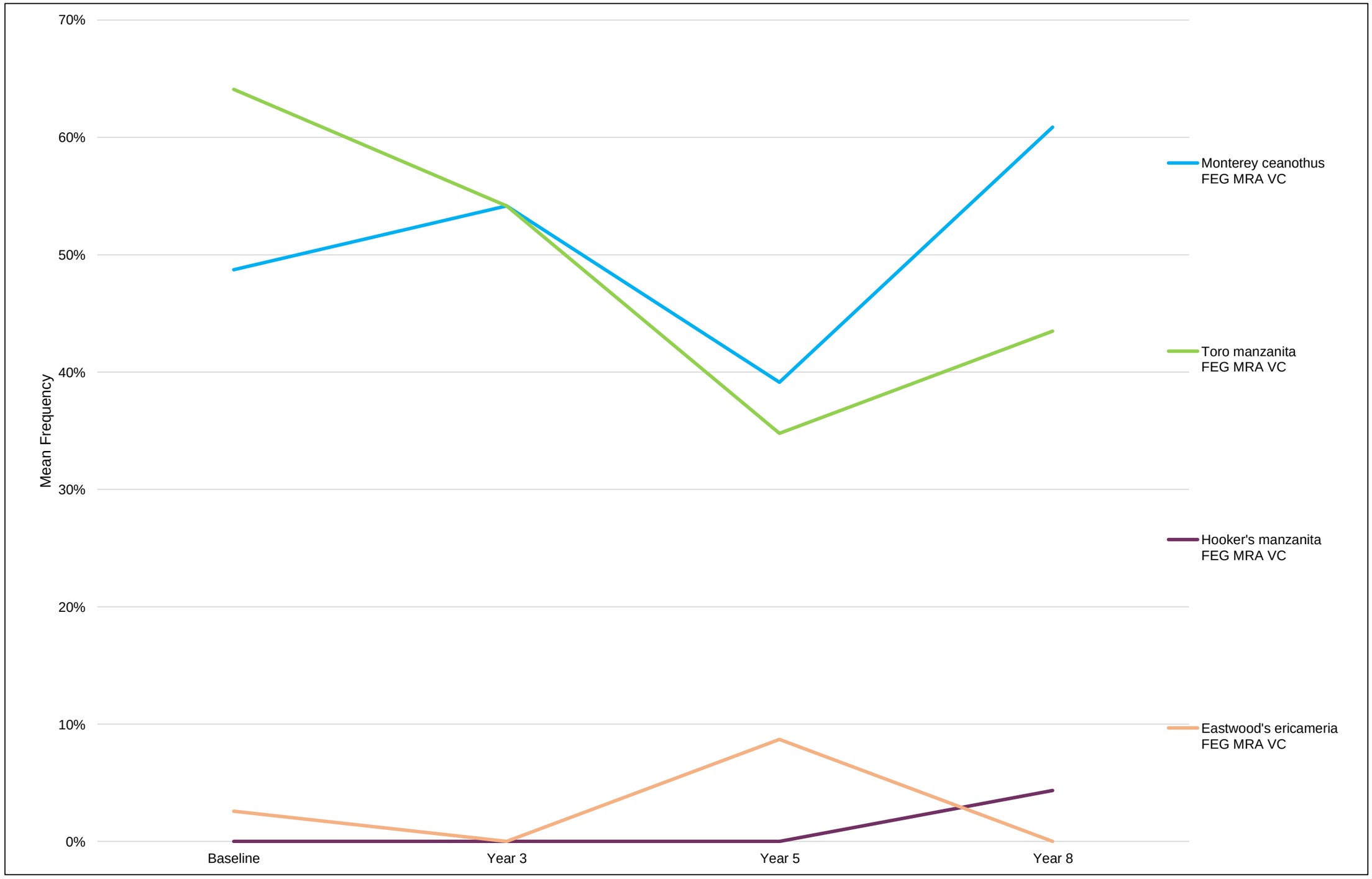
Figure 11.
Future East Garrison MRA - Native Species Richness for Baseline Grids and in 2011 Post-Activity Grids Subject to Vegetation Cutting 2014 - 2019



FEG Monitoring occurs during Years 3, 5, and 8, therefore there are no data for Years 1, 2, 4, 6 and 7.

Figure 12.
Future East Garrison MRA - HMP Shrub Species Frequency from 2010 – 2019



VC = Vegetation Cutting

Appendix A.

2019 Habitat Restoration Monitoring Report
Interim Action Ranges Munitions Response Area

Former Fort Ord
Monterey County, California

February 18, 2020

Prepared for:

FORT ORD REUSE AUTHORITY

920 2nd Avenue, Suite A
Marina, California 93933

Prepared Under:

Environmental Services Cooperative Agreement

No. W9128F-07-2-01621
and
FORA Remediation Services Agreement (3/30/07)

Document Control Number: 09595-19-057-003

Prepared by:

ARCADIS Design & Consultancy for natural and built assets

WESTON SOLUTIONS

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CONTENTS

TABLES

FIGURES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order of Consent
Arcadis	Arcadis U.S., Inc.
ARARs	Applicable or Relevant and Appropriate Requirements
Army	United States Department of the Army
BMP	best management practice
BO	Biological Opinion
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter(s)
CNPS	California Native Plant Society
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESCA	Environmental Services Cooperative Agreement
ESCA RP	Environmental Services Cooperative Agreement Remediation Program
ESCA RP Team	Arcadis U.S., Inc., Weston Solutions, Inc., Westcliffe Engineers, Inc.
FORA	Fort Ord Reuse Authority
ha	hectare(s)
HMP	Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California
HRP	Habitat Restoration Plan
IAR	Interim Action Ranges
IRACR	Interim Remedial Action Completion Report
km	kilometer(s)
LUCs	Land Use Controls
m	meter(s)
MEC	munitions and explosives of concern
MRA	Munitions Response Area(s)
MRS	Munitions Response Site
NCA	Non-Completed Area
ROD	Record of Decision
SCA	Special Case Area
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

This Year 7 Habitat Restoration Monitoring Report summarizes the activities conducted by the Fort Ord Reuse Authority (FORA) during the seventh year of habitat restoration monitoring in the Interim Action Ranges (IAR) Munitions Response Area (MRA) on the former Fort Ord in Monterey County, California, between 1 January 2019 and 31 December 2019; it represents the seventh mitigation monitoring report documenting maintenance and monitoring restoration activities in the IAR MRA. Restoration implementation activities, including seeding and planting in designated restoration areas, were summarized in the Appendix A of the 2013 Annual Natural Resource Monitoring, Mitigation and Management Report (ESCA RP Team 2014; Appendix A). Previous Habitat Restoration Monitoring Reports have been included as Appendix A in the Annual Natural Resource Monitoring, Mitigation, and Management Reports covering the 2013, 2014, 2015, 2016, 2017, and 2018 reporting periods (ESCA RP Team 2014, 2015b, 2016, 2017, 2018a, and 2019).

Munitions and explosives of concern (MEC) Design Study and Phase II Interim Actions have been completed in the Range 44 Special Case Area (SCA), Range 47 SCA, and Central Area Non-Completed Areas (NCAs) of the IAR MRA by the Environmental Services Cooperative Agreement (ESCA) Remediation Program (RP) Team ("ESCA RP Team", consisting of Arcadis U.S., Inc. [Arcadis], Weston Solutions, Inc., and Westcliffe Engineers, Inc.) (Figures A1 and A2). The objective of the Design Study and Phase II Interim Action was to complete the interim remedial action within the IAR MRA consistent with the objectives outlined in the Record of Decision (ROD), Interim Action for Ordnance and Explosives at Ranges 43-48, Range 30A, and Site OE-16, Former Fort Ord, California ("Interim Action ROD"; Army 2002) because the IAR MRA is located within a portion of the United States Department of the Army (Army) Munitions Response Site (MRS) for Ranges 43-48 ("MRS Ranges 43-48"). The interim remedial action objectives in the Interim Action ROD were to reduce risks to human health and the environment and comply with federal and state Applicable or Relevant and Appropriate Requirements (ARARs). The interim remedial action in the remaining portion of the IAR MRA, outside of the SCAs and NCAs, was completed by the Army in accordance with the objectives outlined in the Interim Action ROD and is referred to by FORA as the Phase I Interim Action. To meet the remedial action objectives and complete the selected remedy for the Interim Action ROD in the SCAs and NCAs, a Design Study was conducted followed by an interim remedial action in the Range 47 SCA.

The activities completed during the Design Study and Phase II Interim Action began in February 2011 and were completed in March 2013. Activities were conducted in accordance with the Final Phase II Interim Action Work Plan, IAR MRA ("Interim Action Work Plan"; ESCA RP Team 2011) and associated field variance forms. Activities completed during the Design Study and Phase II Interim Action are discussed in the Interim Remedial Action Completion Report (IRACR; ESCA RP Team 2015a).

In accordance with the Interim Action Work Plan, a Habitat Restoration Plan (HRP) for the IAR MRA (ESCA RP Team 2013b) was prepared to describe the activities to be undertaken to restore the natural resources in habitat parcels that were affected by the ESCA RP Team's

MEC remedial activities (Figures A2 and A3). The HRP includes requirements outlined in the Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord, California ("the HMP"; USACE 1997) and in Biological Opinions (BOs; USFWS 1999, 2002, 2005, 2007) issued to the Army. The HRP includes mitigation measures to avoid and minimize impacts to rare, threatened, and endangered species and their habitats during pre-disposal activities such as munitions response activities (ESCA RP Team 2013b) and also details required monitoring and reporting during the 7-year monitoring period. The plan was reviewed and approved by the Army and United States Fish and Wildlife Service (USFWS) and was provided as an addendum to the Interim Action Work Plan.

The activities outlined in the HRP were designed to establish native vegetation at the site that is progressing on a trajectory toward a self-sustaining native plant community equitable with the species richness and relative cover of species included in the HMP that were present on the site prior to the ESCA RP Team investigation and remedial efforts.

All monitoring areas in the IAR MRA met Year 7 performance targets for HMP herbaceous species presence in 2015 (ESCA RP Team 2016). ESCA RP restoration areas in the IAR MRA in Range 47 SCA, the areas in North Range 44 SCA and South Range 44 SCA and Central Area NCAs subject to vegetation cutting, and the grassland area in South Range 44 SCA met Year 7 performance targets for native vegetation cover, overall species diversity, and HMP shrub species richness in previous years; see Appendix A of the 2015, 2016, 2017, and 2018 Annual Natural Resource Reports (ESCA RP Team 2016, 2017, 2018a, and 2019); these areas are no longer subject to ongoing monitoring.

Vegetation monitoring was conducted in 2019 in the North Range 44 SCA small-scale excavation areas and South Range 44 SCA and Central Area NCAs small-scale excavation areas.

This report summarizes the monitoring activities performed by the ESCA RP Team in 2019, along with its subcontractors, pursuant to requirements outlined in the HRP. Activities were performed for FORA in coordination with the Army.

1.1 Regulatory History

On 31 March 2007, the Army and FORA entered into an ESCA governing the remaining MEC removal activities required for approximately 3,300 acres of former Fort Ord property. In accordance with the ESCA and an Administrative Order on Consent (AOC), FORA is responsible for completion of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions, except for those retained by the Army. The AOC was entered into voluntarily by FORA, the United States Environmental Protection Agency (EPA) Region 9, the California Department of Toxic Substances Control, and the United States Department of Justice Environment and Natural Resources Division on 20 December 2006 (EPA Region 9 CERCLA Docket No. R9-2007-03). The underlying property was transferred to FORA in May 2009. The AOC was issued by the EPA 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.

Arcadis has prepared this document on behalf of FORA in accordance with industry standards and consistent with the requirements of the Remediation Services Agreement dated 30 March 2007, by and between Arcadis and FORA including any applicable governing documents and applicable laws and regulations. As contractors to FORA under the ESCA RP, the field activities described in this report were conducted by the ESCA RP Team, and their subcontractors. The information presented in this Habitat Restoration Monitoring Report supports the completion of the Phase II Interim Action under the Interim Action ROD and IAR MRA ROD (Army 2002 and 2017).

1.2 Project Summary

Former Fort Ord served primarily as a training and staging facility for cavalry and infantry troops from 1917 until its closure in 1994. The IAR MRA is located in the north-central portion of the former Fort Ord, within the boundary of the historical impact area (Figure A1 and A2). The IAR MRA is approximately 227 acres (92 hectares [ha]) in size and is bordered by the Parker Flats MRA to the north, the Seaside MRA to the northwest, and the historical impact area to the southeast, south, and southwest. The IAR MRA is within the jurisdictional boundaries of the City of Seaside and Monterey County. The IAR MRA contains five United States Army Corps of Engineers (USACE) property transfer parcels, E38, E39, E40, E41, and E42.

The designated future land use for the IAR MRA Phase II Interim Action areas is habitat reserve (Figure A3). The future land use presented in this report is primarily based upon the 1997 Fort Ord Base Reuse Plan (FORA 1997). Other sources of future land use information include public benefit conveyance, negotiated sale requests, transfer documents, the HMP (USACE 1997), and the Assessment East Garrison – Parker Flats Land Use Modifications (Zander 2002). The Fort Ord Base Reuse Plan identified approximately 20 land-use categories at the former Fort Ord (FORA 1997) including habitat management, open space/recreation, institutional/public facilities, commercial, industrial/business park, residential, tourism, mixed use, and others.

The former Fort Ord was used to train Army infantry, cavalry, and field artillery units until official closure in 1994. In support of the training of soldiers, military munitions were used at the ranges throughout the former Fort Ord. As a result of the training activities, a wide variety of conventional MEC have been encountered in areas throughout the former Fort Ord. The MEC encountered at the former Fort Ord have been either unexploded ordnance or discarded military munitions.

The IAR MRA is located in the area designated by the Army as MRS Ranges 43-48. The Army previously conducted munitions response actions within MRS Ranges 43-48, which encompasses the IAR MRA (Parsons 2002 and 2007). The Army determined that the MRS Ranges 43-48 warranted an interim action due to the proximity and increased accessibility to

and by the public, the threat of trespassing, and the MEC on or near the surface of the ranges. An Interim Action ROD was produced by the Army in August 2002 for Interim Action Sites at the former Fort Ord, which included MRS Ranges 43-48 (Army 2002). The interim remedial action selected for the Interim Action Sites included surface and subsurface MEC remediation. The interim action in MRS Ranges 43-48, which was referred to by FORA as the Phase I Interim Action, encompassed the IAR MRA and began in 2002 with site preparation followed by a prescribed burn. Interim remedial actions were conducted from November 2003 to December 2005 (Parsons 2007). The Army designated approximately 235 acres within MRS Ranges 43-48 where subsurface MEC removal was not completed as SCAs or NCAs. Subsurface MEC removal was not completed within the SCAs due to high concentrations of anomalies caused by metallic debris and various other reasons (Parsons 2007). Approximately 35.9 acres of SCAs and approximately 9.2 acres of NCAs within MRS Ranges 43-48 are located within the boundaries of the IAR MRA. An additional surface removal was conducted in a portion of the Range 44 SCA in 2007. Range 44 SCA (approximately 18.9 acres), Range 47 SCA (approximately 15.2 acres), and Central Area NCAs (approximately 9.2 acres) are the areas monitored and reported on within this report and previous reports. Two additional SCAs (Range 45 Trench SCA [approximately 1.2 acres] and a small portion of the Fenceline SCA [one partial 100-foot by 100-foot grid]) are also located within the IAR MRA; however, these areas were not included in the Phase II Interim Action completed by FORA and were not monitored or included in ESCA PR Team reports.

On 18 January 2017, the Army recorded the final remedial decision for the IAR MRA in the IAR MRA ROD (Army 2017), documenting the selected remedial alternative of LUCs for managing the risk to future land users from MEC that potentially remain in the IAR MRA. The IAR MRA ROD states: (1) construction and implementation of the IAR MRA restoration areas has been completed and restoration systems are in place, operational and functioning; (2) operation and maintenance to support the long-term success of restoration at the site is being implemented through a post-installation adaptive management process to evaluate and manage the restoration areas as described in the HRP; and (3) initiated restoration activities are currently on track to achieve the prescribed performance criteria in the IAR MRA restoration areas. The LUCs for the Interim Action Ranges MRA are described in the Land Use Controls Implementation Plan / Operation and Maintenance Plan, Interim Action Ranges MRA (ESCA RP Team 2018b). The LUCs include but are not limited to: (1) restrictions prohibiting residential use; and (2) restrictions against inconsistent uses (applicable to the habitat reserve areas). Uses that are inconsistent with the HMP include, but are not limited to, residential, school and commercial /industrial development.

1.3 Report Organization

This Year 7 Habitat Restoration Monitoring Report is presented in numbered sections, tables, figures, and an attachment with photographs. Tables are numbered to correspond with the section in which they are first referenced. Figures and photographs are numbered sequentially. Introductory information for the project, including site description and background information, is presented in Section 1.0. Section 2.0 presents the requirements for restoration associated with the ESCA RP Design Study and Phase II Interim Action activities.

The goals, restoration strategies, and success criteria identified in the HRP are summarized in Section 3.0. Section 4.0 provides the methods for quantitative restoration monitoring, followed by Section 5.0, which summarizes routine restoration maintenance, including weed monitoring and abatement, erosion monitoring, and adaptive management measures. Section 6.0 presents the quantitative monitoring results that document native plant establishment and monitoring results. Conclusions and recommendations are presented in Section 7.0. References are provided in Section 8.0.

2.0 REGULATORY RESTORATION REQUIREMENTS

Primary requirements for restoration associated with ESCA RP response actions are described in the HMP (USACE 1997) and the USFWS BOs (USFWS 1999, 2002, 2005, 2007, 2015, and 2017) issued to the Army. These regulatory documents ensure compliance with the Federal Endangered Species Act (ESA) and provide guidance on avoiding and minimizing, to the extent feasible, take of listed species, as well as protection of other species of concern during remedial activities. Moreover, these documents provide specific objectives and goals for the restoration and monitoring of habitat areas reserved in perpetuity that are impacted by remedial activities.

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 and 1997). Threatened and endangered plant and animal species as well as designated critical habitat occur at the former Fort Ord. Each reuse area has been screened for potential impacts or disturbances to any threatened 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. The HMP specifically addresses protection of habitats and certain wildlife and plant species ("HMP species") within the former Fort Ord. HMP species were chosen based on their state and federal ESA listing status and the relative importance of existing populations and habitats at the former Fort Ord to the continued survival of the species. The HMP species list also incorporates those plant taxa included on rare plant list (now called rare plant ranks) 1B by the California Native Plant Society (CNPS) in 1997 with more than 10 percent of their known range at former Fort Ord.

Restoration objectives and goals required by the HMP and mitigation requirements relevant to the IAR MRA restoration effort are described in the HRP (ESCA RP Team 2013b) and are listed below:

- Survey sites before disturbance to estimate restoration potential and establish success criteria (including information on species presence, soil composition, presence of non-native species, slope, aspect, and microhabitats)
- Develop a restoration plan
- Develop feedback mechanisms that allow restoration results to guide the Army's restoration program
- Collect seed and cuttings from within 0.6 mile (1 kilometer [km]) of the restoration site
- Recontour excavation sites to recreate a natural landscape that grades smoothly into existing topography
- Implement erosion control
- Establish native vegetation and HMP species populations that are equitable with those that were removed
- Monitor re-establishment of vegetation in accordance with the Army's protocol for vegetation monitoring
- Conduct monitoring to evaluate the success of restoration efforts
- Meet success criteria established to evaluate healthy central maritime chaparral using baseline data from undisturbed central maritime chaparral communities
- Meet success criteria related to vegetative cover and species diversity
- Meet success criteria for Monterey gilia, also known as sand gilia (*Gilia tenuiflora* subsp. *arenaria*), Monterey spineflower (*Chorizanthe pungens* var. *pungens*), and seaside bird's-beak (*Cordylanthus rigidus* subsp. *littoralis*) including restoration results after five years consistent with self-sustaining populations (in different age stands) of central maritime chaparral, occupying the same amount of habitat and with population sizes comparable to those recorded during the Army's vegetation survey of the former Fort Ord conducted in 1992 (USACE 1992)
- Prepare annual monitoring reports
- Implement corrective measures if monitoring indicates that success criteria for vegetation or HMP species are not being met, including recontouring, weeding, replanting, reseeding, and improvement of habitat for sand (Monterey) gilia and Monterey spineflower

2.2 Biological Opinions

To ensure compliance with the Federal ESA requirements, the Army consulted with the USFWS on the Army's predisposal actions, including cleanup of MEC. These consultations resulted in five BOs that include incidental take coverage for specific numbers of (or habitat acres for) the following wildlife species: Smith's blue butterfly (*Euphilotes enoptes smithi*), black legless lizard (*Anniella pulchra nigra*), western snowy plover (*Charadrius alexandrines nivosus*), and California tiger salamander (*Ambystoma californiense*). The incidental take statements allow impacts to and incidental take of these listed species during project activities and specify minimization and avoidance measures to be implemented during the project for the protection of special status species and their habitats (USFWS 1999 and 2005). In addressing listed plant species, these BOs state that "Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for the removal or reduction to possession of endangered plants from areas under Federal jurisdiction."

Five BOs include requirements for habitat restoration related to ESCA RP Team's remedial activities. The BO on closure and reuse of Fort Ord (USFWS 1999, p. 21) states that "The Army shall implement all portions of the April 1997 HMP for all predisposal activities undertaken." The BO on critical habitat of Monterey spineflower (USFWS 2002) contains restoration-related measures for excavation of soils. The BOs on California tiger salamander and critical habitat for Contra Costa goldfields (*Lasthenia conjugens*; USFWS 2005 and 2007) describe restoration requirements proposed by the Army. The BO on cleanup and property transfer actions (USFWS 2015) contains an updated analysis of the effects of Army cleanup and transfer activities on Contra Costa goldfields, California tiger salamander, Monterey spineflower, Monterey gilia, Smith's blue butterfly, Yadon's piperia (*Piperia yadonii*), and any relevant critical habitat. The Army consulted with USFWS in 2017, which resulted in the issuing of the 2017 reinitiated Programmatic Biological Opinion, which supersedes all previous BOs. It should be noted that Contra Costa goldfields and Yadon's piperia have not been reported to occur within the IAR MRA and there is no designated critical habitat for Contra Costa goldfields or Yadon's piperia within the former Fort Ord site.

The following list summarizes USFWS restoration requirements identified in the relevant BOs (USFWS 1999, 2002, 2005, 2007, 2015, and 2017).

- Determine a baseline condition during pre-activity assessment
- Biological surveys for HMP plant species will be conducted using the protocol for conducting vegetation sampling at Fort Ord
- Allow sites to recover naturally or restore sites by planting species consistent with the baseline condition of central maritime chaparral plant species present prior to remediation. If recolonization does not appear likely; erosion and weed control will be implemented
- Conduct monitoring of disturbed populations in accordance with HMP protocols

- Identify plant species and population densities to be re-established at each site, including a monitoring plan and corrective measures if goals are not met
- Create goals to establish native vegetation at each site and to establish populations of any HMP species affected to levels equitable to those observed before the disturbance
- Develop a restoration plan with success criteria and a monitoring plan
- Develop measures to enhance natural regeneration and recolonization of the [excavated] site
- After excavation, fill will be added to the excavated areas or they will be recontoured into the natural landscape and smooth transition to surrounding topography
- Provide soil stabilization measures to prevent erosion
- Conduct invasive weed and erosion control
- Monitor, evaluate, and implement corrective actions annually for five years to determine if success criteria are met
- Report monitoring results to the USFWS annually

3.0 HABITAT RESTORATION PLAN

In accordance with goals, objectives and requirements outlined above from the HMP and BOs, the HRP was developed to describe the restoration activities in habitat parcels affected by the ESCA RP Team munition response actions. The following goals established in the HRP reflect those outlined in the HMP:

- 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 CNPS (Rare Plant Rank 1B), 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

All activities outlined in the HRP are designed to establish native vegetation in the IAR MRA restoration areas that are progressing on a trajectory toward a self-sustaining native plant

community equitable with the species richness and relative cover of HMP species documented on the site prior to the ESCA RP Team's investigation and remedial efforts.

Restoration implementation, maintenance, and monitoring in the restoration areas are overseen by FORA and its contractors. The following sections summarize the restoration strategies and success criteria for specific activities and locations within the IAR MRA.

3.1 Designated Ground Disturbance Categories Associated with MEC Remedial Activities

The areas within the IAR MRA that have been the focus of restoration efforts have been given the following names for the purposes of this report, as identified in the HRP (ESCA RP Team 2013b):

- North Range 44 (Figure A3; referred to as "Range 44 SCA [North]" in IAR MRA IRACR Volume 1)

- South Range 44: Includes South Range 44 SCA and Central Area NCAs (Figure A3; referred to as "Range 44 SCA [South] and Central Area NCAs" in IAR MRA IRACR Volume 1)

- Range 47 SCA: Includes a portion of the Range 47 SCA (Subarea A) that was subject to large-scale excavation in which the vegetative cover has historically been low, 10% or less (Figures A4 and A5; ESCA RP Team 2013b); non-native pampas grass was abundant in places. Also includes the majority of Range 47 SCA (Subarea B), which was subject to large-scale excavation prior to restoration activities (Figures A4 and A5). And includes the portion of Range 47 SCA surrounding the large-scale excavation area in which vegetation cutting took place in 2012 (Subarea C, Figures A4 and A5). Subarea C also includes a small scrape where small-scale excavation was conducted, as well as an escarpment created decades previously.

Four designated categories of MEC remedial activities correlated with ground-disturbing actions are addressed in the HRP (Table A3-1). These designated activity categories include:

- Activity A – Ingress/egress pathways and roads: includes light and heavy traffic ingress/egress pathways on *new* ingress/egress corridors required for access to NCAs and SCAs within the IAR MRA boundaries, which required some limited vegetation clearing. This category originally encompassed a more extensive network of existing pathways and roads before it was recognized that no new widening or other vegetation impacts were necessary for the majority of them. Approximate total area affected: 0.4 acres (0.2 ha).

- Activity B – Above-ground vegetation cutting only, prior to target-specific investigation: vegetation was cut at ground level, and removed material was chipped and left in place. Approximate total area affected: 13.8 acres (5.6 ha).

Target-specific investigation (i.e., highly localized typically small excavations involving typically hand tools, but occasionally backhoe operation) were conducted in SCAs and NCA that were not excavated, as described below for Activities C and D.

- Activity C – Small-scale soil excavation: includes above- and below-ground vegetation removal, root removal, and soil excavation in limited areas (less than 1 acre [0.4 ha] or less than 100 feet [30 meters (m)] wide). Excavation depths varied from 1 to 3 feet (0.3 – 1 m), sometimes exposing subsurface hardpan layers, especially on slopes. Approximate total area affected: 1.2 acres (0.4 ha).

- Activity D – Large-scale soil excavation: includes above- and below-ground vegetation removal, root material removal, and soil excavation in a larger area (more than 1 acre [0.4 ha]). Removed vegetation was stockpiled separately, along with the top 6 to 12 inches (15 to 30 cm) of soil to preserve the existing seedbank. Stockpiled soils were used to backfill excavated areas within the IAR MRA. Approximate total area affected: 13.4 acres (5.4 ha).

Restoration strategies were developed for each activity type, as detailed in the HRP (ESCA RP Team 2013b) and are summarized in the following sections.

3.2 Restoration Strategies

The restoration requirements of the BOs and HMP focus on facilitating re-establishment of native vegetation at the site as well as their associated ecological functions. To address the range of disturbance to native habitats anticipated as a result of the MEC investigation and interim remedial action work, three strategies focused on plant community recovery were identified within the HRP. This multi-strategy approach was based on the assumption that sites experiencing lesser disturbance will be more easily restored via natural processes, whereas sites experiencing greater disturbance (especially those of larger extent) require more active restoration interventions that facilitate natural recovery processes.

Two principles follow from this assumption:

- The level of restoration effort should be commensurate with the level and/or extent of site disturbance.

- Allocation of restoration resources should be biased toward more disturbed and/or larger sites where prevention of site deterioration and facilitation of natural recovery processes are most needed.

One of the three restoration strategies listed below was applied to each affected site, depending on the type and extent of disturbances:

Monitoring only: post-disturbance monitoring of vegetation regrowth as well as implementation of weed eradication and/or erosion best management practices (BMPs), as needed. This strategy relies upon vegetation re-establishment from existing root biomass, soil seedbank, and dispersal of plant propagules from adjoining habitat into the sites to re-establish the plant community.

Passive restoration (seeding only): includes topsoil seedbank replacement (i.e., back-filled topsoil), seeding by restoration personnel, and natural dispersal of plant propagules from adjoining high-quality habitat into the sites to re-establish the plant community. The topsoil layers contain native plant seedbank, nutrients, organic material, microorganisms, beneficial fungi, and other elements that promote ecosystem function. Passive restoration has been applied to sites where disturbance activities include small-scale soil excavation or soil disturbance of limited extent (i.e., less than 100 feet [30 m] wide [regardless of acreage] or less than 1 acre [0.4 ha], Activity C).

Active restoration (seeding and planting): The active restoration strategy involved the greatest level of effort and a wide range of restoration procedures and materials. This strategy was implemented only in Range 47 SCA, where disturbances included large-scale soil excavation (i.e., greater than 100 feet [30 m] wide and more than 1 acre [0.4 ha], Activity D).

Restored sites are monitored for erosion and invasion by exotic plant species. Restoration activities in the IAR MRA are shown in Figure A4.

3.3 Success Criteria and Performance Targets

Quantitative success criteria for the first seven years following site restoration are shown in Tables A3-2 and A3-3 and Year 7 monitoring results are compared with these success criteria in Section 6 of this report (Table A6-1).

Evaluation of and reporting against performance standards is required to support compliance with ARAR (ESA Federal requirements) in completion of the Phase II Interim Action under the Interim Action ROD (Army 2002). Habitat restoration and monitoring activities are documented consistent with the Phase II Interim Action Work Plan. These results are the basis for annual meetings with the Army and the USFWS held in the first quarter of each year. Site restoration performance is evaluated and approved by the USFWS based on compliance with the requirements of the BO and HMP in accordance with the Federal ESA.

Demonstration that the restoration requirements of the BO (USFWS 2017) and the HMP (USACE 1997) have been met will be accomplished by documenting two categories of outcomes as stated below:

- Successful soil and topography remediation in targeted areas (Table A3-2)
- Plant species and vegetation establishment that meet success criteria (Table A3-3)

Habitat restoration in the IAR MRA has been conducted at the site in a manner consistent with the land use requirements, engineering and institutional controls, and site management restrictions outlined in the HMP (USACE 1997) and HRP (ESCA RP Team 2013b). Quantitative success criteria for plant survival, species richness, and percentage were established for the first seven years following site restoration. Metrics for most criteria are based on the pre-existing baseline values, and progress toward those values is determined on anticipated restoration trajectories. Upon determination that success criteria have been met at each site, monitoring efforts will be considered complete.

Restoration success is evaluated based on the following guidelines as stated in the HRP (ESCA RP Team 2013b):

- The health of the restored community will be determined by successful establishment of the community's component species, most importantly the HMP species (USACE 1997, p. 3-20)

- The self-sustainability of the restored community will be determined by vegetative development (i.e., community species richness and percentage cover) over a minimum of three to five years that is consistent with the generally accepted trajectory of central maritime chaparral vegetation development

- The equity of the restored community will be determined by its consistency with the baseline (i.e., pre-disturbance) community. The baseline community represents the community that was removed (USACE 1997, p. 3-6)

- The equity of the restored populations of the HMP species will be determined by their consistency with the baseline (i.e., pre-disturbance) HMP populations. The baseline HMP populations represent the populations that were removed (USACE 1997, p. 3-6)

- The self-sustainability of restored populations of HMP species will be determined by their initial establishment and subsequent colonization of seeded and/or planted areas (i.e., HMP species richness and population estimates) over a minimum of three to five years that is consistent with the HMP baseline populations

- The establishment of a restored habitat that is devoid of or minimally affected by exotic invasive plant populations will be determined by eliminating populations of the target exotic species and/or documenting that their populations are below the quantitative target levels (i.e., total community percentage cover) for a minimum of three to five years

Achievement of these restoration objectives are evaluated via the following parameters and their associated quantitative metrics as stated in the HRP (ESCA RP Team 2013b). Results of seventh-year monitoring for each objective are presented in tables as noted.

- Community equity will be assessed by comparing the total number of plant species present in the site with the number present prior to disturbance (i.e., the plant palette or baseline, including HMP species; Tables A6-2, A6-3, A6-4, A6-5, A6-6, A6-7, and A6-7)

- Restored community health and HMP equity will be assessed by comparing the total number of HMP species present in the site with the number present prior to disturbance (Tables A6-8 and A6-9)

- Self-sustainability of the community will be assessed by: a) achievement of community equity and b) vegetative development as exhibited by the total percentage live plant cover at the site and in a pattern consistent with the anticipated trajectory of central maritime chaparral regeneration (Tables A6-2 to A6-7)

- Minimization of habitat degradation via exotic invasion will be assessed by preventing the total area of the site occupied collectively by populations of pampas grass (*Cortaderia jubata*), iceplant (*Carpobrotus edulis*) and French broom (*Genista monspessulana*) from exceeding a target value (Tables A6-2 to A6-7, summarized in Section 6.2)

The values of most of the metrics are not static but reflect the increases associated with growth and maturation of the community to be expected as it progresses along the anticipated trajectory. The following assumptions were made in selecting quantitative success criteria (Table A3-3 in this Appendix).

- Vegetation cover will start at a low of 0% in most areas in Year 1 and increase through time

- The trajectory for vegetation cover to be equitable with pre-disturbance baseline conditions for each location will generally take 10 years

- Species diversity will increase with time and achievement of equitable diversity to pre-disturbance baseline conditions for each location will take 15 years. This process is assumed to be slower than vegetative growth since long-distance seed dispersal and ideal germination conditions are required for seedling establishment and growth for each new species at a given site

- HMP shrub species presence will increase through time

- Monterey spineflower and sand (Monterey) gilia cover and frequency will decrease through time as the central maritime chaparral shrub canopy fills in and microsites are occupied by other species

- Seaside bird's-beak is restricted to one location and requires a host plant for long-term presence. This species will recover more quickly in areas with above-ground

vegetation removal where host plants are present but will take time to become established in excavated areas

- Plant establishment in Range 47 SCA Subarea A will be slow initially but will increase slowly to at least a minimum of pre-disturbance conditions within 7 years

- Container plant survival will vary by species and individuals may gradually die, but these may be replaced by recruits of the same species

In order to evaluate progress towards achieving success criteria and performance targets, monitoring results are tabulated at least annually, and the result for each parameter are compared with its expected outcome for Year 7 post-installation (Table A3-3). Results that meet or exceed the target criterion for the monitoring period are considered to have demonstrated a successful outcome and achievement of the restoration objective. Results that are below the expected outcome for Year 7 post-installation are examined by the adaptive management process to determine an appropriate course of action, if any. Review and potential reconsideration of past or proposed adaptive management actions will be conducted jointly with USFWS during annual review meetings.

4.0 HABITAT RESTORATION MONITORING METHODS

All monitoring areas in the IAR MRA met Year 7 performance targets for HMP herbaceous species presence in 2015 (ESCA RP Team 2016). Performance targets have been met in all but one category to date (Table A6-1). In 2015, native vegetation cover in North Range 44 areas subjected to ingress egress and vegetation cutting (Activity A and B) and all Range 47 SCA areas (Activity A, B, C and D) met and exceeded the performance targets required for the final year of restoration – Year 7 (ESCA RP Team 2016). Similarly, in 2016, Year 5 native vegetation cover in South Range 44 SCA subjected to vegetation cutting (Activity B) exceeded the Year 7 performance targets (ESCA RP Team 2017). These areas also met performance targets for overall species diversity and HMP shrub species richness. Therefore, monitoring was not conducted in Range 47 SCA or in released portions of North Range 44 and South Range 44 in 2017, 2018, and 2019.

Areas requiring vegetation monitoring in 2019 included North Range 44 SCA small-scale excavation areas and South Range 44 SCA and Central Area NCAs small-scale excavation areas (Activity C), since these areas did not meet Year 7 performance targets in 2018.

4.1 Native Vegetation Cover Methods (Activity C)

Line-intercept vegetation transects have been used to measure shrub and herbaceous vegetation cover in central maritime chaparral vegetation in the IAR MRA in areas subject to ESCA RP munitions investigation activities, following Burleson (2009) and (Tetra Tech and EcoSystems West 2015). Transects are generally measured by using a 164-foot-long (50-m-long) tape, although a shorter transect length was used if it was placed in a smaller excavated

area. GPS waypoints and the transect survey direction (e.g., north to south) are recorded so that the same transect can be revisited in subsequent years. Locations of 2019 transects are shown on Figure A2. A random number generator was 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 was randomly selected and overlapped another transect, it was discarded and a new transect location was chosen.

During 2019, aerial cover by shrub and tree species was recorded for all individuals that intercept the monitoring tape, including overlapping shrub layers, so there may be two or more species recorded in the same location. Herbaceous cover was only recorded in the absence of shrub or tree overstory, as per the 2009 and 2015 protocols (Burleson 2009, and Tetra Tech and EcoSystems West 2015). Cover by herbaceous plants were recorded by species and the percent cover for each species was recorded individually. Bare ground and/or litter was recorded in transect segments devoid of vegetation.

Baseline Transects:

1999-2000 – Baseline transects established by the Army in the Range 44, Range 45, and Range 47 SCA in 2000, prior to the 2003 prescribed burn (HLA 2001, Parsons 2005).

2008 – Thirty Army transects monitored by the ESCA RP Team.

2010-2011 – Twenty-three Army baseline transects in central maritime chaparral selected as "proxy" baseline transects for upcoming munitions activities, excluding the Range 47 SCA large-scale excavation area. An additional nine new "proxy" baseline transects were established near to proposed ESCA RP munitions investigation areas; three of these transects were located immediately west of Range 47 SCA to serve as proxy baseline transects for the large-scale excavation.

As of 2011, no further monitoring of Army transects outside of the IAR MRA NCAs and SCAs was indicated due to vegetation recovery reflecting an appropriate and sustainable trajectory associated with high quality habitat (ESCA RP Team 2012).

Munitions Activities Dates:

2011 - Vegetation cutting and small-scale excavations were completed in linear scrapes in South Range 44 SCA and Central Area NCAs. Limited ingress-egress routes were cut for access to work areas.

2011-2012 - Large-scale excavation was conducted in 14.4 acres (5.8 ha) in Range 47 SCA and completed in December 2012. A small amount of vegetation cutting was conducted around the edges of Range 47 SCA in 2012. Limited ingress-egress routes were cut for access to work areas.

2012-2013 - Vegetation cutting of all grids in North Range 44 SCA and small-scale excavations in targeted areas and along scrapes were conducted in 2012 and completed in early 2013.

Post-activity Transects:

2012 - Sixteen Year 1 post-activity transects were established in the South Range 44 SCA/NCAs and areas outside the large-scale excavation in Range 47 SCA.

2013 - Thirteen Year 1 post-activity transects were established in North Range 44 SCA. Ten new transects were established in the Range 47 SCA large scale excavation. One of these 10 was placed in Subarea A, one was placed in the deer exclusion control area, and one was placed in the irrigation control area. The remaining seven were in Subarea B.

All 29 transects were monitored in 2013.

2014 - All 29 transects were monitored on 8 and 13-14 May, 26 and 30 June, and 1-3 and 14-15 July 2014.

2015 - Thirty-eight transects were monitored on 16 and 24 April and 18, 19, 20, 21, 26, 27, and 28 May 2015. These included five Year 3 transects in vegetation-cut areas in North Range 44 SCA; seven Year 4 transects in vegetation-cut areas in South Range 44 SCA and Central Area NCAs; and three Year 4 transects in vegetation-cut areas in Range 47 SCA Subarea C. An additional 13 transects were monitored in areas subject to small-scale excavations in the IAR MRA. Ten transects were also monitored in the large-scale excavation area in the IAR MRA.

2016 – Twenty transects were monitored on 27, 28, and 29 April and 2 and 5 May 2016. These included seven Year 5 transects in areas subject to vegetation cutting in South Range 44 SCA and Central Area NCAs. An additional 13 Year 4 transects were completed in areas subject to small-scale excavations -- eight in North Range 44 SCA and five in South Range 44 SCA and Central Area NCAs.

2017 – Thirteen transects were monitored on 27 and 29 March 2017. These included Year 5 transects in areas subject to small-scale excavations - eight in North Range 44 SCA and five in South Range 44 SCA and Central Area NCAs.

2018 – Twenty-nine transects were monitored on 26 April and 7, 8, 9, and 10 May 2018. In the North Range 44 SCA, eight transects were installed in 2013 and were located mostly at the top of slopes in small-scale excavation areas. In 2018, seven additional transects were installed in North Range 44 small-scale excavation areas near the middle and bottom of slopes to provide more even sampling coverage to gather representative data for the length of the small-scale excavation areas. In South Range 44 small-scale excavation areas, five transects were installed in 2013. In 2018, nine additional transects were placed near the middle and bottom of slopes to provide more even sampling coverage in the small-scale excavation areas.

2019 – Twenty-nine transects were monitored on 29 and 30 April and on 1 May 2019. These included eight original and seven additional Year 7 transects in areas subject to small-scale excavations in North Range 44 SCA and five original and nine additional Year 8 transects in South Range 44 SCA and Central Area NCAs.

Locations of all transects in the IAR MRA are shown in Figure A2.

4.2 Target Weed Cover Methods (Activity C)

Several weedy species found at the site are listed by the California Invasive Plant Council as invasive weeds (Cal-IPC 2019). Three target weeds are given priority attention during monitoring events, pampas and/or jubata grass, French broom, and iceplant as required by the HMP (USACE 1997).

In areas that have not already met performance criteria for native vegetation cover, weed cover data are collected along vegetation transects along with native species cover. In areas that have already met performance criteria in previous years, target weed monitoring was conducted using CNPS relevé vegetation monitoring protocol on *CDFW-CNPS Protocol for the Combined Vegetation Rapid Assessment and Relevé Field Form* (CNPS 2018). Survey plot locations were identified using a random stratified approach. The survey area was divided into five spatially separate areas and then a plot center was randomly selected using a random number generator placing the plot in the middle of the preestablished 100x100 foot grid cells.

4.3 Native Plant Species Richness Methods (Activity C)

Although native plant species richness performance targets were met for all activity types in the IAR MRA in 2015 (ESCA RP Team 2016), ongoing documentation of native species presence provides an overview of existing species diversity and the suite of species that recolonize activity areas over time, along with the relative abundance of HMP species in the site as a whole (Tables A6-1, A6-8, and A6-9). A comprehensive list of species in the IAR MRA is compiled and updated each year (Table A6-10).

All native plant species occurring along a vegetation transect or within a quadrat were recorded to provide total species richness per sample. All native plant species within one meter of a transect tape measure were also recorded in order to capture a more comprehensive summary of native species in specific munitions investigation areas. Plant species diversity summary is presented in Tables A6-8 and A6-9. These diversity tables also include information on mean species richness per transect or quadrat, evenness, and summary cover data.

Diversity was determined using the Shannon-Wiener Index (H'), which is a function of the relative abundances of the species present, depending on both the number of species and their evenness (Pielou 1974). The following equation was used to calculate H'.

$$H' = -\sum p_i \ln p_i$$

Where:

H' = Shannon-Wiener Index

p_i = proportion of community that belongs to the *i*th species

Evenness (J') was calculated as the ratio of the observed H' to the maximum possible H' for a community with the same number of species (H'_{max}) (Pielou 1974). The maximum possible value for evenness (i.e., 1) is achieved when H' = H'_{max}, which occurs when all species are present in equal abundance. The following equation was used to calculate J'.

$$J' = \frac{H'}{H'_{max}} = \frac{H'}{\log s}$$

Where:

J' = evenness

H' = Shannon-Wiener Index

H'max = maximum possible H' for a community with s species

s = total number of species present

Field logs and species lists for vascular plants and wildlife are maintained and updated on a routine basis during each monitoring visit (Table A6-10 and A6-11). Documentation includes conditions prior to investigation activities and subsequent to activities.

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.

5.0 RESTORATION MAINTENANCE AND MONITORING

Restoration maintenance and monitoring in the IRA MRA in 2019 consisted of erosion monitoring, weed monitoring and abatement, and remedial measures to increase cover in small-scale excavation areas in Range 44. Erosion control BMPs added in 2018 in the IAR MRA are summarized in Figure A6. No additional erosion control BMPs were required in 2019.

To boost native vegetation cover and improve site conditions in North Range and South Range 44 small-scale excavation areas, several remedial measures were implemented in December 2018 and January 2019. These include:

1) installation of one rolled coir wattle and one constructed soil water bar in steep areas near Transect 414 in North Range 44 to prevent sediment loss and capture seeds and of two soil water bars in steep areas near Transects 1 and 2 in South Range 44,

2) creation of small 1-foot-wide depressions ("divots") with a shovel every five to ten or more feet throughout the small-scale excavation areas to loosen compacted soil and increase resource capture (seeds, water, nutrients),

3) application of certified weed-free mulch in rings around the base of young shrubs in early December 2018,

4) addition of woody debris in some areas to 'roughen' soil surface and add complexity, and

5) sowing and raking-in eight pounds of central maritime chaparral seed, including site-collected black sage (*Salvia mellifera*), shaggy-barked manzanita (*Arctostaphylos tomentosa*), golden yarrow (*Eriophyllum confertiflorum*), Eastwood's ericameria (*Ericameria fasciculata*), and mock heather (*Ericameria ericoides*), with western wild rye (*Elymus glaucus*) seed produced commercially from seed originating at former Fort Ord.

These remedial measures effectively addressed several issues in 2019. The water bars diverted flow from steep exposed areas. The divots largely filled with sand from water erosion and often contained small patches of seedlings. Surviving seedlings are expected to enhance native cover in small-scale excavation areas in 2020 and beyond.

6.0 QUANTITATIVE MONITORING RESULTS

Results of quantitative monitoring in North Range 44 SCA small-scale excavation areas and South Range 44 SCA and Central Area NCAs small-scale excavation areas (Activity C) are provided in this section. Aerial imagery of the North Range 44 SCA and South Range 44 SCA and Central Area NCAs are shown in Figure A7 and A8, respectively. Tables A6-2 to A6-7 and Figures A9 to A18 provide data for native vegetation cover and target weed cover. A summary of species richness data is also provided in Tables A6-8 and A6-9. Attachment A provides selected photographs of areas surveyed in 2019.

6.1 Native Vegetation Cover Results

The performance category for native vegetation cover applies to Activity C, small-scale excavation, in 2019. Native vegetation in the IAR MRA is comprised primarily of central maritime chaparral, with a small grassland area located in South Range 44 SCA outside of the 2019 vegetation sampling area. Baseline and 2019 post-activity sampling data for small-scale

excavation areas are summarized in this section. During 2019, a total of 29 transects were monitored in the IAR MRA in areas that had been subject to small-scale excavation during munitions investigation activities (Figure A2). Sixteen transects were added in 2018 to provide a more comprehensive overview of native cover in small-scale excavation areas, as shown in Tables A6-2 and A6-3; these tables show 2010-2011 baseline results and post-activity data for the past four years. Tables A6-4 and A6-5 compare cover and frequency data for Years 1-7 in North Range 44 and Years 1-8 in South Range 44, respectively.

The 29 baseline transects sampled in 2010-2011 in the IAR MRA were placed outside of the munitions investigation areas due to safety exclusion zones, so they only represent an approximation of pre-activity conditions. The data from the 29 baseline transects are shown in Table A6-2, along with the five baseline transects located closest to North Range 44. The data from the 29 baseline transects area also included in Table 6-3, along with the seven baseline transects located closest to South Range 44. Because dominance by shrub species shifts with small topographical changes from location to location, the IAR-wide baseline data are generally referenced in the narrative herein unless otherwise specified.

6.1.1 2019 Native Vegetation Cover

In small-scale excavation areas, all above-ground and below-ground vegetation parts were removed during munitions investigation activities. As a result, these areas are colonized by plants that germinate from seed or other propagules, since there are no burls or other subterranean stems to enable resprouting. Furthermore, many of the small-scale excavation areas in the IAR MRA were linear scrapes that, in some cases, had exposed hardpan subsurface layers and were also subject to compaction due to vehicle traffic.

North Range 44 SCA: Table A6-2 shows 2019 weighted-average cover data from eight transects installed in 2013 and seven transects installed in 2018. Table A6-6 provides non-weighted averages for the same data.

Total 2019 native cover in North Range SCA small-scale excavation areas averaged 30.8%. Mean native woody species (shrub, subshrub, and tree) cover in small-scale excavation areas was 22.3% in Year 7 (Table A6-2, Figures A10 and A11). The shrubs sandmat manzanita (*Arctostaphylos pumila*) and dwarf ceanothus (*Ceanothus dentatus*) exhibited the greatest mean cover (4.7% and 3.3% mean cover, respectively), and these shrubs were associated with Monterey ceanothus (1.6% mean cover) and subshrubs rush-rose (*Crocanthemum scoparium*, 5.3% mean cover) and deerweed (*Acmispon glaber*, 1.5% mean cover). The HMP shrub sandmat manzanita had greater cover in Year 7 than in baseline transects (4.7% mean cover in Year 7 and 1.6% cover in IAR-wide baseline transects).

Shrubs and subshrubs that occurred in more than 50% of small-scale excavation transects include Monterey ceanothus (*Ceanothus rigidus*, 80.0% frequency), dwarf ceanothus (80% mean frequency), sandmat manzanita (66.7% frequency), and shaggy-barked manzanita (60% frequency) along with three subshrubs, rush-rose (86.7% frequency), golden yarrow (86.7% frequency), and deerweed (73.3% frequency).

In IAR-wide baseline transects, the greatest mean cover was exhibited by shaggy-barked manzanita (29.3% mean cover) and dwarf ceanothus (20.2% mean cover), followed by Monterey ceanothus (13.5% mean cover). For the five baseline transects closest to North Range 44, the greatest mean cover was exhibited by shaggy-barked manzanita (21.7% mean cover) and dwarf ceanothus (23.4% mean cover), followed by Monterey ceanothus (16.1% mean cover). Although cover by these shrub species was low in 2019, shaggy-barked manzanita had 60% mean frequency and dwarf ceanothus and Monterey ceanothus each had 80% mean frequency, suggesting widespread presence of species that will increase in size and cover in time (Figure A12). Mean native herbaceous cover in Year 8 was 8.5%.

Mean non-native species cover in Year 7 was 0.4%, comprised of annual non-native species such as silvery hairgrass (*Aira caryophyllea*), tocalote (*Centaurea melitensis*), and narrow-leaved filago (*Logfia gallica*). No target weeds were present in these transects.

Performance summary: Year 7 mean native vegetative cover in North Range 44 small-scale excavation areas was 30.8%, meeting the Year 6 native cover performance target of 30% and suggesting that these areas are on a positive trajectory towards forming self-sustaining natural central maritime chaparral communities. Small-scale excavation areas support the same shrub species that were present prior to munitions investigation activities, and these shrubs are increasing in cover each year.

South Range 44 SCA: Table A6-3 shows 2019 weighted-average cover data from five transects installed in 2013 and nine transects installed in 2018. Table A6-7 provides non-weighted averages for the same data.

Native cover in Year 8 (2019) transects in South Range 44 small-scale excavation areas averaged 26.4%. Mean native shrub and subshrub cover was 22.8% and mean native herbaceous cover was 3.6% (Table A6-3, Figures A14 and A15). The greatest shrub cover was provided by sandmat manzanita and shaggy-barked manzanita, with 5.4% and 2.6% mean cover, respectively. Dwarf ceanothus exhibited only 0.3% mean cover, much lower than in North Range 44. Subshrub cover included rush-rose (5.6% mean cover) and deerweed (3.3% mean cover), with two additional short-lived species providing 1.6 to 1.2% mean cover: golden yarrow and black sage. Poison-oak (*Toxicodendron diversilobum*) contributed 1.8% cover.

Shrubs that occurred in more than 50% of small-scale excavation transects include sandmat manzanita (100% frequency), shaggy-barked manzanita (78.6% frequency), and black sage (71.4% frequency); subshrubs with more than 50% frequency include rush-rose (92.9% frequency), deerweed (85.7% frequency), and golden yarrow (71.4% frequency), see Figure A16.

Two HMP shrubs, sandmat manzanita and Eastwood's ericameria, exhibited higher frequency in 2019 than in the IAR-wide baseline (sandmat manzanita: 100% frequency in Year 8, 65.5% in IAR-wide baseline; Eastwood's ericameria: 21.4% in Year 8 and 17.2% in IAR-wide baseline). Monterey ceanothus was present in 96.6% of IAR-wide baseline

transects and 21.4% of 2018 Year 8 transects. Mean native herbaceous cover in Year 8 was 3.6%.

Mean non-native species cover in Year 8 was 0.4%, comprised annual non-native species such as smooth cat's ears (*Hypochaeris glabra*), narrow-leaved filago, and ripgut brome (*Bromus diandrus*), all with 0.1% mean cover. No target weeds were present in these transects.

Performance summary: Year 8 mean native vegetative cover in South Range 44 small-scale excavation areas was 26.4%, meeting the Year 5 native cover performance target of 25% and suggesting that these areas are on a positive trajectory towards forming self-sustaining natural central maritime chaparral communities. Small-scale excavation areas support the same shrub species that were present prior to munitions investigation activities, and these shrubs are increasing in cover each year.

6.1.2 Vegetation Monitoring Discussion

Central maritime chaparral is the dominant vegetation type in the IAR MRA, where deep aeolian sands form the primary substrate. 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 and under shrubs, including a number of local endemic taxa. 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 (Zedler, P. H. 1995; Keeley, J. E. 2002; Davis and Borchert 2006).

Central maritime chaparral subject to vegetation cutting met the Year 7 performance targets in Range 47 SCA and North Range 44 in 2015 (ESCA RP Team 2016); the remaining vegetation-cut monitoring area in South Range 44 met the Year 7 performance target in 2016 (ESCA RP Team 2017). However, monitoring areas subject to small-scale excavation have been slower to recover, due in large part to lack of topsoil containing seeds, nutrients, and beneficial micro-organisms, as well as compacted subsoils now serving as the growing substrate. Native vegetation recovery in these areas is dependent on gradual colonization of the bare excavated areas by means of seed dispersal into the excavated area over time.

North Range 44 SCA: IAR-wide baseline transects in North Range 44 indicate dominance by four shrub species - two stump-sprouting shrubs, shaggy-barked manzanita and chamise, and two obligate-seeding shrubs, dwarf ceanothus and Monterey ceanothus (72% combined mean cover in baseline transects). Mean cover by the three HMP shrubs was 15.3%. Cover by subshrubs such as deerweed, rush-rose, and golden yarrow was 11.5%, and herbaceous cover was zero.

Total mean native cover in 2019 (Year 7) was 30.9%, approximately twice the mean cover in Year 5 (2017). The stump-sprouting shrubs shaggy-barked manzanita and chamise provided only 1.8% mean cover in North Range 44 small-scale excavation areas in 2019, an expected

result due to the decades it takes for large burls to form. Combined mean cover by the four shrub species that predominated in North Range 44 prior to munitions investigation activities was 6.6%.

The HMP shrub, sandmat manzanita, provided 4.7% mean cover in 2019, in contrast to 1.6% mean cover in baseline transects. Total HMP shrub cover averaged 6.3%, or 41.4% of baseline cover. Subshrubs provided 8.0% mean cover, lower than baseline data. Herbaceous cover, at 8.5% mean cover, was higher than the zero baseline herbaceous cover.

Figure A9 illustrates the steady increase in mean native cover during the past seven monitoring years, along with the trendline for vegetation recovery in North Range 44 small-scale excavation areas in the coming years. During the past seven years, woody species (excluding subshrubs) showed a steady rise over time (Figure A10), in contrast to subshrubs, which peaked in Year 6 and then declined. Herbaceous species cover also increased over time, with a dip in 2017 that is also reflected in subshrub data and South Range 44 transect data. Figure A11 provides a cover comparison of the shrubs and subshrubs with the highest cover between Years 1 and 7.

Frequency data suggest a strong recovery is underway and will continue. Dominant shrubs such as dwarf ceanothus (80% mean frequency) and shaggy-barked manzanita (60% frequency) are making a robust recovery, as are Monterey ceanothus (80% frequency) and sandmat manzanita (66.7% frequency). Frequency of the three HMP shrubs also suggest recovery, with higher frequency values for sandmat manzanita in Year 7 than in baseline data; Monterey ceanothus, with 80% frequency is approaching its widespread pre-activity baseline frequency of 96.6%. Eastwood's ericameria has 13.3% frequency in Year 7, within 4% of its frequency in the IAR-wide baseline. The three subshrubs, rush-rose (86.7% frequency), golden yarrow (86.7% frequency), and deerweed (73.3% frequency) are widespread. Figure A12 compares frequency data for several common shrubs over the past 7 years. Dwarf ceanothus, shaggy-barked manzanita, and black sage all exhibit higher frequencies over time. Of the three HMP shrub species, Monterey ceanothus frequency rose steadily, with lower frequencies in the last two to three years of sandmat manzanita and Eastwood's ericameria; however, sandmat manzanita frequency is higher than in the baseline, and Eastwood's ericameria frequency is within 4% of baseline values, suggesting successful colonization of dominant and associated shrubs consistent with baseline conditions.

A review of 2009 aerial imagery prior to munitions investigation activities reveals a mixture of dense central maritime chaparral along with patchy open and disturbed areas in both North and South Range 44 (Figures A7a and A8a).

The 2015 Fort Ord revised vegetation monitoring protocol (Tetra Tech and EcoSystems West 2015) states: "Succession of maritime chaparral is a slow process that occurs over many decades. It is not expected that mature maritime chaparral communities will fully establish in the relatively brief timeline practical for monitoring. However, succession in maritime chaparral following fire typically follows a predictable pattern of colonization beginning with the establishment of herbaceous species (including HMP annuals), sub-shrubs, and obligate seeding shrubs (i.e. ceanothus, sandmat manzanita)."

A review of vegetation recovery at other comparable restoration sites at Fort Ord suggests that selection of a 50% native cover target for Year 7 was overly ambitious for excavated sites that lacked topsoil containing seeds, nutrients, and beneficial micro-organisms after munitions investigation activities and that contained compacted subsoils (Burleson 2019). The native vegetation cover and diversity data for North Range 44 small-scale excavation areas suggest that the site is on track to reach full vegetation recovery in the coming years (see Figure A9).

South Range 44 SCA: IAR-wide baseline transects in South Range 44 indicated dominance by four shrub species - two stump-sprouting shrubs, shaggy-barked manzanita and chamise, and two obligate-seeding shrubs, dwarf ceanothus and Monterey ceanothus, as in North Range 44. Field observations indicate that South Range 44 tends to be drier than North Range 44, based on density and numbers of herbaceous and shrubs species observed at any given time.

Similar to the cover data from North Range 44, shaggy-barked manzanita and chamise provided 2.6% mean cover in South Range 44 small-scale excavation areas in 2019, an expected result due to the decades it takes for large burls to form. HMP mean shrub cover totaled 5.7%, or 37% of baseline cover. Subshrubs provided 10.5% mean cover, and herbaceous mean cover was 3.6%.

Total mean native cover in 2019 (Year 8) was 26.4%, two and one-half times more than the mean cover in 2017 and slightly more than 2018 data; this average cover value was about 4.5% less than in North Range 44. Figure A13 illustrates the increase in mean native cover over time that reflects the anticipated trajectory of full recovery; this trajectory is anticipated to take longer than in North Range 44 due to drier conditions in South Range 44.

Woody shrub cover (excluding subshrubs) remained below 4% in Years 1 to 6 and only began to rise in Years 7 and 8, when woody cover (excluding subshrubs) exceeded 8% (Figure A14). Cover by subshrubs increased year after year (except for 2017), reaching above 10% in Years 7 and 8 (Figure A14). Herbaceous cover varied from year to year, with higher values in Years 1 and 2 than in later years. Figure A15 provides a cover comparison of the shrubs and subshrubs with the highest cover between Years 1 and 7.

Frequency data indicate that native shrub recovery is underway and will continue. Shrubs such as sandmat manzanita (100% frequency), shaggy-barked manzanita (78.6% frequency), and black sage (71.4% frequency) have higher frequency values than Monterey ceanothus (21.4% frequency). Sandmat manzanita shows a steady pattern of 80 to 100% frequency after Year 3, whereas frequency of dwarf and Monterey ceanothus was more variable, with small seedlings of these species observing drying and dying more frequently during rainless intervals than in North Range 44 (Figure A16).

The three subshrubs, rush-rose (93% frequency), deerweed (86% frequency), and golden yarrow (71.4% frequency) are widespread in South Range 44 as in North Range 44 (Figure A16).

As with North Range 44, 2009 aerial imagery prior to munitions investigation activities in South Range 44 reveals a mixture of dense central maritime chaparral along with swaths of disturbed open chaparral (Figure A8a).

Native vegetation cover in South Range 44 small-scale excavation areas meets the Year 5 vegetation cover target. As with North Range 44, a review of vegetation recovery at other comparable restoration sites at Fort Ord suggests that selection of a 50% native cover target for Year 7 was overly ambitious for excavated sites that lacked topsoil containing seeds, nutrients, and beneficial micro-organisms after munitions investigation activities and that contained compacted subsoils (Burleson 2019). Frequency data for several shrubs are higher in South Range 44 than North Range 44, suggesting that, although vegetation cover in South Range 44 may lag behind North Range 44, small-scale excavation areas in South Range 44 will achieve full vegetation recovery in the coming years.

Cover, frequency, and diversity data all indicate a sustainable recovery for central maritime chaparral vegetation in Range 44.

6.2 Target Weed Cover Results

Iceplant is the primary target weed in the IAR MRA monitoring area. There were no iceplant individuals in any of the transects in North Range 44 and South Range 44 in 2019 (Tables A6-2 and A6-3), however, iceplant was observed and removed in these areas during routine weed monitoring where it was observed growing into the narrow small-scale excavations from preexisting plants located in adjacent undisturbed habitat. Average target weed cover for all areas meets the Year 7 performance target of less than 5% mean cover (Tables A6-1 and Appendix D; Table D-1). No target weeds were found in any of the 19 relevé plots randomly sampled in North Range 44, South Range 44, and Range 47 SCAs and NCAs in June or October 2019. However, during routine weed surveys (non-randomized sampling) iceplant was found to be encroaching into the South Range 44 small-scale excavations areas from adjacent undisturbed habitat. These mats of iceplant were hand pulled or dug up with a shovel. Pampas grass seedlings were also observed and removed in non-ESCA RP habitat parcel areas north and northeast of North Range 44. Weed monitoring forms and weed monitoring data are included in Appendix D of the main report.

6.3 Native Plant Species Richness Results

Fifteen native species were documented in 2010 baseline transects in in central maritime chaparral vegetation in North Range and South Range 44 (Tables A6-8 and A6-9, Figure A17).

Subsequent to small-scale excavation activities (Activity C), the total number of species in the North Range 44 SCA was 24 in Year 1 (2013) and 18 in South Range 44 SCA and Central Area NCAs in Year 1 (2012). By 2019, a total of 50 species were observed in North Range 44 transects in areas subject to small-scale excavation, with 16 tree, shrub, and subshrub species and 34 herbaceous and fern species. A total of 72 species occurred within

the one-meter belt along the transect in 2019, including one tree species, 19 shrub species, 51 herbaceous species, and one fern species, an increase over previous years (Table A6-8).

In South Range 44 SCA and Central Area NCAs, total native species in Year 8 after small-scale excavation activities was 44. The number of shrub species was 13 and herbaceous species richness increased from 1 to 31 between baseline and Year 8 (Table A6-9). A total of 61 species were observed within the one-meter belt along the transects, including 16 shrub species, and 45 herbaceous species.

A total of six HMP species were documented in portions of Range 44 prior to small-scale-excavation: sandmat manzanita, Eastwood's ericameria, Monterey ceanothus, Monterey spineflower, sand (Monterey) gilia, and seaside bird's-beak. In 2013, coast wallflower (*Erysimum ammophilum*) appeared in small-scale excavation areas, in addition to areas subject to vegetation cutting. All seven of these species were observed in 2019 (Tables A6-8 and A6-9, Figure A18).

The Shannon index values rose from 0.8 in Year 1 to 1.4 in Year 7 in North Range 44 and 1.4 in Year 8 in South Range 44, close to the 1.8 value in the 2010 baseline.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Munitions investigation activities in the IAR MRA were completed in early 2013. Biological monitoring in 2019 included completion of 29 vegetation transects in North Range 44 and South Range 44 small-scale excavation areas; these monitoring events and associated data provide the ESCA RP Team with valuable information to guide site management.

Vegetation cover and species diversity data indicate recovery of all sensitive vegetation types subject to munitions response actions in the IAR MRA. A combination of committed stewardship, including reductions in acreages potentially subject to vegetation cutting in South Range 44 (saving 13.2 acres [5.4 ha], or 75% of intact central maritime chaparral, along with a diversity of native and HMP species); steady post-activity increases in vegetation cover, species richness, and number of individual HMP herbaceous species; and ongoing weed and erosion control management activities promote habitat recovery after munitions investigation activities.

All required soil and topography remediation success criteria were met in 2013 (ESCA RP Team 2014).

All required soil and topography remediation success criteria were met in 2013 (ESCA RP Team 2014). Both large-scale excavation Subareas A and B in Range 47 achieved all performance targets required in the HRP in 2015 (ESCA RP Team 2016). All areas in Range 44 have reached Year 7 performance targets for species richness, HMP shrub species presence, and HMP herbaceous species presence in all areas. Vegetation cover in all locations in the IAR MRA met the Year 7 performance target for areas subject to vegetation-cutting in

2015 and 2016. Native vegetation in grassland areas has completely recovered to baseline conditions and met Year 7 performance targets in 2017.

All areas met the weed cover targets each year since monitoring has begun.

A review of vegetation recovery at other comparable restoration sites at Fort Ord suggests that selection of a 50% native cover target for Year 7 in North Range 44 and South Range 44 small-scale excavation areas was overly ambitious for excavated sites that lacked topsoil containing seeds, nutrients, and beneficial micro-organisms after munitions investigation activities and that contained compacted subsoils (Burleson 2019). The native vegetation cover and diversity data for both North Range 44 and South Range 44 small-scale excavation areas suggest that these sites are on a trajectory to reach full vegetation recovery in the coming years, supporting self-sustaining native plant communities equitable with the species richness and species composition present on the site prior to the ESCA RP Team investigation and remedial efforts.

Therefore, we recommend monitoring of these areas cease after 2019.

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Table 3-1
Interim Action Ranges MRA Activity Types and Restoration Strategies

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Activity Type	Activity Category	Anticipated Investigation Area (acres)	Completed Investigation Area (acres)	Restoration Strategy	Planned Actions
Ingress/egress routes	A	5.5	0.4	Monitoring only	- monitor
Above-ground vegetation cutting prior to target-specific excavation	B	12.3	13.8	Monitoring only	- separate/replace topsoil/subsoil in specified sequence
Small-scale soil excavation - areas of less than 1 acre or no more than 100 feet wide. All vegetation removed above and below ground.	C	2.9	1.2	Passive (seeding)	- separate/replace topsoil/subsoil in specified sequence
					- recontour to match original
					- control erosion as needed
					- seed
					- monitor
Large scale soil excavation - areas of greater than 1 acre or more than 100 feet wide. All vegetation removed above and below ground.	D	13.4	13.4	Active (seeding and container planting)	- separate/replace topsoil/subsoil in specified sequence
					- recontour to match original
					- control erosion as needed
					- seed
					- container plantings
					- monitor
Totals		***34.1***	***28.8***		

Table 3-2
Soil and Topography Remediation Success Criteria

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Restoration Strategy	Success Criteria	Evaluation Method/Procedure	Monitoring Frequency
Soil decompaction on trails and roads	Match soil texture and structure to that of nearby native soils	Linear measurements via GIS of trails and roads requiring restoration	At end of construction activities prior to restoration
		Comparison of samples every 0.25 mile with nearby native soils	After completion of de-compaction efforts
Remove constructed berm in Range 47 and restore to pre-existing conditions	Match original topography as closely as possible	Comparison with 1964 aerial image for reference	At end of construction activities prior to remediation
		Ground-level photographic imagery before and after remediation	After completion of re-contouring
Topsoil and subsoil placement in Range 47 Subarea A	6-inch topsoil improvement on 80% of exposed dune hill in Range 47 Subarea A	Comparison with 1964 aerial image for reference	At end of construction activities prior to remediation
		Volume calculations	During re-contouring
		Document soil placement in specified manner	During re-contouring
		Ground-level photographic imagery before and after remediation	After completion of re-contouring

Table A 3-3
Plant Species Diversity and Vegetation-Based Success Criteria

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Activity Category	Location	Completed Investigation Area (acres)	Restoration Strategy	Performance Category	Performance Metric	Performance Target for Post-installation by Year							Baseline for Comparison
						1	2	3	4	5	6	7	
Ingress/egress routes (Activity A)	All ingress/egress routes	0.4	Monitoring only	Monterey spineflower presence	% focus species baseline	100	70	60	50	30	20	10	Baseline in 2013 ESCA RP Annual Natural Resource Report*
				Sand (Monterey) Gilia presence	% focus species baseline	100	50	40	30	20	10	0	
				Pampas grass and French broom recruits	% total area	<5	<5	<5	<5	<5	<5	<5	total area
Above-ground vegetation cutting followed by target-specific excavation (Activity B)	North Range 44 SCAs, South Range 44 SCAs and Central Area NCAs, part of Range 47 SCA Subarea C[1]	13.8	Monitoring only	Total native species richness (max. value = 20)	% IAR-wide baseline by area	25	30	35	40	50	60	70	Tables 2 and 3 of this HRP
				Native vegetation cover	% cover by location	0	5	10	20	25	30	50	
				HMP shrub species richness (max. value =3)	% IAR-wide baseline by area	0	0	33	33	33	66	66	
				HMP shrub species frequency	% frequency of HMP shrub species	0	5	5	10	15	20	20	
				Monterey spineflower presence	% focus species baseline	100	70	60	50	30	20	10	2012 baseline monitoring plots
				Sand (Monterey) Gilia presence	% focus species baseline	100	50	40	30	20	10	0	
				Seaside bird's beak presence	% focus species baseline	10	10	5	5	5	5	5	
				Pampas grass and French broom recruits	% total area	<5	<5	<5	<5	<5	<5	<5	total area
Small-scale soil excavation (Activity C)	North Range 44 SCAs, South Range 44 SCAs and Central Area NCAs, linear scrape in Range 47 Subarea C	1.1	Passive (seeding)	Total native species richness (max value = 20)	% of Total Present	15	20	25	30	40	50	50	Tables 2 and 3 of this HRP
				Native vegetation cover	% cover by location	0	5	10	20	25	30	50	
				HMP shrub species richness (max value =3)	% of total present	0	0	33	33	33	66	66	
				Monterey spineflower presence	% focus species baseline	100	30	10	0	0	0	0	2012 baseline monitoring plots
				Sand (Monterey) Gilia presence	% focus species baseline	100	20	10	0	0	0	0	
				Seaside bird's beak presence	% focus species baseline	0	0	0	5	5	5	5	
				Pampas grass, iceplant, and French broom recruits	% total area	<5	<5	<5	<5	<5	<5	<5	total area
	Grassland grid cell in South Range 44 SCA	0.1	Passive (seeding)	Total Species Richness	% baseline	10	20	30	40	45	50	50	Grassland Reference Site - 2010/2011*
				Native vegetation cover	% cover	8	12	20	25	30	35	40	Grassland Reference Site - 2010/2011*
				Monterey spineflower presence	% focus species baseline	100	50	30	10	10	10	10	2012 baseline monitoring plots
				Pampas grass, iceplant, and French broom recruits	% total area	<5	<5	<5	<5	<5	<5	<5	total area

Table A 3-3
Plant Species Diversity and Vegetation-Based Success Criteria

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Activity Category	Location	Completed Investigation Area (acres)	Restoration Strategy	Performance Category	Performance Metric	Performance Target for Post-installation by Year							Baseline for Comparison
						1	2	3	4	5	6	7	
Large-scale soil excavation (Activity D)	Range 47 Subarea A (low recruitment area)	1.2	Passive (seeding)	Shrub species richness	% of total present	0	10	10	20	20	20	30	Tables 2 and 3 in this HRP
				Native vegetation cover	% cover by location	0	1	2	4	6	8	10	
				Monterey spineflower presence	% focus species baseline	0	0	30	10	10	10	10	2012 baseline monitoring plots
				Pampas grass, iceplant, and French broom recruits	% total area	<5	<5	<5	<5	<5	<5	<5	total area
	Range 47 Subarea B	12.2	Active (container planting and seeding)	Container plant survival	% total planted	0	60	60	60	50	50	50	Tables 2 and 3 in this HRP
				Shrub species richness	% of total present	0	20	30	40	50	60	70	
				Native vegetation cover	% cover by location	0	5	15	20	25	30	50	
				HMP shrub species richness (max value =3)	% of total present	0	0	33	33	33	66	66	
				HMP shrub species frequency	% frequency of HMP shrub species in IAR-	0	0	33	33	33	66	66	
				Monterey spineflower presence	% focus species baseline	100	70	60	50	30	20	10	2012 baseline monitoring plots
				Sand (Monterey) Gilia presence	% focus species baseline	100	50	40	30	20	10	0	
				Pampas grass, iceplant, and French broom recruits	% total area	<5	<5	<5	<5	<5	<5	<5	total area

Notes:

1 = Area includes 0.5-acre escarpment where small-scale excavation was conducted. The escarpment could not be accessed safely to conduct passive or active restoration. For this reason, the escarpment was categorized as an Activity B area and the monitoring-only strategy was implemented in this area.

*ESCA RP Team. 2014. 2013 Annual Natural Resource Monitoring, Mitigation, and Management Report, Former Fort Ord, Monterey County, California.28 March. (Fort Ord Administrative Record No. ESCA-0283)

Table A 6-1
Interim Action Ranges MRA 2019 Performance Criteria Status

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Activity Category	Location	Performance Category	Performance Metric	Performance Target for Post-activity Area by Monitoring Year							2019 Status	Monitoring Year Status
				Monitoring Years								
				1	2	3	4	5	6	7		
										North Range 44		
Ingress/egress routes (Activity A)		Monterey spineflower presence	% focus (Monterey spineflower) species baseline = present in 2 grids in 2012 baseline ingress/egress survey	100%	70%	60%	50%	30%	20%	10%	Year 7 Targets met in 2015	--
		Sand (Monterey) Gilia presence	% focus (sand gilia) species baseline presence = 0 in ingress/egress routes	100%	50%	40%	30%	20%	10%	0%		--
		Pampas grass and French broom recruits	% total area	<5%	<5%	<5%	<5%	<5%	<5%	<5%		--
Above-ground vegetation cutting followed by target-specific excavation (Activity B)	North Range 44 SCAs, South Range 44 SCAs and Central Area NCAs, part of Range 47 SCA Subarea C[1]	Total native species richness (max. value = 20 species)	% IAR-wide baseline	25%	30%	35%	40%	50%	60%	70%	Year 7 Targets met in 2015	--
		Native vegetation cover	% cover by location	0%	5%	10%	20%	25%	30%	50%	Year 7 Targets met in 2016	--
		HMP shrub species richness (max. value =3 HMP species, or 100%)	% IAR-wide baseline	0%	0%	33%	33%	33%	66%	66%	Year 7 Targets met in 2015	--
		HMP shrub species frequency	% frequency of HMP shrub species	0%	5%	5%	10%	15%	20%	20%		--
		Monterey spineflower presence	% focus species baseline (baseline = 27.2 Monterey spineflower/plot in North Range 44, 40.5 Monterey spineflower/plot in South Range 44, and 6 Monterey spineflower/plot in Range 47 Subarea C)	100%	70%	60%	50%	30%	20%	10%		--
		Sand (Monterey) Gilia presence	% focus (sand gilia) species baseline (baseline = 0 in North Range 44 and Range 47 Subarea C, 2.7 sand gilia/plot in South Range 44)	100%	50%	40%	30%	20%	10%	0%		--
		Seaside bird's beak presence	% focus (seaside bird's-beak) species baseline (baseline = 3.3 seaside bird's beak/plot in North Range 44, 9.3/plot in South Range 44, 0 in Range 47 Subarea C)	10%	10%	5%	5%	5%	5%	5%		--
		Pampas grass and French broom recruits	% total area	<5%	<5%	<5%	<5%	<5%	<5%	<5%		

Table A 6-1
Interim Action Ranges MRA 2019 Performance Criteria Status

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Activity Category	Location	Performance Category	Performance Metric	Performance Target for Post-activity Area by Monitoring Year							2019 Status	Monitoring Year Status
				Monitoring Years								
				1	2	3	4	5	6	7		
										North Range 44		
Small-scale soil excavation (Activity C)	North Range 44 SCAs, South Range 44 SCAs and Central Area NCAs, linear scrape in Range 47 Subarea C	Total native species richness (max value = 20 species)	% of total present	15%	20%	25%	30%	40%	50%	50%	Year 7 Target met in 2015	--
		Native vegetation cover	% cover by location	0%	5%	10%	20%	25%	30%	50%	North Range 44 (Year 7): 30.8% native cover; South Range 44 (Year 8): 26.4% native cover	North Range 44 meets Year 6 target; South Range 44 meets Year 5 target
		HMP shrub species richness (max. value =3 HMP species, or 100%)	% of total present	0%	0%	33%	33%	33%	66%	66%	Year 7 Targets met in 2015	--
		Monterey spineflower presence	% focus species baseline (baseline = 27.2 Monterey spineflower/plot in North Range 44, 40.5 Monterey spineflower/plot in South Range 44, and 6 Monterey spineflower/plot in Range 47 Subarea C)	100%	30%	10%	0%	0%	0%	0%		--
		Sand (Monterey) Gilia presence	% focus species baseline (baseline = 0 in North Range 44 and Range 47 Subarea C, 2.7 sand gilia/plot in South Range 44)	100%	20%	10%	0%	0%	0%	0%		--
		Seaside bird's beak presence	% focus species baseline (baseline = 3.3 seaside bird's beak/plot in North Range 44; no seaside bird's-beak found in baseline conditions where small-scale excavation performed in South Range 44 or Range 47 Subarea C)	0%	0%	0%	5%	5%	5%	5%		--
		Pampas grass, iceplant, and French broom recruits	% total area	<5%	<5%	<5%	<5%	<5%	<5%	<5%		--
	Grassland grid cell in South Range 44 SCA	Total Species Richness	% baseline (baseline = 18 species)	10%	20%	30%	40%	45%	50%	50%	Year 7 Target met in 2015	--
		Native vegetation cover	% cover	8%	12%	20%	25%	30%	35%	40%	Year 7 Target met in 2017	--
		Monterey spineflower presence	% focus species baseline (baseline = 40.5 Monterey spineflower/plot)	100%	50%	30%	10%	10%	10%	10%	Year 7 Targets met in 2015	--
		Pampas grass, iceplant, and French broom recruits	% total area	<5%	<5%	<5%	<5%	<5%	<5%	<5%		--

Table A 6-1
Interim Action Ranges MRA 2019 Performance Criteria Status

ESCA RP 2019 Annual Natural Resource Report – Appendix A

Activity Category	Location	Performance Category	Performance Metric	Performance Target for Post-activity Area by Monitoring Year							2019 Status	Monitoring Year Status
				Monitoring Years								
				1	2	3	4	5	6	7		
										North Range 44		
Large-scale soil excavation (Activity D)	Range 47 Subarea A (low recruitment area)	Shrub species richness	% of total present (11 species in baseline)	0%	10%	10%	20%	20%	20%	30%	Year 7 Targets met in 2015	--
		Native vegetation cover	% cover	0%	1%	2%	4%	6%	8%	10%		--
		Monterey spineflower presence	% focus (Monterey spineflower) species baseline (baseline = 6 Monterey spineflower/plot)	0%	0%	30%	10%	10%	10%	10%		--
		Pampas grass, iceplant, and French broom recruits	% total area	<5%	<5%	<5%	<5%	<5%	<5%	<5%		--
	Range 47 Subarea B	Container plant survival	% total planted	0%	60%	60%	60%	50%	50%	50%	Year 7 Targets met in 2015	--
		Shrub species richness (22 shrub species in baseline)	% of total present	0%	20%	30%	40%	50%	60%	70%		--
		Native vegetation cover	% cover	0%	5%	15%	20%	25%	30%	50%		--
		HMP shrub species richness (max. value =3 HMP species, or 100%)	% of total present	0%	0%	33%	33%	33%	66%	66%		--
		HMP shrub species frequency	% frequency of HMP shrub species in IAR-wide baseline (baseline = 44.4%)	0%	0%	33%	33%	33%	66%	66%		--
		Monterey spineflower presence	% focus (Monterey spineflower) species baseline (baseline = 6 Monterey spineflower/plot)	100%	70%	60%	50%	30%	20%	10%		--
		Sand (Monterey) Gilia presence	% focus (sand gilia) species baseline (baseline = 2.0 sand gilia/plot)	100%	50%	40%	30%	20%	10%	0%		--
		Pampas grass, iceplant, and French broom recruits	% total area	<5%	<5%	<5%	<5%	<5%	<5%	<5%		--

[1] Please refer to Section 6 of Appendix A, where each performance category and target are explained in more detail.

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Twenty-nine Baseline Transects				
		Baseline Data 2010 - 2011 (all Interim Action Ranges MRA baseline transects)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.0%	--	--	0.0%	0.0%
Total Cover by Native Tree Species		***0.0%***			***0.0%***	
Acmispon glaber	deerweed	1.4%	1.6%	0.6%	1.5%	79.3%
Crocanthemum scoparium	rush-rose	8.1%	9.1%	2.9%	8.6%	86.2%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**2.0%**	**0.6%**	**1.7%**	**65.5%**
Ceanothus dentatus	dwarf ceanothus	20.2%	16.0%	5.0%	21.4%	89.7%
Eriophyllum confertiflorum	golden yarrow	1.5%	2.2%	0.7%	1.6%	65.5%
Lupinus chamissonis	silver bush lupine	0.4%	1.1%	0.4%	0.4%	13.8%
Toxicodendron diversilobum	poison-oak	0.0%	--	--	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	15.6%	4.9%	31.0%	100%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**9.3%**	**2.9%**	**14.3%**	**96.6%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.5%**	**0.2%**	**0.2%**	**17.2%**
Salvia mellifera	black sage	5.3%	7.2%	2.3%	5.6%	69.0%
Adenostoma fasciculatum	chamise	9.0%	6.9%	2.2%	9.5%	89.7%
Ericameria ericoides	dune-heather, mock-heather	1.5%	5.6%	1.8%	1.6%	24.1%
Frangula californica subsp. *californica*	California coffeeberry	0.9%	1.9%	0.6%	1.0%	31.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	1.8%	0.6%	0.7%	24.1%
Diplacus aurantiacus	bush monkeyflower	0.5%	0.9%	0.3%	0.5%	27.6%
Lepechinia calycina	pitcher sage	0.4%	1.4%	0.5%	0.4%	20.7%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***			***100%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***0.0%***	***--***	***--***	***0.0%***	***--***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***				
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***94.5%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***19.3%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***--***				
Total Mean Percent Bare Ground		***19.3%***	***9.3%***	***2.9%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Baseline Transects				
		Baseline Data 2010 -2011 (North Range 44 baseline transects only)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.0%	0.0%	--	0.0%	0.0%
Total Cover by Native Tree Species		***0.0%***			***0.0%***	
Acmispon glaber	deerweed	0.8%	0.9%	0.8%	0.8%	80.0%
Crocanthemum scoparium	rush-rose	11.6%	11.0%	10.5%	11.6%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**2.4%**	**3.3%**	**3.1%**	**2.4%**	**60.0%**
Ceanothus dentatus	dwarf ceanothus	23.4%	19.3%	18.4%	23.5%	100.0%
Eriophyllum confertiflorum	golden yarrow	2.8%	3.2%	3.0%	2.8%	100.0%
Lupinus chamissonis	silver bush lupine	0.3%	0.7%	0.7%	0.3%	20.0%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	--	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	22%	6%	6%	22%	100%
Ceanothus rigidus	**Monterey ceanothus**	**9.4%**	**10.3%**	**9.9%**	**9.4%**	**100.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.6%**	**0.9%**	**0.8%**	**0.6%**	**40.0%**
Salvia mellifera	black sage	6.1%	5.8%	5.6%	6.1%	60.0%
Adenostoma fasciculatum	chamise	16.1%	6.1%	5.8%	16.2%	100.0%
Ericameria ericoides	dune-heather, mock-heather	0.8%	1.2%	1.1%	0.8%	40.0%
Frangula californica subsp. *californica*	California coffeeberry	1.8%	2.2%	2.1%	1.8%	60.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.1%	0.1%	0.1%	20.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***98.0%***			***98.3%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.7%***	***1.4%***	***1.3%***	***1.7%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***99.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***20.3%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***--***				
Total Mean Percent Bare Ground		***20.3%***	***10.4%***	***9.9%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]				
		Post-Activity Data 2015* (Year 3)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.5%	1.5%	1.0%	4.2%	12.5%
Total Cover by Native Tree Species		***0.5%***			***4.9%***	
Acmispon glaber	deerweed	1.1%	2.3%	1.6%	8.4%	62.5%
Crocanthemum scoparium	rush-rose	1.0%	1.1%	0.7%	7.6%	75.0%
Arctostaphylos pumila	**sandmat manzanita**	**0.9%**	**0.9%**	**0.6%**	**7.5%**	**75.0%**
Ceanothus dentatus	dwarf ceanothus	0.4%	0.6%	0.4%	3.1%	50.0%
Eriophyllum confertiflorum	golden yarrow	0.3%	0.3%	0.2%	2.2%	62.5%
Lupinus chamissonis	silver bush lupine	0.1%	0.4%	0.2%	1.1%	25.0%
Toxicodendron diversilobum	poison-oak	0.5%	0.9%	0.6%	3.7%	25.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0%	1%	0%	3%	38%
Ceanothus rigidus	**Monterey ceanothus**	**0.2%**	**0.4%**	**0.2%**	**1.4%**	**50.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.4%**	**0.3%**	**1.1%**	**12.5%**
Salvia mellifera	black sage	0.0%	0.1%	0.1%	0.3%	25.0%
Adenostoma fasciculatum	chamise	0.0%	0.0%	0.0%	0.1%	12.5%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	0.0%	0.1%	12.5%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	--	--	--	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	--	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	--	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	--	0.0%
Total Mean Percent Shrub and Subshrub Cover		***5.0%***			***45.7%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***5.4%***	***7.9%***	***5.3%***	***49.4%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***0.0%***	***0.0%***	***12.5%***
Total Mean Non-native Herbaceous Species Cover		***1.7%***	***3.6%***	***2.4%***		
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***10.9%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***87.2%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***0.0%***	*--*	*--*	*--*
Total Mean Percent Bare Ground		***87.2%***	***14.2%***	***9.5%***	*--*	***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]				
		Post-Activity Data 2016 (Year 4)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	1.0%	2.9%	1.9%	3.9%	12.5%
Total Cover by Native Tree Species		***1.0%***			***5.0%***	
Acmispon glaber	deerweed	4.4%	10.9%	7.3%	17.1%	75.0%
Crocanthemum scoparium	rush-rose	2.7%	2.6%	1.8%	10.4%	75.0%
Arctostaphylos pumila	**sandmat manzanita**	**2.0%**	**1.1%**	**0.7%**	**7.9%**	**87.5%**
Ceanothus dentatus	dwarf ceanothus	0.4%	0.6%	0.4%	1.5%	62.5%
Eriophyllum confertiflorum	golden yarrow	0.8%	1.1%	0.7%	3.1%	75.0%
Lupinus chamissonis	silver bush lupine	0.3%	0.7%	0.5%	1.0%	25.0%
Toxicodendron diversilobum	poison-oak	0.1%	0.3%	0.2%	0.4%	12.5%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0%	1%	1%	2%	50%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**0.3%**	**0.2%**	**0.6%**	**37.5%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.4%**	**0.3%**	**0.6%**	**25.0%**
Salvia mellifera	black sage	0.1%	0.2%	0.1%	0.3%	25.0%
Adenostoma fasciculatum	chamise	0.1%	0.2%	0.1%	0.3%	25.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	--	--	0.0%	0.0%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	--	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.5%***			***56.4%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***7.9%***	***10.9%***	***7.3%***	***38.6%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***0.0%***	***0.0%***	***7.7%***
Total Mean Non-native Herbaceous Species Cover		***1.8%***	***3.8%***	***2.6%***	***7.1%***	***46.2%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***20.5%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***82.4%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***--***	***--***		***0.0%***
Total Mean Percent Bare Ground		***82.4%***	***14.4%***	***9.6%***		***61.5%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]				
		Post-Activity Data 2017 (Year 5)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.6%	1.6%	1.1%	3.2%	12.5%
Total Cover by Native Tree Species		***0.6%***			***3.4%***	
Acmispon glaber	deerweed	3.2%	7.7%	5.1%	17.7%	75.0%
Crocanthemum scoparium	rush-rose	2.7%	2.7%	1.8%	15.4%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**1.9%**	**1.3%**	**0.8%**	**10.4%**	**75.0%**
Ceanothus dentatus	dwarf ceanothus	1.0%	1.5%	1.0%	5.4%	75.0%
Eriophyllum confertiflorum	golden yarrow	0.8%	0.6%	0.4%	4.6%	87.5%
Lupinus chamissonis	silver bush lupine	0.6%	1.6%	1.1%	3.2%	25.0%
Toxicodendron diversilobum	poison-oak	0.5%	0.9%	0.6%	2.7%	25.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.5%	1%	1%	3%	38%
Ceanothus rigidus	**Monterey ceanothus**	**0.4%**	**0.6%**	**0.4%**	**2.2%**	**50.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.4%**	**0.3%**	**1.1%**	**25.0%**
Salvia mellifera	black sage	0.1%	0.2%	0.1%	0.5%	25.0%
Adenostoma fasciculatum	chamise	0.1%	0.2%	0.1%	0.4%	12.5%
Ericameria ericoides	dune-heather, mock-heather	0.0%	--	--	0.0%	0.0%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	--	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.8%***			***70.8%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***4.3%***	***5.7%***	***3.8%***	***25.8%***	***87.5%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***0.0%***	***0.0%***	***12.5%***
Total Mean Non-native Herbaceous Species Cover		***1.1%***	***2.8%***	***1.9%***	***6.9%***	***75.0%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***16.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***82.7%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.1%***	***0.2%***	***0.1%***		***12.5%***
Total Mean Percent Bare Ground		***82.6%***	***15.5%***	***10.4%***		***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fifteen Transects in Small Scale Excavations in North Range 44[2]				
		Post-Activity Data 2018 (Year 6)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.2%	--	--	0.8%	6.7%
Total Cover by Native Tree Species		***0.2%***			***0.8%***	
Acmispon glaber	deerweed	3.2%	8.0%	3.6%	10.5%	86.7%
Crocanthemum scoparium	rush-rose	6.5%	4.0%	1.8%	21.3%	86.7%
Arctostaphylos pumila	**sandmat manzanita**	**3.7%**	**1.8%**	**0.8%**	**12.2%**	**73.3%**
Ceanothus dentatus	dwarf ceanothus	2.6%	4.5%	2.1%	8.6%	80.0%
Eriophyllum confertiflorum	golden yarrow	1.7%	1.3%	0.6%	5.7%	73.3%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Toxicodendron diversilobum	poison-oak	0.8%	2.1%	0.9%	2.5%	40.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	1.3%	3.7%	1.7%	4.2%	60%
Ceanothus rigidus	**Monterey ceanothus**	**1.2%**	**1.8%**	**0.8%**	**4.0%**	**73.3%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.0%**	**0.0%**	**0.5%**	**13.3%**
Salvia mellifera	black sage	0.8%	4.5%	2.0%	2.5%	46.7%
Adenostoma fasciculatum	chamise	0.4%	3.0%	1.4%	1.5%	13.3%
Ericameria ericoides	dune-heather, mock-heather	0.4%	1.3%	0.6%	1.3%	26.7%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	--	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	12.5%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***22.9%***			***76.1%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***7.0%***	***19.6%***	***6.2%***	***22.8%***	***75.9%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.5%***	***13.2%***	***4.2%***	***1.5%***	***60.0%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***30.1%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***70.5%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***--***	***--***		***0.0%***
Total Mean Percent Bare Ground		***70.5%***	***17.0%***	***8.0%***		***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-2
IAR MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fifteen Transects in Small Scale Excavations in North Range 44[2]				
		Post-Activity Data 2019 (Year 7)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.2%	--	--	0.8%	6.7%
Total Cover by Native Tree Species		***0.2%***			***0.6%***	
Acmispon glaber	deerweed	1.5%	5.9%	4.0%	4.8%	73.3%
Crocanthemum scoparium	rush-rose	5.3%	2.9%	1.9%	17.1%	86.7%
Arctostaphylos pumila	**sandmat manzanita**	4.7%	2.3%	1.5%	15.2%	66.7%
Ceanothus dentatus	dwarf ceanothus	3.3%	5.3%	3.5%	10.4%	80.0%
Eriophyllum confertiflorum	golden yarrow	1.1%	0.8%	0.6%	3.7%	86.7%
Lupinus chamissonis	silver bush lupine	0.1%	1.1%	0.8%	0.2%	13.3%
Toxicodendron diversilobum	poison-oak	1.2%	1.8%	1.2%	3.7%	40.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	1.3%	4.3%	2.9%	4.1%	60.0%
Ceanothus rigidus	**Monterey ceanothus**	1.6%	2.3%	1.5%	5.2%	80.0%
Ericameria fasciculata	**Eastwood's ericameria**	0.02%	0.1%	0.1%	0.1%	13.3%
Salvia mellifera	black sage	0.9%	5.5%	3.7%	3.0%	46.7%
Adenostoma fasciculatum	chamise	0.5%	3.5%	2.4%	1.5%	13.3%
Ericameria ericoides	dune-heather, mock-heather	0.5%	1.4%	0.9%	1.5%	26.7%
Frangula californica subsp. *californica*	California coffeeberry	0.1%	--	--	0.2%	6.7%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***22.12%***	***9.8%***	***4.4%***	***71.8%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***8.5%***	***12.7%***	***5.8%***	***27.3%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.4%***	***2.1%***	***1.0%***	***1.0%***	***33.3%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***30.8%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***70.4%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***--***	***--***		***0.0%***
Total Mean Percent Bare Ground		***70.4%***	***16.4%***	***11.0%***		***100.0%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1-5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Twenty-nine Baseline Transects				
		Baseline Data 2010 - 2011 (all Interim Action Ranges MRA baseline transects)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.5%	2.2%	0.7%	1.6%	65.5%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**2.0%**	**0.6%**	**1.7%**	**65.5%**
Crocanthemum scoparium	rush-rose	8.1%	9.1%	2.9%	8.6%	86.2%
Acmispon glaber	deerweed	1.4%	1.6%	0.6%	1.5%	79.3%
Adenostoma fasciculatum	chamise	9.0%	6.9%	2.2%	9.5%	89.7%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	15.6%	4.9%	31.0%	100%
Toxicodendron diversilobum	poison-oak	0.0%	--	--	--	0.0%
Ericameria ericoides	dune-heather, mock-heather	1.5%	5.6%	1.8%	1.6%	24.1%
Salvia mellifera	black sage	5.3%	7.2%	2.3%	5.6%	69.0%
Ceanothus dentatus	dwarf ceanothus	20.2%	16.0%	5.0%	21.4%	89.7%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	1.8%	0.6%	0.7%	24.1%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**9.3%**	**2.9%**	**14.3%**	**96.6%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.5%**	**0.2%**	**0.2%**	**17.2%**
Frangula californica subsp. californica	California coffeeberry	0.9%	1.9%	0.6%	1.0%	31.0%
Lepechinia calycina	pitcher sage	0.4%	1.4%	0.5%	0.4%	20.7%
Lupinus chamissonis	silver bush lupine	0.4%	1.1%	0.4%	0.4%	13.8%
Diplacus aurantiacus	bush monkeyflower	0.5%	0.9%	0.3%	0.5%	27.6%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***			***99%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.3%***	***2.3%***	***1.3%***	***1.4%***	***90.0%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover		***95.8%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***19.3%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***--***				
Total Mean Percent Bare Ground		***19.3%***	***9.3%***	***2.9%***	***--***	***100.0%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Seven Baseline Transects				
		Baseline Data 2010 - 2011 (South Range 44 baseline transects only)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	3.0%	2.7%	2.0%	2.8%	85.7%
Arctostaphylos pumila	**sandmat manzanita**	**0.7%**	**0.6%**	**0.4%**	**0.7%**	**71.4%**
Crocanthemum scoparium	rush-rose	10.0%	8.5%	6.2%	9.2%	100%
Acmispon glaber	deerweed	1.2%	1.1%	0.8%	1.1%	85.7%
Adenostoma fasciculatum	chamise	9.9%	7.1%	5.2%	9.1%	100%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	25.8%	9.5%	6.9%	23.7%	100%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	--	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	--	0.0%	0.0%
Salvia mellifera	black sage	8.7%	9.7%	7.1%	8.0%	100%
Ceanothus dentatus	dwarf ceanothus	30.4%	14.9%	10.9%	27.9%	100%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.2%	0.4%	0.3%	0.2%	28.6%
Ceanothus rigidus	**Monterey ceanothus**	**16.3%**	**5.0%**	**3.7%**	**14.9%**	**100%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.2%**	**0.2%**	**0.1%**	**14.3%**
Frangula californica subsp. californica	California coffeeberry	0.1%	0.2%	0.2%	0.1%	14.3%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	1.2%	2.1%	1.5%	1.1%	28.6%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***107.6%***			***98.9%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.2%***	***1.2%***	***0.9%***	***1.1%***	***71.4%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover		***108.8%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***16.2%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***--***				
Total Mean Percent Bare Ground		***16.2%***	***7.9%***	***5.8%***	***14.8%***	***100.0%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]				
		Post-activity Data 2015* (Year 4)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.2%	1.2%	1.2%	7.7%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**0.9%**	**1.2%**	**1.2%**	**6.2%**	**80.0%**
Crocanthemum scoparium	rush-rose	1.4%	1.6%	1.5%	9.4%	100%
Acmispon glaber	deerweed	7.0%	7.4%	7.1%	46.1%	80%
Adenostoma fasciculatum	chamise	0.4%	0.9%	0.9%	2.6%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.1%	0.1%	0.1%	0.6%	40.0%
Toxicodendron diversilobum	poison-oak	0.2%	0.3%	0.3%	1.0%	20.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	0.3%	0.3%	0.8%	20.0%
Salvia mellifera	black sage	0.0%	0.1%	0.1%	0.3%	40.0%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.0%	0.0%	0.1%	20.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	--	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.0%**	**--**	**--**	**--**	**0.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**--**	**--**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.3%***			***76.0%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***3.6%***	***5.2%***	***5.0%***	***23.7%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***--***	***--***	***--***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.2%***	***0.4%***	***0.0%***		
Total Mean Percent Native Vegetative Cover		***14.9%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***85.3%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***85.3%***	***6.0%***	***5.7%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6

2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]				
		Post-activity Data 2016 (Year 5)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.3%	2.1%	2.0%	9.2%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**1.9%**	**1.4%**	**1.4%**	**7.7%**	**80.0%**
Crocanthemum scoparium	rush-rose	2.4%	2.0%	1.9%	9.3%	100%
Acmispon glaber	deerweed	5.9%	5.2%	4.9%	29.7%	80%
Adenostoma fasciculatum	chamise	0.4%	0.8%	0.8%	1.8%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.3%	0.5%	0.5%	1.3%	40.0%
Toxicodendron diversilobum	poison-oak	0.0%	--	--	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	0.3%	0.3%	0.5%	20.0%
Salvia mellifera	black sage	0.4%	0.8%	0.8%	1.5%	60.0%
Ceanothus dentatus	dwarf ceanothus	0.1%	0.2%	0.1%	0.5%	60.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**0.1%**	**0.1%**	**0.2%**	**20.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**--**	**--**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***14.0%***			***75.3%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***4.6%***	***6.0%***	***5.8%***	***22.9%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***--***	***--***	***--***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***1.5%***	***1.7%***	***1.6%***	***7.3%***	***80.0%***
Total Mean Percent Native Vegetative Cover		***18.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***80.2%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***80.2%***	***5.7%***	***5.4%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]				
		Post-activity Data 2017 (Year 6)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.1%	1.7%	1.7%	18.4%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**2.0%**	**1.5%**	**1.4%**	**17.7%**	**80.0%**
Crocanthemum scoparium	rush-rose	1.6%	2.3%	2.2%	14.1%	100%
Acmispon glaber	deerweed	1.4%	0.9%	0.9%	12.3%	100%
Adenostoma fasciculatum	chamise	0.4%	0.9%	0.9%	3.6%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.2%	0.3%	0.3%	1.8%	40.0%
Toxicodendron diversilobum	poison-oak	0.1%	0.2%	0.1%	0.6%	40.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	0.0%	0.2%	20.0%
Salvia mellifera	black sage	0.0%	0.0%	0.0%	0.2%	60.0%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.0%	0.0%	0.1%	20.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.0%**	**0.0%**	**--**	**0.0%**	**0.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.0%**	**--**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	0.0%	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	0.0%	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***7.7%***	***0.7%***	***0.7%***	***69.0%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***2.9%***	***4.8%***	***4.6%***	***25.8%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***--***	***--***	***--***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.6%***	***0.7%***	***0.7%***	***5.2%***	***80.0%***
Total Mean Percent Native Vegetative Cover		***10.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***88.4%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.1%***				
Total Mean Percent Bare Ground		***88.3%***	***8.2%***	***7.8%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fourteen Transects in Small-scale Excavations in South Range 44 Conducted in 2011[2]				
		Post-activity Data 2018 (Year 7)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.3%	2.1%	1.0%	1.2%	92.9%
Arctostaphylos pumila	**sandmat manzanita**	**4.3%**	**3.4%**	**1.6%**	**18.5%**	**100%**
Crocanthemum scoparium	rush-rose	6.3%	6.3%	3.0%	27.0%	100%
Acmispon glaber	deerweed	2.1%	2.5%	1.2%	8.8%	78.6%
Adenostoma fasciculatum	chamise	0.0%	--	--	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	1.9%	2.5%	1.2%	8.0%	78.6%
Toxicodendron diversilobum	poison-oak	1.8%	7.6%	3.6%	7.5%	28.6%
Ericameria ericoides	dune-heather, mock-heather	0.3%	1.1%	0.5%	1.2%	21.4%
Salvia mellifera	black sage	1.0%	2.1%	1.0%	4.1%	64.3%
Ceanothus dentatus	dwarf ceanothus	0.3%	0.8%	0.4%	1.1%	28.6%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**0.4%**	**0.2%**	**0.5%**	**28.6%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.1%**	**0.0%**	**0.1%**	**21.4%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.3%	2.4%	1.1%	1.3%	28.6%
Total Mean Percent Shrub and Subshrub Cover		***20.6%***			***89.5%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***2.4%***	***15.4%***	***4.9%***	***10.4%***	***76%***
Target Weed Total (*Carpobrotus edulis*)		***0.1%***	***0.9%***	***0.4%***	***0.6%***	***14.3%***
Total Mean Non-native Herbaceous Species Cover		***0.4%***	***10.2%***	***3.2%***	***1.7%***	***48.3%***
Total Mean Percent Native Vegetative Cover		***23.0%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***77.6%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***77.6%***	***14.4%***	***6.8%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-3
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations - Weighted Averages

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fourteen Transects in Small-scale Excavations in South Range 44 Conducted in 2011[2]				
		Post-activity Data 2019 (Year 8)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.6%	1.3%	1.3%	6.1%	71.4%
Arctostaphylos pumila	**sandmat manzanita**	**5.4%**	**3.8%**	**3.7%**	**20.2%**	**100.0%**
Crocanthemum scoparium	rush-rose	5.6%	6.0%	5.7%	20.9%	93%
Acmispon glaber	deerweed	3.3%	4.2%	4.0%	12.2%	86%
Adenostoma fasciculatum	chamise	0.0%	--	--	0.1%	7.1%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	2.6%	3.4%	3.2%	9.8%	78.6%
Toxicodendron diversilobum	poison-oak	1.8%	8.8%	8.4%	6.9%	28.6%
Ericameria ericoides	dune-heather, mock-heather	0.3%	1.2%	1.2%	1.0%	21.4%
Salvia mellifera	black sage	1.2%	2.2%	2.1%	4.6%	71.4%
Ceanothus dentatus	dwarf ceanothus	0.3%	0.6%	0.5%	1.0%	14.3%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.2%**	**0.7%**	**0.6%**	**0.8%**	**21.4%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.2%**	**0.2%**	**0.3%**	**21.4%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.4%	3.2%	3.0%	1.4%	21.4%
Total Mean Percent Shrub and Subshrub Cover		***22.8%***			***86.2%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***3.6%***	***2.6%***	***1.2%***	***13.4%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***--***	***--***	***--***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.4%***	***0.5%***	***0.2%***	***1.3%***	***71.4%***
Total Mean Percent Native Vegetative Cover		***26.4%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***74.2%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***74.2%***	***15.6%***	***14.9%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-4
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Twenty-nine Baseline Transects		Five Baseline Transects		Eight Transects in Small Scale Excavations in North Range 44[1]	
		Baseline Data 2010 - 2011 (all Interim Action Ranges MRA baseline transects)		Baseline Data 2010 -2011 (North Range 44 baseline transects only)		Post-Activity Data 2013 (Year 1)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Tree Species							
Quercus agrifolia	coast live oak	0.0%	0.0%	0.0%	0.0%	0.1%	12.5%
Total Cover by Native Tree Species		***0.0%***		***0.0%***		***0.1%***	
Acmispon glaber	deerweed	1.4%	79.3%	0.8%	80.0%	0.0%	12.5%
Crocanthemum scoparium	rush-rose	8.1%	86.2%	11.6%	100%	0.1%	37.5%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**65.5%**	**2.4%**	**60.0%**	**0.1%**	**50.0%**
Ceanothus dentatus	dwarf ceanothus	20.2%	89.7%	23.4%	100%	0.1%	25.0%
Eriophyllum confertiflorum	golden yarrow	1.5%	65.5%	2.8%	100%	0.0%	25.0%
Lupinus chamissonis	silver bush lupine	0.4%	13.8%	0.3%	20.0%	0.1%	12.5%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	0.0%	0.0%	0.1%	25.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	100%	22%	100%	0%	25%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**96.6%**	**9.4%**	**100%**	**0.1%**	**12.5%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**17.2%**	**0.6%**	**40.0%**	**0.0%**	**0.0%**
Salvia mellifera	black sage	5.3%	69.0%	6.1%	60.0%	0.0%	0.0%
Adenostoma fasciculatum	chamise	9.0%	89.7%	16.1%	100%	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	1.5%	24.1%	0.8%	40.0%	0.0%	0.0%
Frangula californica subsp. *californica*	California coffeeberry	0.9%	31.0%	1.8%	60.0%	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	24.1%	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.5%	27.6%	0.0%	20.0%	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.4%	20.7%	0.0%	0.0%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***		***98.0%***		***0.7%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***0.0%***	**--**	***1.7%***	***100%***	***0.0%***	
Target Weed Total *(Carpobrotus edulis)*		***0.0%***		***0.0%***	***0.0%***	***2.0%***	
Total Mean Non-native Herbaceous Species Cover		***na***		***na***		**--**	
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***94.5%***		***99.6%***		***0.8%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***19.3%***		***20.3%***		***97.2%***	
Total Mean Percent Masticated Vegetation (only calculated in 2014)		**--**		**--**		**--**	
Total Mean Percent Bare Ground		***19.3%***		***20%***		***97.2%***	

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-4
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]		Eight Transects in Small Scale Excavations in North Range 44[1]		Eight Transects in Small Scale Excavations in North Range 44[1]	
		Post-Activity Data 2014 (Year 2)		Post-Activity Data 2015* (Year 3)		Post-Activity Data 2016 (Year 4)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Tree Species							
Quercus agrifolia	coast live oak	1.2%	12.5%	0.5%	12.5%	1.0%	12.5%
Total Cover by Native Tree Species		***1.2%***		***0.5%***		***1.0%***	
Acmispon glaber	deerweed	0.3%	25.0%	1.1%	62.5%	4.4%	75.0%
Crocanthemum scoparium	rush-rose	0.4%	75.0%	1.0%	75.0%	2.7%	75.0%
Arctostaphylos pumila	**sandmat manzanita**	**0.5%**	**62.5%**	**0.9%**	**75.0%**	**2.0%**	**87.5%**
Ceanothus dentatus	dwarf ceanothus	0.3%	62.5%	0.4%	50.0%	0.4%	62.5%
Eriophyllum confertiflorum	golden yarrow	--	0.0%	0.3%	62.5%	0.8%	75.0%
Lupinus chamissonis	silver bush lupine	0.03%	12.5%	0.1%	25.0%	0.3%	25.0%
Toxicodendron diversilobum	poison-oak	0.6%	25.0%	0.5%	25.0%	0.1%	12.5%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	--	0.0%	0%	38%	0%	50%
Ceanothus rigidus	**Monterey ceanothus**	**0.5%**	**12.5%**	**0.2%**	**50.0%**	**0.1%**	**37.5%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**12.5%**	**0.1%**	**12.5%**	**0.2%**	**25.0%**
Salvia mellifera	black sage	--	0.0%	0.0%	25.0%	0.1%	25.0%
Adenostoma fasciculatum	chamise	--	0.0%	0.0%	12.5%	0.1%	25.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	25.0%	0.0%	12.5%	0.0%	0.0%
Frangula californica subsp. *californica*	California coffeeberry	--	0.0%	0.0%	0.0%	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	--	0.0%	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.02%	25.0%	0.0%	0.0%	0.0%	0.0%
Lepechinia calycina	pitcher sage	--	0.0%	0.0%	0.0%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***1.5%***		***5.0%***		***11.5%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***2.4%***		***5.4%***	***100%***	***7.9%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.1%***		***0.0%***	***12.5%***	***0.0%***	***7.7%***
Total Mean Non-native Herbaceous Species Cover		**--**		***1.7%***		***1.8%***	***46.2%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***4.3%***		***10.9%***		***20.5%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***95.7%***		***87.2%***		***82.4%***	
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.5%***		***0.0%***	**--**	***0.0%***	***0.0%***
Total Mean Percent Bare Ground		***95.1%***		***87%***	***100%***	***82%***	***62%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-4
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]		Fifteen Transects in Small Scale Excavations in North Range 44[2]		Fifteen Transects in Small Scale Excavations in North Range 44[2]	
		Post-Activity Data 2017 (Year 5)		Post-Activity Data 2018 (Year 6)		Post-Activity Data 2019 (Year 7)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Tree Species							
Quercus agrifolia	coast live oak	0.6%	12.5%	0.2%	6.7%	0.2%	6.7%
Total Cover by Native Tree Species		***0.6%***		***0.2%***		***0.2%***	
Acmispon glaber	deerweed	3.2%	75.0%	3.2%	86.7%	1.5%	73.3%
Crocanthemum scoparium	rush-rose	2.7%	100.0%	6.5%	86.7%	5.3%	86.7%
Arctostaphylos pumila	**sandmat manzanita**	**1.9%**	**75.0%**	**3.7%**	**73.3%**	**4.7%**	**66.7%**
Ceanothus dentatus	dwarf ceanothus	1.0%	75.0%	2.6%	80.0%	3.3%	80.0%
Eriophyllum confertiflorum	golden yarrow	0.8%	87.5%	1.7%	73.3%	1.1%	86.7%
Lupinus chamissonis	silver bush lupine	0.6%	25.0%	0.0%	0.0%	0.1%	13.3%
Toxicodendron diversilobum	poison-oak	0.5%	25.0%	0.8%	40.0%	1.2%	40.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0%	38%	1%	60%	1.3%	60.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.4%**	**50.0%**	**1.2%**	**73.3%**	**1.6%**	**80.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**25.0%**	**0.1%**	**13.3%**	**0.02%**	**13.3%**
Salvia mellifera	black sage	0.1%	25.0%	0.8%	46.7%	0.9%	46.7%
Adenostoma fasciculatum	chamise	0.1%	12.5%	0.4%	13.3%	0.5%	13.3%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	0.4%	26.7%	0.5%	26.7%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	0.0%	0.0%	0.0%	0.1%	6.7%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	0.0%	12.5%	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.8%***		***22.9%***		***22.12%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***4.3%***	***87.5%***	***7.0%***	***75.9%***	***8.5%***	
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***12.5%***	***0.0%***	***13.8%***	***0.0%***	
Total Mean Non-native Herbaceous Species Cover		***1.1%***	***75.0%***	***0.5%***	***60.0%***	***0.4%***	
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***16.6%***		***30.1%***		***30.8%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***82.7%***		***70.5%***		***70.4%***	
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.1%***	***12.5%***	***0.0%***	***0.0%***	*--*	
Total Mean Percent Bare Ground		***83%***	***100%***	***70.5%***	***100%***	***70.4%***	

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

Mean percent cover values for 2018 and 2019 represent averages weighted by transect length

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-5
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Twenty-nine Baseline Transects		Seven Baseline Transects	
		Baseline Data 2010 - 2011 (all Interim Action Ranges MRA baseline transects)		Baseline Data 2010 - 2011 (South Range 44 baseline transects only)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.5%	65.5%	3.0%	85.7%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**65.5%**	**0.7%**	**71.4%**
Crocanthemum scoparium	rush-rose	8.1%	86.2%	10.0%	100%
Acmispon glaber	deerweed	1.4%	79.3%	1.2%	85.7%
Adenostoma fasciculatum	chamise	9.0%	89.7%	9.9%	100%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	100%	25.8%	100%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	1.5%	24.1%	0.0%	0.0%
Salvia mellifera	black sage	5.3%	69.0%	8.7%	100%
Ceanothus dentatus	dwarf ceanothus	20.2%	89.7%	30.4%	100%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	24.1%	0.2%	28.6%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**96.6%**	**16.3%**	**100%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**17.2%**	**0.1%**	**14.3%**
Frangula californica subsp. californica	California coffeeberry	0.9%	31.0%	0.1%	14.3%
Lepechinia calycina	pitcher sage	0.4%	20.7%	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.4%	13.8%	1.2%	28.6%
Diplacus aurantiacus	bush monkeyflower	0.5%	27.6%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***		***107.6%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.3%***	***90.0%***	***1.2%***	***71.4%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***		***na***	
Total Mean Percent Native Vegetative Cover		***95.8%***		***108.8%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***19.3%***		***16.2%***	
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***--***		***--***	
Total Mean Percent Bare Ground		***19.3%***	***100%***	***16.2%***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6

2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-5
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 20111		Five Transects in Small-scale Excavations in South Range 44 Conducted in 20111	
		Post-activity Data 2012 (Year 1)		Post-activity Data 2013 (Year 2)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	0.1%	83.3%	0.1%	60.0%
Arctostaphylos pumila	**sandmat manzanita**	**0.0%**	**0.0%**	**0.02%**	**40.0%**
Crocanthemum scoparium	rush-rose	0.8%	100%	1.2%	100%
Acmispon glaber	deerweed	1.3%	83.3%	6.1%	100%
Adenostoma fasciculatum	chamise	0.0%	0.0%	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.03%	66.7%	0.0%	0.0%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	0.004%	20.0%
Salvia mellifera	black sage	0.1%	33.3%	0.03%	40.0%
Ceanothus dentatus	dwarf ceanothus	0.01%	16.7%	0.02%	40.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.003%	16.7%	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.01%**	**16.7%**	**0.03%**	**40.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	0.0%	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***2.3%***		***7.6%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***5.1%***	***100%***	***6.8%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover					
Total Mean Percent Native Vegetative Cover		***7.5%***		***14.4%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***92.5%***		***85.7%***	
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)					
Total Mean Percent Bare Ground		***92.5%***	***100%***	***85.7%***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6

2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-5
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]		Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]	
		Post-activity Data 2014 (Year 3)		Post-activity Data 2015* (Year 4)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	0.6%	60.0%	1.2%	100%
Arctostaphylos pumila	**sandmat manzanita**	**0.4%**	**80.0%**	**0.9%**	**80.0%**
Crocanthemum scoparium	rush-rose	0.8%	100%	1.4%	100%
Acmispon glaber	deerweed	7.2%	80.0%	7.0%	80.0%
Adenostoma fasciculatum	chamise	0.4%	20.0%	0.4%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.0%	0.0%	0.1%	40.0%
Toxicodendron diversilobum	poison-oak	0.1%	20.0%	0.2%	20.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	20.0%	0.1%	20.0%
Salvia mellifera	black sage	0.1%	60.0%	0.04%	40.0%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.0%	0.02%	20.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	0.0%	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***12.9%***		***11.3%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***3.3%***	***100%***	***3.6%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover				***0.2%***	
Total Mean Percent Native Vegetative Cover		***16.1%***		***14.9%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***88.0%***		***85.3%***	
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)				***0.0%***	
Total Mean Percent Bare Ground		***88.0%***	***100%***	***85.3%***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6

2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-5
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]		Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]	
		Post-activity Data 2016 (Year 5)		Post-activity Data 2017 (Year 6)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.3%	100%	2.1%	100%
Arctostaphylos pumila	**sandmat manzanita**	**1.9%**	**80.0%**	**2.0%**	**80.0%**
Crocanthemum scoparium	rush-rose	2.4%	100%	1.6%	100%
Acmispon glaber	deerweed	5.9%	80.0%	1.4%	100%
Adenostoma fasciculatum	chamise	0.4%	20.0%	0.4%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.3%	40.0%	0.2%	40.0%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	0.1%	40.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	20.0%	0.02%	20.0%
Salvia mellifera	black sage	0.4%	60.0%	0.02%	60.0%
Ceanothus dentatus	dwarf ceanothus	0.1%	60.0%	0.01%	20.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**20.0%**	**0.0%**	**0.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	0.0%	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***14.0%***		***7.7%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***4.6%***	***100%***	***2.9%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***0.0%***	
Total Mean Non-native Herbaceous Species Cover		***1.5%***	***80.0%***	***0.6%***	***80.0%***
Total Mean Percent Native Vegetative Cover		***18.6%***		***10.6%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***80.2%***		***88.4%***	
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***		***0.1%***	
Total Mean Percent Bare Ground		***80.2%***	***100%***	***88.3%***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6

2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-5
IAR MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations 2010-2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fourteen Transects in Small-scale Excavations in South Range 44		Fourteen Transects in Small-scale Excavations in South Range 44	
		Post-activity Data 2018 (Year 7)		Post-activity Data 2019 (Year 8)	
		Mean Percent Cover	Mean Frequency	Mean Percent Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.3%	92.9%	1.6%	71.4%
Arctostaphylos pumila	**sandmat manzanita**	**4.3%**	**100%**	**5.4%**	**100%**
Crocanthemum scoparium	rush-rose	6.3%	100%	5.6%	92.9%
Acmispon glaber	deerweed	2.1%	78.6%	3.3%	85.7%
Adenostoma fasciculatum	chamise	0.0%	0.0%	0.03%	7.1%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	1.9%	78.6%	2.6%	78.6%
Toxicodendron diversilobum	poison-oak	1.8%	28.6%	1.8%	28.6%
Ericameria ericoides	dune-heather, mock-heather	0.3%	21.4%	0.3%	21.4%
Salvia mellifera	black sage	1.0%	64.3%	1.2%	71.4%
Ceanothus dentatus	dwarf ceanothus	0.3%	28.6%	0.3%	14.3%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**28.6%**	**0.2%**	**21.4%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.03%**	**21.4%**	**0.1%**	**21.4%**
Frangula californica subsp. californica	California coffeeberry	0.0%	0.0%	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	0.0%	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.3%	28.6%	0.4%	21.4%
Total Mean Percent Shrub and Subshrub Cover		***20.7%***		***22.8%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***2.5%***	***75.9%***	***3.6%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.2%***	***14.3%***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.5%***	***48.3%***	***0.3%***	***71.4%***
Total Mean Percent Native Vegetative Cover		***23.1%***		***26.4%***	
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***75.1%***		***74.2%***	
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***		***0.0%***	
Total Mean Percent Bare Ground		***75.1%***	***100%***	***74.2%***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6

2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Mean percent cover and relative cover values for 2018 and 2019 represent averages weighted by transect length

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Twenty-nine Baseline Transects (IAR MRA-wide Transects)				
		Baseline Data 2010 - 2011 (all Interim Action Ranges MRA baseline transects)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.0%	--	--	0.0%	0.0%
Total Cover by Native Tree Species		***0.0%***			***0.0%***	
Acmispon glaber	deerweed	1.4%	1.6%	0.6%	1.5%	79.3%
Crocanthemum scoparium	rush-rose	8.1%	9.1%	2.9%	8.6%	86.2%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**2.0%**	**0.6%**	**1.7%**	**65.5%**
Ceanothus dentatus	dwarf ceanothus	20.2%	16.0%	5.0%	21.4%	89.7%
Eriophyllum confertiflorum	golden yarrow	1.5%	2.2%	0.7%	1.6%	65.5%
Lupinus chamissonis	silver bush lupine	0.4%	1.1%	0.4%	0.4%	13.8%
Toxicodendron diversilobum	poison-oak	0.0%	--	--	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	15.6%	4.9%	31.0%	100%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**9.3%**	**2.9%**	**14.3%**	**96.6%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.5%**	**0.2%**	**0.2%**	**17.2%**
Salvia mellifera	black sage	5.3%	7.2%	2.3%	5.6%	69.0%
Adenostoma fasciculatum	chamise	9.0%	6.9%	2.2%	9.5%	89.7%
Ericameria ericoides	dune-heather, mock-heather	1.5%	5.6%	1.8%	1.6%	24.1%
Frangula californica subsp. *californica*	California coffeeberry	0.9%	1.9%	0.6%	1.0%	31.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	1.8%	0.6%	0.7%	24.1%
Diplacus aurantiacus	bush monkeyflower	0.5%	0.9%	0.3%	0.5%	27.6%
Lepechinia calycina	pitcher sage	0.4%	1.4%	0.5%	0.4%	20.7%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***			***100.0%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***0.0%***	***--***	***--***	***0.0%***	***--***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***				
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***94.5%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***19.3%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***--***				
Total Mean Percent Bare Ground		***19.3%***	***9.3%***	***2.9%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Baseline Transects near North Range 44				
		Baseline Data 2010 -2011 (North Range 44 baseline transects only)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.0%	0.0%	--	0.0%	0.0%
Total Cover by Native Tree Species		***0.0%***			***0.0%***	
Acmispon glaber	deerweed	0.8%	0.9%	0.8%	0.8%	80.0%
Crocanthemum scoparium	rush-rose	11.6%	11.0%	10.5%	11.6%	100%
Arctostaphylos pumila	**sandmat manzanita**	**2.4%**	**3.3%**	**3.1%**	**2.4%**	**60.0%**
Ceanothus dentatus	dwarf ceanothus	23.4%	19.3%	18.4%	23.5%	100%
Eriophyllum confertiflorum	golden yarrow	2.8%	3.2%	3.0%	2.8%	100%
Lupinus chamissonis	silver bush lupine	0.3%	0.7%	0.7%	0.3%	20.0%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	--	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	21.7%	6%	6%	22%	100%
Ceanothus rigidus	**Monterey ceanothus**	**9.4%**	**10.3%**	**9.9%**	**9.4%**	**100%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.6%**	**0.9%**	**0.8%**	**0.6%**	**40.0%**
Salvia mellifera	black sage	6.1%	5.8%	5.6%	6.1%	60.0%
Adenostoma fasciculatum	chamise	16.1%	6.1%	5.8%	16.2%	100%
Ericameria ericoides	dune-heather, mock-heather	0.8%	1.2%	1.1%	0.8%	40.0%
Frangula californica subsp. *californica*	California coffeeberry	1.8%	2.2%	2.1%	1.8%	60.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.1%	0.1%	0.1%	20.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***98.0%***			***98.3%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.7%***	***1.4%***	***1.3%***	***1.7%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***99.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***20.3%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***--***				
Total Mean Percent Bare Ground		***20%***	***10%***	***10%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]				
		Post-Activity Data 2015* (Year 3)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.5%	1.5%	1.0%	4.9%	12.5%
Total Cover by Native Tree Species		***0.5%***			***4.9%***	
Acmispon glaber	deerweed	1.1%	2.3%	1.6%	8.4%	62.5%
Crocanthemum scoparium	rush-rose	1.0%	1.1%	0.7%	7.6%	75.0%
Arctostaphylos pumila	**sandmat manzanita**	**0.9%**	**0.9%**	**0.6%**	**7.5%**	**75.0%**
Ceanothus dentatus	dwarf ceanothus	0.4%	0.6%	0.4%	3.1%	50.0%
Eriophyllum confertiflorum	golden yarrow	0.3%	0.3%	0.2%	2.2%	62.5%
Lupinus chamissonis	silver bush lupine	0.1%	0.4%	0.2%	1.1%	25.0%
Toxicodendron diversilobum	poison-oak	0.5%	0.9%	0.6%	3.7%	25.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0%	1%	0%	3%	38%
Ceanothus rigidus	**Monterey ceanothus**	**0.2%**	**0.4%**	**0.2%**	**1.4%**	**50.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.4%**	**0.3%**	**1.1%**	**12.5%**
Salvia mellifera	black sage	0.0%	0.1%	0.1%	0.3%	25.0%
Adenostoma fasciculatum	chamise	0.0%	0.0%	0.0%	0.1%	12.5%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	0.0%	0.1%	12.5%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	--	--	--	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	--	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	--	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	--	0.0%
Total Mean Percent Shrub and Subshrub Cover		***5.0%***			***45.7%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***5.4%***	***7.9%***	***5.3%***	***49.4%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***0.0%***	***0.0%***	***12.5%***
Total Mean Non-native Herbaceous Species Cover		***1.7%***	***3.6%***	***2.4%***		
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***10.9%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***87.2%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***0.0%***	*--*	*--*	*--*
Total Mean Percent Bare Ground		***87%***	***14%***	***10%***	*--*	***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]				
		Post-Activity Data 2016 (Year 4)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	1.0%	2.9%	1.9%	5.0%	12.5%
Total Cover by Native Tree Species		***1.0%***			***5.0%***	
Acmispon glaber	deerweed	4.4%	10.9%	7.3%	17.1%	75.0%
Crocanthemum scoparium	rush-rose	2.7%	2.6%	1.8%	10.4%	75.0%
Arctostaphylos pumila	**sandmat manzanita**	**2.0%**	**1.1%**	**0.7%**	**7.9%**	**87.5%**
Ceanothus dentatus	dwarf ceanothus	0.4%	0.6%	0.4%	1.5%	62.5%
Eriophyllum confertiflorum	golden yarrow	0.8%	1.1%	0.7%	3.1%	75.0%
Lupinus chamissonis	silver bush lupine	0.3%	0.7%	0.5%	1.0%	25.0%
Toxicodendron diversilobum	poison-oak	0.1%	0.3%	0.2%	0.4%	12.5%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0%	1%	1%	2%	50%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**0.3%**	**0.2%**	**0.6%**	**37.5%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.4%**	**0.3%**	**0.6%**	**25.0%**
Salvia mellifera	black sage	0.1%	0.2%	0.1%	0.3%	25.0%
Adenostoma fasciculatum	chamise	0.1%	0.2%	0.1%	0.3%	25.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	--	--	0.0%	0.0%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	--	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.5%***			***56.4%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***7.9%***	***10.9%***	***7.3%***	***38.6%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***0.0%***	***0.0%***	***7.7%***
Total Mean Non-native Herbaceous Species Cover		***1.8%***	***3.8%***	***2.6%***	***7.1%***	***46.2%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***20.5%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***82.4%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***--***	***--***		***0.0%***
Total Mean Percent Bare Ground		***82%***	***14%***	***10%***		***62%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Eight Transects in Small Scale Excavations in North Range 44[1]				
		Post-Activity Data 2017 (Year 5)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.6%	1.6%	1.1%	3.4%	12.5%
Total Cover by Native Tree Species		***0.6%***			***3.4%***	
Acmispon glaber	deerweed	3.2%	7.7%	5.1%	17.7%	75.0%
Crocanthemum scoparium	rush-rose	2.7%	2.7%	1.8%	15.4%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**1.9%**	**1.3%**	**0.8%**	**10.4%**	**75.0%**
Ceanothus dentatus	dwarf ceanothus	1.0%	1.5%	1.0%	5.4%	75.0%
Eriophyllum confertiflorum	golden yarrow	0.8%	0.6%	0.4%	4.6%	87.5%
Lupinus chamissonis	silver bush lupine	0.6%	1.6%	1.1%	3.2%	25.0%
Toxicodendron diversilobum	poison-oak	0.5%	0.9%	0.6%	2.7%	25.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0%	1%	1%	3%	38%
Ceanothus rigidus	**Monterey ceanothus**	**0.4%**	**0.6%**	**0.4%**	**2.2%**	**50.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.4%**	**0.3%**	**1.1%**	**25.0%**
Salvia mellifera	black sage	0.1%	0.2%	0.1%	0.5%	25.0%
Adenostoma fasciculatum	chamise	0.1%	0.2%	0.1%	0.4%	12.5%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	--	0.0%	0.0%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	0.0%	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.8%***			***70.8%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***4.3%***	***5.7%***	***3.8%***	***25.8%***	***87.5%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***0.0%***	***0.0%***	***0.0%***	***12.5%***
Total Mean Non-native Herbaceous Species Cover		***1.1%***	***2.8%***	***1.9%***	***6.9%***	***75.0%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***16.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***82.7%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.1%***	***0.2%***	***0.1%***		***12.5%***
Total Mean Percent Bare Ground		***83%***	***15%***	***10%***		***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fifteen Transects in Small Scale Excavations in North Range 44[2]				
		Post-Activity Data 2018 (Year 6)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.6%	--	--	1.8%	6.7%
Total Cover by Native Tree Species		***0.6%***			***1.8%***	
Acmispon glaber	deerweed	4.5%	8.0%	3.6%	13.8%	86.7%
Crocanthemum scoparium	rush-rose	4.7%	4.0%	1.8%	14.5%	86.7%
Arctostaphylos pumila	**sandmat manzanita**	**3.4%**	**1.8%**	**0.8%**	**10.4%**	**73.3%**
Ceanothus dentatus	dwarf ceanothus	3.0%	4.5%	2.1%	9.1%	80.0%
Eriophyllum confertiflorum	golden yarrow	1.1%	1.3%	0.6%	3.5%	73.3%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Toxicodendron diversilobum	poison-oak	0.8%	2.1%	0.9%	2.3%	40.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	1.5%	4%	2%	5%	60%
Ceanothus rigidus	**Monterey ceanothus**	**1.5%**	**1.8%**	**0.8%**	**4.4%**	**73.3%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.0%**	**0.0%**	**0.2%**	**13.3%**
Salvia mellifera	black sage	1.5%	4.5%	2.0%	4.6%	46.7%
Adenostoma fasciculatum	chamise	0.4%	3.0%	1.4%	1.3%	13.3%
Ericameria ericoides	dune-heather, mock-heather	0.4%	1.3%	0.6%	1.2%	26.7%
Frangula californica subsp. *californica*	California coffeeberry	0.0%	0.0%	--	0.0%	0.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	--	0.0%	12.5%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***22.9%***			***71.4%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***8.6%***	***19.6%***	***6.2%***	***26.3%***	***75.9%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***--***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.7%***	***13.2%***	***4.2%***	***2.0%***	***60.0%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***32.0%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***68.4%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***0.0%***	***0.0%***	***--***		***0.0%***
Total Mean Percent Bare Ground		***68.4%***	***17.0%***	***8.0%***		***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-6
Interim Action Ranges MRA North Range 44 SCA
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fifteen Transects in Small Scale Excavations in North Range 44[2]				
		Post-Activity Data 2019 (Year 7)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Tree Species						
Quercus agrifolia	coast live oak	0.6%	--	--	1.8%	6.7%
Total Cover by Native Tree Species		***0.6%***			***1.8%***	
Acmispon glaber	deerweed	2.1%	5.9%	2.7%	6.1%	73.3%
Crocanthemum scoparium	rush-rose	4.0%	2.9%	1.3%	11.4%	86.7%
Arctostaphylos pumila	**sandmat manzanita**	**4.3%**	**2.3%**	**1.0%**	**12.1%**	**66.7%**
Ceanothus dentatus	dwarf ceanothus	4.0%	5.3%	2.4%	11.3%	80.0%
Eriophyllum confertiflorum	golden yarrow	1.1%	0.8%	0.4%	3.2%	86.7%
Lupinus chamissonis	silver bush lupine	0.1%	1.1%	0.5%	0.4%	13.3%
Toxicodendron diversilobum	poison-oak	1.1%	1.8%	0.8%	3.2%	40.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	1.6%	4.3%	2.0%	4.6%	60.0%
Ceanothus rigidus	**Monterey ceanothus**	**1.8%**	**2.3%**	**1.0%**	**5.1%**	**80.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.01%**	**0.1%**	**0.0%**	**0.0%**	**13.3%**
Salvia mellifera	black sage	1.8%	5.5%	2.5%	5.2%	46.7%
Adenostoma fasciculatum	chamise	0.4%	3.5%	1.6%	1.3%	13.3%
Ericameria ericoides	dune-heather, mock-heather	0.4%	1.4%	0.6%	1.2%	26.7%
Frangula californica subsp. *californica*	California coffeeberry	0.2%	--	--	0.5%	6.7%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***23.6%***	***9.8%***	***4.4%***	***67.4%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***10.7%***	***12.7%***	***5.8%***	***30.4%***	***100.0%***
Target Weed Total *(Carpobrotus edulis)*		***0.0%***	***--***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.5%***	***2.1%***	***1.0%***	***1.3%***	***33.3%***
Total Mean Percent Native Vegetative Cover (Tree, Shrub, and Herbaceous)		***34.9%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***65.3%***				
Total Mean Percent Masticated Vegetation (only calculated in 2014)		***--***				
Total Mean Percent Bare Ground		***65.3%***	***16.4%***	***7.4%***		***100%***

HMP Species in Bold

1. These data are reported from the same eight transects sampled in years 1- 5

2. These data are reported from the same eight transects sampled in years 1- 5, plus seven transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Twenty-nine Baseline Transects (IAR MRA-wide Transects)				
		Baseline Data 2010 - 2011 (all Interim Action Ranges MRA baseline transects)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.5%	2.2%	0.7%	1.6%	65.5%
Arctostaphylos pumila	**sandmat manzanita**	**1.6%**	**2.0%**	**0.6%**	**1.7%**	**65.5%**
Crocanthemum scoparium	rush-rose	8.1%	9.1%	2.9%	8.6%	86.2%
Acmispon glaber	deerweed	1.4%	1.6%	0.6%	1.5%	79.31%
Adenostoma fasciculatum	chamise	9.0%	6.9%	2.2%	9.5%	89.7%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	29.3%	15.6%	4.9%	31.0%	100%
Toxicodendron diversilobum	poison-oak	0.0%	--	--	--	0.0%
Ericameria ericoides	dune-heather, mock-heather	1.5%	5.6%	1.8%	1.6%	24.1%
Salvia mellifera	black sage	5.3%	7.2%	2.3%	5.6%	69.0%
Ceanothus dentatus	dwarf ceanothus	20.2%	16.0%	5.0%	21.4%	89.7%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.7%	1.8%	0.6%	0.7%	24.1%
Ceanothus rigidus	**Monterey ceanothus**	**13.5%**	**9.3%**	**2.9%**	**14.3%**	**96.6%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.2%**	**0.5%**	**0.2%**	**0.2%**	**17.2%**
Frangula californica subsp. californica	California coffeeberry	0.9%	1.9%	0.6%	1.0%	31.0%
Lepechinia calycina	pitcher sage	0.4%	1.4%	0.5%	0.4%	20.7%
Lupinus chamissonis	silver bush lupine	0.4%	1.1%	0.4%	0.4%	13.8%
Diplacus aurantiacus	bush monkeyflower	0.5%	0.9%	0.3%	0.5%	27.6%
Total Mean Percent Shrub and Subshrub Cover		***94.5%***			***99%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.3%***	***2.3%***	***1.3%***	***1.4%***	***90.0%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover		***95.8%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***19.3%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***--***				
Total Mean Percent Bare Ground		***19.3%***	***9.3%***	***2.9%***	***--***	***100.0%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Seven Baseline Transects near South Range 44				
		Baseline Data 2010 - 2011 (South Range 44 baseline transects only)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Mean Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	3.0%	2.7%	2.0%	2.8%	85.7%
Arctostaphylos pumila	**sandmat manzanita**	**0.7%**	**0.6%**	**0.4%**	**0.7%**	**71.4%**
Crocanthemum scoparium	rush-rose	10.0%	8.5%	6.2%	9.2%	100%
Acmispon glaber	deerweed	1.2%	1.1%	0.8%	1.1%	85.7%
Adenostoma fasciculatum	chamise	9.9%	7.1%	5.2%	9.1%	100%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	25.8%	9.5%	6.9%	23.7%	100%
Toxicodendron diversilobum	poison-oak	0.0%	0.0%	--	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	--	0.0%	0.0%
Salvia mellifera	black sage	8.7%	9.7%	7.1%	8.0%	100%
Ceanothus dentatus	dwarf ceanothus	30.4%	14.9%	10.9%	27.9%	100%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.2%	0.4%	0.3%	0.2%	28.6%
Ceanothus rigidus	**Monterey ceanothus**	**16.3%**	**5.0%**	**3.7%**	**14.9%**	**100%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.2%**	**0.2%**	**0.1%**	**14.3%**
Frangula californica subsp. californica	California coffeeberry	0.1%	0.2%	0.2%	0.1%	14.3%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	1.2%	2.1%	1.5%	1.1%	28.6%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***107.6%***			***98.9%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***1.2%***	***1.2%***	***0.9%***	***1.1%***	***71.4%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***na***				
Total Mean Percent Native Vegetative Cover		***108.8%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***16.2%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***--***				
Total Mean Percent Bare Ground		***16.2%***	***7.9%***	***5.8%***	***14.8%***	***100.0%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]				
		Post-activity Data 2015* (Year 4)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.2%	1.2%	1.2%	7.7%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**0.9%**	**1.2%**	**1.2%**	**6.2%**	**80.0%**
Crocanthemum scoparium	rush-rose	1.4%	1.6%	1.5%	9.4%	100%
Acmispon glaber	deerweed	7.0%	7.4%	7.1%	46.1%	80%
Adenostoma fasciculatum	chamise	0.4%	0.9%	0.9%	2.6%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.1%	0.1%	0.1%	0.6%	40.0%
Toxicodendron diversilobum	poison-oak	0.2%	0.3%	0.3%	1.0%	20.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	0.3%	0.3%	0.8%	20.0%
Salvia mellifera	black sage	0.0%	0.1%	0.1%	0.3%	40.0%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.0%	0.0%	0.1%	20.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	--	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.0%**	**--**	**--**	**--**	**0.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**--**	**--**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***11.3%***			***76.0%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***3.6%***	***5.2%***	***5.0%***	***23.7%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	*--*	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.2%***	***0.4%***	***0.0%***		
Total Mean Percent Native Vegetative Cover		***14.9%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***85.3%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***85.3%***	***6.0%***	***5.7%***	*--*	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]				
		Post-activity Data 2016 (Year 5)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.3%	2.1%	2.0%	9.2%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**1.9%**	**1.4%**	**1.4%**	**7.7%**	**80.0%**
Crocanthemum scoparium	rush-rose	2.4%	2.0%	1.9%	9.3%	100%
Acmispon glaber	deerweed	5.9%	5.2%	4.9%	29.7%	80%
Adenostoma fasciculatum	chamise	0.4%	0.8%	0.8%	1.8%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.3%	0.5%	0.5%	1.3%	40.0%
Toxicodendron diversilobum	poison-oak	0.0%	--	--	0.0%	0.0%
Ericameria ericoides	dune-heather, mock-heather	0.1%	0.3%	0.3%	0.5%	20.0%
Salvia mellifera	black sage	0.4%	0.8%	0.8%	1.5%	60.0%
Ceanothus dentatus	dwarf ceanothus	0.1%	0.2%	0.1%	0.5%	60.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**0.1%**	**0.1%**	**0.2%**	**20.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**--**	**--**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	--	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***14.0%***			***75.3%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***4.6%***	***6.0%***	***5.8%***	***22.9%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	**--**	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***1.5%***	***1.7%***	***1.6%***	***7.3%***	***80.0%***
Total Mean Percent Native Vegetative Cover		***18.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***80.2%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***80.2%***	***5.7%***	***5.4%***	**--**	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Five Transects in Small-scale Excavations in South Range 44 Conducted in 2011[1]				
		Post-activity Data 2017 (Year 6)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.1%	1.7%	1.7%	18.4%	100.0%
Arctostaphylos pumila	**sandmat manzanita**	**2.0%**	**1.5%**	**1.4%**	**17.7%**	**80.0%**
Crocanthemum scoparium	rush-rose	1.6%	2.3%	2.2%	14.1%	100%
Acmispon glaber	deerweed	1.4%	0.9%	0.9%	12.3%	100%
Adenostoma fasciculatum	chamise	0.4%	0.9%	0.9%	3.6%	20.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	0.2%	0.3%	0.3%	1.8%	40.0%
Toxicodendron diversilobum	poison-oak	0.1%	0.2%	0.1%	0.6%	40.0%
Ericameria ericoides	dune-heather, mock-heather	0.0%	0.0%	0.0%	0.2%	20.0%
Salvia mellifera	black sage	0.0%	0.0%	0.0%	0.2%	60.0%
Ceanothus dentatus	dwarf ceanothus	0.0%	0.0%	0.0%	0.1%	20.0%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	0.0%	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.0%**	**0.0%**	**--**	**0.0%**	**0.0%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.0%**	**--**	**0.0%**	**0.0%**
Frangula californica subsp. californica	California coffeeberry	0.0%	0.0%	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	0.0%	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	0.0%	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.0%	0.0%	--	0.0%	0.0%
Total Mean Percent Shrub and Subshrub Cover		***7.7%***	***0.7%***	***0.7%***	***69.0%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***2.9%***	***4.8%***	***4.6%***	***25.8%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***0.0%***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.6%***	***0.7%***	***0.7%***	***5.2%***	***80.0%***
Total Mean Percent Native Vegetative Cover		***10.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***88.4%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.1%***				
Total Mean Percent Bare Ground		***88.3%***	***8.2%***	***7.8%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fourteen Transects in Small-scale Excavations in South Range 44 Conducted in 2011[2]				
		Post-activity Data 2018 (Year 7)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	2.3%	2.1%	1.0%	8.9%	92.9%
Arctostaphylos pumila	**sandmat manzanita**	**4.6%**	**3.4%**	**1.6%**	**17.4%**	**100%**
Crocanthemum scoparium	rush-rose	7.3%	6.3%	3.0%	27.7%	100%
Acmispon glaber	deerweed	2.4%	2.5%	1.2%	9.2%	78.6%
Adenostoma fasciculatum	chamise	0.0%	--	--	0.0%	0.0%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	2.2%	2.5%	1.2%	8.4%	78.6%
Toxicodendron diversilobum	poison-oak	2.3%	7.6%	3.6%	8.9%	28.6%
Ericameria ericoides	dune-heather, mock-heather	0.4%	1.1%	0.5%	1.3%	21.4%
Salvia mellifera	black sage	1.1%	2.1%	1.0%	4.1%	64.3%
Ceanothus dentatus	dwarf ceanothus	0.2%	0.8%	0.4%	0.8%	28.6%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.1%**	**0.4%**	**0.2%**	**0.5%**	**28.6%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.0%**	**0.1%**	**0.0%**	**0.1%**	**21.4%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.4%	2.4%	1.1%	1.5%	28.6%
Total Mean Percent Shrub and Subshrub Cover		***23.3%***			***90.4%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***2.5%***	***15.4%***	***4.9%***	***9.4%***	***76%***
Target Weed Total (*Carpobrotus edulis*)		***0.2%***	***0.9%***	***0.4%***	***0.7%***	***14.3%***
Total Mean Non-native Herbaceous Species Cover		***0.5%***	***10.2%***	***3.2%***	***1.7%***	***48.3%***
Total Mean Percent Native Vegetative Cover		***25.8%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***75.1%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***75.1%***	***14.4%***	***6.8%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-7
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
Vegetation Cover in Areas Subject to Small-scale Excavations

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	Fourteen Transects in Small-scale Excavations in South Range 44 Conducted in 2011[2]				
		Post-activity Data 2019 (Year 8)				
		Mean Percent Cover	Standard Deviation	90% Confidence Interval	Relative Cover	Mean Frequency
Eriophyllum confertiflorum	golden yarrow	1.6%	1.3%	0.6%	5.4%	71.4%
Arctostaphylos pumila	**sandmat manzanita**	**5.8%**	**3.8%**	**1.8%**	**19.3%**	**100%**
Crocanthemum scoparium	rush-rose	6.5%	6.0%	2.8%	21.7%	92.9%
Acmispon glaber	deerweed	3.9%	4.2%	2.0%	13.1%	85.7%
Adenostoma fasciculatum	chamise	0.02%	--	--	0.1%	7.1%
Arctostaphylos tomentosa subsp. *tomentosa*	shaggy-barked manzanita	3.0%	3.4%	1.6%	10.0%	78.6%
Toxicodendron diversilobum	poison-oak	2.4%	8.8%	4.2%	8.1%	28.6%
Ericameria ericoides	dune-heather, mock-heather	0.3%	1.2%	0.6%	1.2%	21.4%
Salvia mellifera	black sage	1.4%	2.2%	1.0%	4.6%	71.4%
Ceanothus dentatus	dwarf ceanothus	0.2%	0.6%	0.3%	0.7%	14.3%
Baccharis pilularis subsp. *consanguinea*	coyote brush	0.0%	--	--	0.0%	0.0%
Ceanothus rigidus	**Monterey ceanothus**	**0.2%**	**0.7%**	**0.3%**	**0.7%**	**21.4%**
Ericameria fasciculata	**Eastwood's ericameria**	**0.1%**	**0.2%**	**0.1%**	**0.2%**	**21.4%**
Frangula californica subsp. californica	California coffeeberry	0.0%	--	--	0.0%	0.0%
Lepechinia calycina	pitcher sage	0.0%	--	--	0.0%	0.0%
Lupinus chamissonis	silver bush lupine	0.0%	--	--	0.0%	0.0%
Diplacus aurantiacus	bush monkeyflower	0.5%	3.2%	1.5%	1.8%	21.4%
Total Mean Percent Shrub and Subshrub Cover		***26.0%***			***86.9%***	
Total Combined Mean Native Cover Between Shrubs and Subshrubs		***3.6%***	***2.6%***	***1.2%***	***12.0%***	***100%***
Target Weed Total (*Carpobrotus edulis*)		***0.0%***	***--***	***--***	***0.0%***	***0.0%***
Total Mean Non-native Herbaceous Species Cover		***0.3%***	***0.5%***	***0.2%***	***1.6%***	***71.4%***
Total Mean Percent Native Vegetative Cover		***29.6%***				
Total Mean Percent Bare Ground (Including Masticated Vegetation)		***71.3%***				
Total Mean Percent Masticated Vegetation (calculated in 2014 and 2015)		***0.0%***				
Total Mean Percent Bare Ground		***71.3%***	***15.6%***	***7.4%***	***--***	***100%***

HMP Species in Bold

1. These data are reported from the same five transects sampled in years 1- 6
2. These data are reported from the same five transects sampled in years 1- 6, plus nine transects added in 2018

*A calculation error was discovered after report submission in 2015; updated values are reported here.

Table A 6-8
Interim Action Ranges MRA North Range 44 SCA and Central Area NCAs
2010 - 2019 Plant Species Richness and Diversity

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Interim Action Ranges MRA in Central Maritime Chaparral														
Location	**Interim Action Ranges MRA Range NR44**													
Area	**All**	**Small-scale Excavation**												
Activity Type	**Baseline**													
Activity Year	**2010**	**Year 1 (2013)**	**Year 2 (2014)**	**Year 2 with surrounding species included (2014)**	**Year 3 (2015)**	**Year 3 with surrounding species included (2015)**	**Year 4 (2016)**	**Year 4 with surrounding species included (2016)**	**Year 5 (2017)**	**Year 5 with surrounding species included (2017)**	**Year 6 (2018)**	**Year 6 with surrounding species included (2018)**	**Year 7 (2019)**	**Year 7 with surrounding species included (2019)**
Number of Transects/Quadrats	**Five Transects**	**Eight Transects**									**Fifteen Transects**		**Fifteen Transects**	
Total Number of Native Species	**15**	24	41	58	44	62	47	60	42	63	52	65	50	72
Total Number of HMP Species Present	**3**	3	6	7	6	7	6	7	6	7	7	7	7	7
Total Number of HMP Herbaceous Species Present	**0**	1	3	4	3	4	3	4	3	4	4	4	4	4
Total Tree Species in All Transects	**0**	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Shrub Species in All Transects	**14**	10	15	18	13	17	11	15	12	14	14	18	15	19
Total Herbaceous Species in All Transects or Related Herbaceous Plots	**1**	12	24	38	30	43	35	43	29	47	36	45	33	51
Total Fern and Fern Allies Species in All Transects	**0**	1	1	1	0	1	0	1	0	1	1	1	1	1
Mean Number of Tree Species per Transect	**0.0**	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mean Number of Shrub Species per Transect	**9.8**	2.9	4.9	8.3	5.0	11.0	3.9	9.5	6.1	8.0	7.1	9.5	6.7	7.9
Mean Number of Herbaceous Species per Transect[2]	**0.0**	1.9	5.0	11.3	8.8	15.6	10.1	18.0	8.4	16.4	8.8	16.9	9.4	16.3
Mean Number of Fern and Fern Allies Species per Transect	**0.0**	0.3	0.1	0.3	0.0	0.3	0.0	0.4	0.0	0.2	0.1	0.2	0.1	0.3
Diversity - Shannon Index	**1.8**	0.8	0.9	--	1.1	--	1.2	--	1.3	--	1.4	--	1.4	--
Evenness	**0.2**	0.3	0.2	--	0.2	--	0.2	--	0.2	--	0.2	--	0.2	--
Total Percent Mean Native Cover (Transects)	**99.6%**	2.8%	4.4%	--	10.9%	--	23.8%	--	16.5%	--	25.9%	--	34.9%	--
Percent Mean Shrub Cover	**98.0%**	0.8%	1.9%	--	5.0%	--	11.5%	--	12.3%	--	20.3%	--	23.6%	--
Percent Mean Herbaceous Cover (Transects)	**1.7%**	0.0%	2.4%	--	5.4%	--	11.3%	--	4.2%	--	6.5%	--	10.7%	--
Percent Mean Herbaceous Species Cover (Quadrats)	**--**	0.9%	0.7%	--	--	--	--	--	--	--	--	--	--	--
Total Percent Mean Native Cover (Herbaceous Quadrats)	**--**	0.5%	0.6%	--	--	--	--	--	--	--	--	--	--	--

Table A 6-9
Interim Action Ranges MRA South Range 44 SCA and Central Area NCAs
2019 Plant Species Richness and Diversity

		Interim Action Ranges MRA in Central Maritime Chaparral													
Location		Interim Action Ranges MRA Range 44													
Area	**All**	South Range 44 NCAs and Central Area SCAs													
Activity Type	**Baseline**	Small-scale Excavation													
Activity Year	**2010**	**Year 1 (2012)**	**Year 2 (2013)**	**Year 3 (2014)**	**Year 3 with surrounding species included (2014)**	**Year 4 (2015)**	**Year 4 with surrounding species included (2015)**	**Year 5 (2016)**	**Year 5 with surrounding species included (2016)**	**Year 6 (2017)**	**Year 6 with surrounding species included (2017)**	**Year 7 (2018)**	**Year 7 with surrounding species included (2018)**	**Year 8 (2019)**	**Year 8 with surrounding species included (2019)**
Number of Transects/Quadrats	**Seven Transects**	**Five Transects and 30 Quadrats**				**Five Transects**						**Fourteen Transects**		**Fourteen Transects**	
Total Number of Native Species	**15**	18	29	26	39	44	70	39	52	35	58	41	60	44	61
Total Number of HMP Species Present	**3**	1	3	5	5	3	5	3	5	3	5	5	5	5	5
Total Number of HMP Herbaceous Species Present	**0**	1	1	3	2	2	2	2	2	2	3	2	2	2	2
Total Tree Species in All Transects	**0**	0	0	0	0	1	1	0	0	0	1	0	0	0	0
Total Shrub Species in All Transects	**14**	7	12	11	14	17	20	8	14	10	14	12	16	13	16
Total Herbaceous Species in All Transects or Related Herbaceous Plots	**1**	11	17	15	25	26	49	31	38	25	43	29	44	31	45
Total Fern and Fern Allies Species in All Transects	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean Number of Tree Species per Transect	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Mean Number of Shrub Species per Transect	**9.6**	4.0	5.8	5.0	9.2	5.2	9.2	4.4	9.0	5.8	7.8	6.7	8.9	6.4	7.6
Mean Number of Herbaceous Species per Transect	**0.0**	4.6	6.6	3.0	11.2	7.0	14.0	14.8	23.4	13.8	22.3	6.1	17.1	9.3	11.6
Mean Number of Fern and Fern Allies Species per Transect	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diversity - Shannon Index	**1.8**	0.7	0.6	0.8	--	1.0	--	1.2	--	1.3	--	1.5	--	1.4	--
Evenness	**0.2**	0.2	0.1	0.2	--	0.2	--	0.2	--	0.2	--	0.2	--	0.2	--
Total Percent Mean Native Cover (Transects)	**108.8%**	7.5%	14.4%	19.7%	--	14.8%	--	18.6%	--	10.6%	--	25.7%	--	29.5%	--
Percent Mean Shrub Cover	**107.6%**	2.3%	7.6%	16.4%	--	11.3%	--	14.0%	--	7.7%	--	23.3%	--	26.0%	--
Percent Mean Herbaceous Cover (Transects)	**1.2%**	5.1%	6.8%	3.3%	--	3.5%	--	--	--	2.9%	--	2.4%	--	3.6%	--
Percent Mean Herbaceous Species Cover (Quadrats)	**--**	1.2%	1.6%	4.2%	--	--	--	--	--	--	--	--	--	--	--
Total Percent Mean Native Cover (Herbaceous Quadrats)	**--**	1.3%	3.4%	6.2%	--	--	--		--	--	--	--	--	--	--

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

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Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Trees						
Arbutus menziesii	**Pacific madrone**				x	
Hesperocyparis macrocarpa	**Monterey cypress**		1B.2		x	
Pinus radiata	**Monterey pine**		1B.1		x	
Populus trichocarpa	**black cottonwood**				x	
Quercus agrifolia	**coast live oak**				x	
Salix lasiolepis	**arroyo willow**				x	
Shrubs and Subshrubs						
Acmispon glaber	**deerweed**				x	
Adenostoma fasciculatum	**chamise**				x	
Arctostaphylos pumila	**sandmat manzanita**	HMP	1B.2		x	
Arctostaphylos tomentosa **subsp. *tomentosa***	**shaggy-barked manzanita**				x	
Artemisia californica	**California sagebrush**				x	
Baccharis pilularis **subsp. *consanguinea***	**coyote bush, coyote brush**				x	
Ceanothus dentatus	**dwarf ceanothus**				x	
Ceanothus rigidus	**Monterey ceanothus**	HMP	4.2		x	
Crocanthemum scoparium	**rush-rose**				x	
Ericameria ericoides	**dune-heather, mock-heather**				x	
Ericameria fasciculata	**Eastwood's ericameria**	HMP	1B.1		x	x
Eriogonum fasciculatum var. foliolosum	**California buckwheat**				x	
Eriophyllum confertiflorum	**golden yarrow**				x	
Frangula californica **subsp. *californica***	**California coffeeberry**				x	
Garrya elliptica	**coast silk-tassel**				x	
Heteromeles arbutifolia	**toyon**				x	
Lepechinia calycina	**pitcher sage**				x	

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Lupinus arboreus	**coastal bush lupine**				x	
Lupinus chamissonis	**silver bush lupine**				x	x
Mimulus aurantiacus	**bush monkeyflower**				x	
Ribes malvaceum	**chaparral currant**				x	
Ribes speciosum	**fuchsia-flowered gooseberry**				x	
Salvia mellifera	**black sage**				x	
Solanum umbelliferum	**blue witch nightshade**				x	
Symphoricarpos mollis	**creeping snowberry**				x	
Toxicodendron diversilobum	***poison-oak***				x	
Achillea millefolium	**common yarrow**				x	
Acmispon heermannii* var. *orbicularis	**woolly lotus**				x	x
Acmispon strigosus	**Bishop's lotus**				x	
Aira caryophyllea	common silver-hair grass				x	x
Amblyopappus pusillus	**amblyopappus**				x	
Amsinckia intermedia	**common fiddleneck**				x	x
Anagallis arvensis	scarlet pimpernel				x	
Antirrhinum majus	snapdragon				x	
Apiastrum angustifolium	**wild celery**				x	
Armeria maritima* subsp. *californica	**California sea-pink, sea thrift**				x	
Artemisia douglasiana	**mugwort**				x	
Avena barbata	slender wild oat				x	x
Avena fatua	wild oat				x	
Briza maxima	rattlensnake grass				x	
Bromus diandrus	ripgut brome				x	x

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Bromus hordeaceus	soft chess				x	x
Bromus madritensis subsp. *rubens*	red brome			high	x	
Calandrinia ciliata	**red maids**				x	x
Calochortus albus* var. *albus	**fairy lanterns, globe lily**				x	
Calyptridium monandrum	**pussy paws**				x	
Calystegia subacaulis	**hill morning-glory**				x	
Camissonia contorta	**contorted suncups**				x	x
Camissonia strigulosa	**strigose suncups**				x	x
Camissoniopsis cheiranthifolia* subsp. *cheiranthifolia	**beach primrose**				x	
Camissoniopsis micrantha	**small suncups**				x	
Cardionema ramosissimum	**sand mat**				x	
Carex globosa	**round-fruited sedge**				x	
Carpobrotus edulis	hottentot fig/ice plant			high	x	
Castilleja exserta* subsp. *latifolia	**wideleaf purple owl's clover**				x	x
Caulanthus lasiophyllus	**California mustard**				x	
Centaurea melitensis	tocalote			mod	x	x
Cerastium glomeratum	mouse-eared chickweed				x	x
Chenopodium californicum	**California goosefoot**				x	
Chorizanthe diffusa	**diffuse chorizanthe**				x	
Chorizanthe pungens* var. *pungens	**Monterey spineflower**	HMP	1B.2		x	x
Cirsium occidentale* var. *occidentale	**cobweb thistle**				x	x

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Claytonia perfoliata	**miner's lettuce**				x	
Collinsia heterophylla	**Chinese houses**				x	
Cordylanthus rigidus **subsp. *littoralis***	**seaside bird's beak**	HMP	1B.1		x	
Corethrogyne filaginifolia	**California aster**				x	
Cortaderia jubata	pampas grass, jubata grass			high	x	
Crassula connata	**pygmy weed**				x	x
Croton californicus	**California croton**				x	x
Cryptantha clevelandii **var. *florosa***	**coastal cryptantha**				x	x
Cryptantha micromeres	**small-flowered cryptantha**				x	x
Cryptantha microstachys	**Tejon cryptantha**				x	x
Daucus pusillus	**rattlesnake weed**				x	
Deinandra increscens **subsp. *increscens***	**coast tarplant**				x	x
Dichelostemma capitatum	**blue dicks, wild hyacinth**				x	x
Drymocallis glandulosa **var. *glandulosa***	**sticky cinquefoil**				x	
Elymus glaucus **subsp. *glaucus***	**western wild-rye**				x	
Epilobium brachycarpus	**tall annual willowherb**				x	
Epilobium canum	**California-fuchsia**				x	
Epilobium ciliatum **var. *ciliatum***	**northern willowherb**				x	
Eriastrum virgatum	**wand woollystar**		4.3		x	x
Erigeron bonariensis	flax-leaved fleabane				x	
Erigeron canadensis	**horseweed**				x	x
Erigeron foliosus **var. *foliosus***	**leafy daisy**				x	

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Erigeron sumatrensis	tropical horseweed				x	
Erodium botrys	long-beaked filaree				x	x
Erodium cicutarium	red-stemmed filaree			lim	x	x
Erysimum ammophilum	**coast wallflower**	HMP	1B.2		x	
Eschscholzia californica	**California poppy**				x	x
Euphorbia peplus	petty spurge				x	
Festuca microstachya	**small fescue**				x	
Festuca myuros	rattail fescue			mod	x	x
Festuca octoflora	**six-weeks fescue**				x	x
Fritillaria affinis	**checker lily, Mission bells**				x	
Galium californicum	**California bedstraw**				x	
Galium porrigens **var. *porrigens***	**climbing bedstraw**				x	
Gamochaeta ustulata	**purple cudweed**				x	
Gilia capitata **subsp. *capitata***	**ball gilia**				x	
Gilia tenuiflora **subsp. *arenaria***	**sand [Monterey] gilia**	HMP	1B.2		x	
Gilia tricolor	**bird's eyes gilia**				x	
Helminthotheca echioides	bristly ox-tongue			lim	x	
Herniaria hirsuta subsp. *cinerea*	hairy rupturewort				x	
Heterotheca grandifolia	**telegraph weed**				x	x
Hordeum brachyantherum **subsp. *brachyantherum***	**meadow barley**				x	
Horkelia cuneata **var. *cuneata***	**coast horkelia, wedge-leaved horkelia**				x	x
Hypochaeris glabra	smooth cat's ears			lim	x	x
Hypochaeris radicata	cat's ears			mod	x	

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Juncus effusus* var. *pacificus	**bog rush**				x	
Koeleria macrantha	**June grass**				x	
Layia platyglossa	**tidy tips**				x	x
Lepidium nitidum	**common peppergrass**				x	
Leptochloa fusca* subsp. *fascicularis	**bearded sprangletop**				x	
Lessingia pectinata* var. *pectinata	**common lessingia**				x	x
Leptosiphon parviflorus	**common linanthus**				x	
Logfia gallica	narrow-leaved filago				x	x
Logfia filaginoides	**California filago**				x	x
Lomatium parvifolium	**coastal biscuitroot**		4.2		x	
Lupinus bicolor	**miniature lupine**				x	x
Lupinus concinnus	**elegant lupine**				x	
Lupinus nanus	**sky lupine**				x	x
Lupinus truncatus	**blunt-leaved lupine**				x	
Madia exigua	**small tarplant**				x	
Madia sativa	**coast tarplant**				x	
Marah fabaceus	**wild cucumber**				x	
Melica imperfecta	**Coast Range melic**				x	
Melilotus indicus	yellow sweet-clover				x	
Micropus californicus* var. *californicus	**cottontop**				x	
Mimulus cardinalis	**scarlet monkeyflower**				x	
Monardella sinuata* subsp. *nigrescens	**northern curly-leaved monardella**		**4.2**		x	x
Navarretia hamata* subsp. *parviloba	**hooked navarretia**				x	

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Navarretia intertexta	**needle-leaved navarretia**				x	x
Navarretia squarrosa	**skunkweed**				x	
Nemophila menziesii	**baby blue-eyes**				x	
Nuttallanthus texanus [Linaria canadensis]	**toad-flax**				x	x
Orobanche bulbosa	**chaparral broomrape**				x	
Orobanche californica	**California broomrape**				x	
Oxalis pilosa	**hairy wood sorrel**				x	
Parapholis incurva	sicklegrass				x	
Pectocarya penicillata	**winged combseed**				x	x
Petrorhagia dubia	hairypink				x	x
Phacelia campanularia	**desert bluebells**				x	
Phacelia distans	**wild heliotrope**				x	
Phacelia douglasii	**Douglas' phacelia**				x	
Piperia michaelii	**Michael's rein-orchid**		**4.2**		x	
Plagiobothrys collinus* var. *fulvescens	**rusty-haired popcorn flower**				x	
Plantago coronopus	cut-leaved plantain				x	
Plantago erecta	**California plantain**				x	x
Poa annua	annual bluegrass				x	
Poa secunda	**one-sided bluegrass, pine bluegrass**				x	
Pogogyne serpylloides	**thymeleaf mesamint**				x	
Polypogon interruptus	ditch beard grass				x	
Polypogon monspeliensis	rabbitsfoot grass			lim	x	

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Polypogon viridis	water beard grass				x	
Pseudognaphalium beneolens	**fragrant everlasting**				x	
Pseudognaphalium californicum	**California everlasting**				x	x
Pseudognaphalium ramosissimum	**pink everlasting**				x	
Pseudognaphalium stramineum	**cottonbatting plant**				x	
Psilocarphus tenellus	**slender woolly marbles**				x	
Pterostegia drymarioides	**fairy mist**				x	
Rumex acetosella	sheep sorrel			mod	x	x
Sagina apetela	**sticky pearlwort**				x	
Senecio c.f. aphanactis	**chaparral ragwort**		2B.2		x	
Senecio glomeratus	cut-leaved fireweed			mod	x	
Senecio vulgare	common ragwort				x	
Silene gallica	windmill pink				x	x
Sisymbrium orientale	Indian hedgemustard				x	
Sisyrinchium bellum	**blue-eyed grass**				x	
Solanum americanum **(herbaceous)**	**American nightshade**				x	
Sonchus asper subsp. *asper*	prickly sow-thistle				x	
Sonchus oleraceus	common sow-thistle				x	
Spergula arvensis	corn spurrey				x	
Spergularia rubra	red sand-spurrey				x	
Stachys bullata	**wood mint**				x	
Stipa pulchra	**purple needlegrass**				x	
Stylocline gnaphaliodes	**everlasting neststraw**				x	x
Taraxia [Camissonia] ovata	**suncups**				x	
Toxicoscordion fremontii	**Fremont's star lily**				x	

Table A 6-10
Observed Plant Species in Interim Action Ranges MRA

2019 Annual Natural Resource Report – Appendix A

Scientific Name	Common Name	HMP species	CNPS Rare Plant Rank	Cal-IPC Invasiveness Status	IAR MRA	IAR MRA Range 44 Grassland
Herbaceous species (annuals, perennial herbs, grasses, and grass-like species)						
Trifolium ciliolatum	**foothill clover**				x	x
Trifolium gracilentum	**pinpoint clover**				x	
Trifolium hirtum	rose clover			mod	x	
Trifolium microcephalum	**hairy clover, small-headed clover**				x	x
Uropappus lindleyi	**silver puffs**				x	
Viola cultivar	pansy				x	
Ferns and Fern-relatives						
Pteridium aquilinum* var. *pubescens	**western bracken fern**				x	

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
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, establishmen dependent upon disturbance.
limited – invasive but impacts not widespread statewide, low to moderate rates of dispersal, may be locally persistent and problematic.

Table A6-11
Observed Wildlife Species in Interim Action Ranges MRA 2008 - 2019

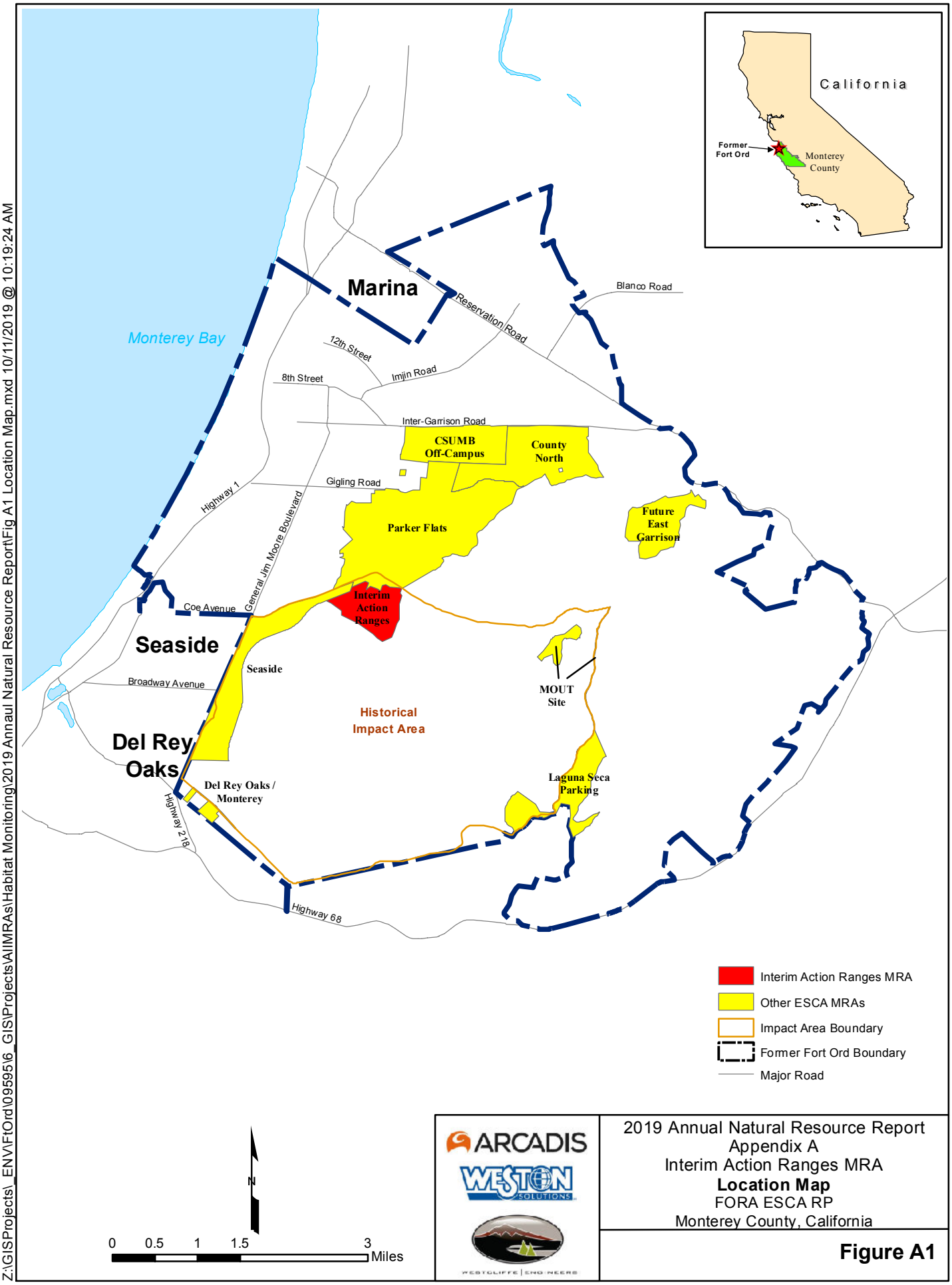
ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	HMP species	IAR MRA Range 44	IAR MRA Range 47	IAR MRA
MAMMALS					
Canis latrans	Coyote		x	x	x
Lepus californicus	Black-tailed jackrabbit		x	x	x
Lynx rufus	Bobcat		x	x	x
Mus musculus	House mouse				x
Neotoma fuscipes	Dusky-footed wood rat		x		x
Odocoileus hemionus	Mule deer		x	x	x
Sorex ornatus salarius	Monterey ornate shrew	x			
Sylvilagus audubonii	Desert cottontail		x	x	
Sylvilagus bachmani	Brush rabbit				x
Thomomys bottae	Botta's pocket gopher			x	
REPTILES AND AMPHIBIANS					
Ambystoma californiense	California tiger salamander	x			
Aneides lugubris	Arboreal salamander				x
Anniella pulchra nigra	California black legless lizard	x	x		
Crotalus oreganus oreganus	Northern Pacific rattlesnake		x	x	x
Ensatina eschscholtzii eschscholtzii	Monterey ensatina		x		x
Lampropeltis getulus	Common kingsnake			x	x
Phrynosoma blainvillii	Coast horned lizard		x	x	x
Pituophis melanoleucus	Gopher snake		x	x	x
Sceloporus occidentalis	Western fence lizard		x	x	x
BIRDS					
Amphispiza belli	Bell's sage sparrow			x	
Aphelocoma californica	Western scrub jay		x	x	x
Asio otus	Long-eared owl			x	
Buteo jamaicensis	Red-tailed hawk		x	x	x
Callipepla californica	California quail		x	x	x
Calypte anna	Anna's hummingbird		x	x	x
Carduelis psaltria	Lesser goldfinch		x	x	x
Carpodacus mexicanus	House finch		x		x
Cathartes aura	Turkey vulture		x	x	x
Chamaea fasciata	Wrentit		x	x	x

Table A6-11
Observed Wildlife Species in Interim Action Ranges MRA 2008 - 2019

ESCA RP 2019 Annual Natural Resource Report - Appendix A

Scientific Name	Common Name	HMP species	IAR MRA Range 44	IAR MRA Range 47	IAR MRA
BIRDS					
Charadrius vociferus	**Killdeer**		x	x	x
Circus cyaneus	**Northern harrier**		x	x	x
Colaptes auratus	**Northern flicker**		x		x
Corvus brachyrhynchos	**American crow**		x	x	x
Corvus corax	**common raven**		x		x
Dendroica coronata	**Yellow-rumped warbler**		x		x
Falco sparverius	**American kestrel**		x	x	x
Geococcyx californianus	**Greater roadrunner**		x	x	x
Hirundo rustica	**Barn swallow**		x	x	x
Junco hyemalis	**Dark-eyed junco**		x		x
Pipilo crissalis	**California towhee**		x	x	x
Pipilo maculatus	**Spotted towhee**		x		x
Polioptila caerulea	**blue-gray gnatcatcher**		x		x
Psaltriparus minimus	**Bushtit**		x		x
Toxostoma redivivum	**California thrasher**		x	x	x
Vireo huttoni	**Hutton's vireo**		x		x
Zenaida macroura	**Mourning dove**		x	x	x
Zonotrichia atricapilla	**Golden-crowned sparrow**		x		x



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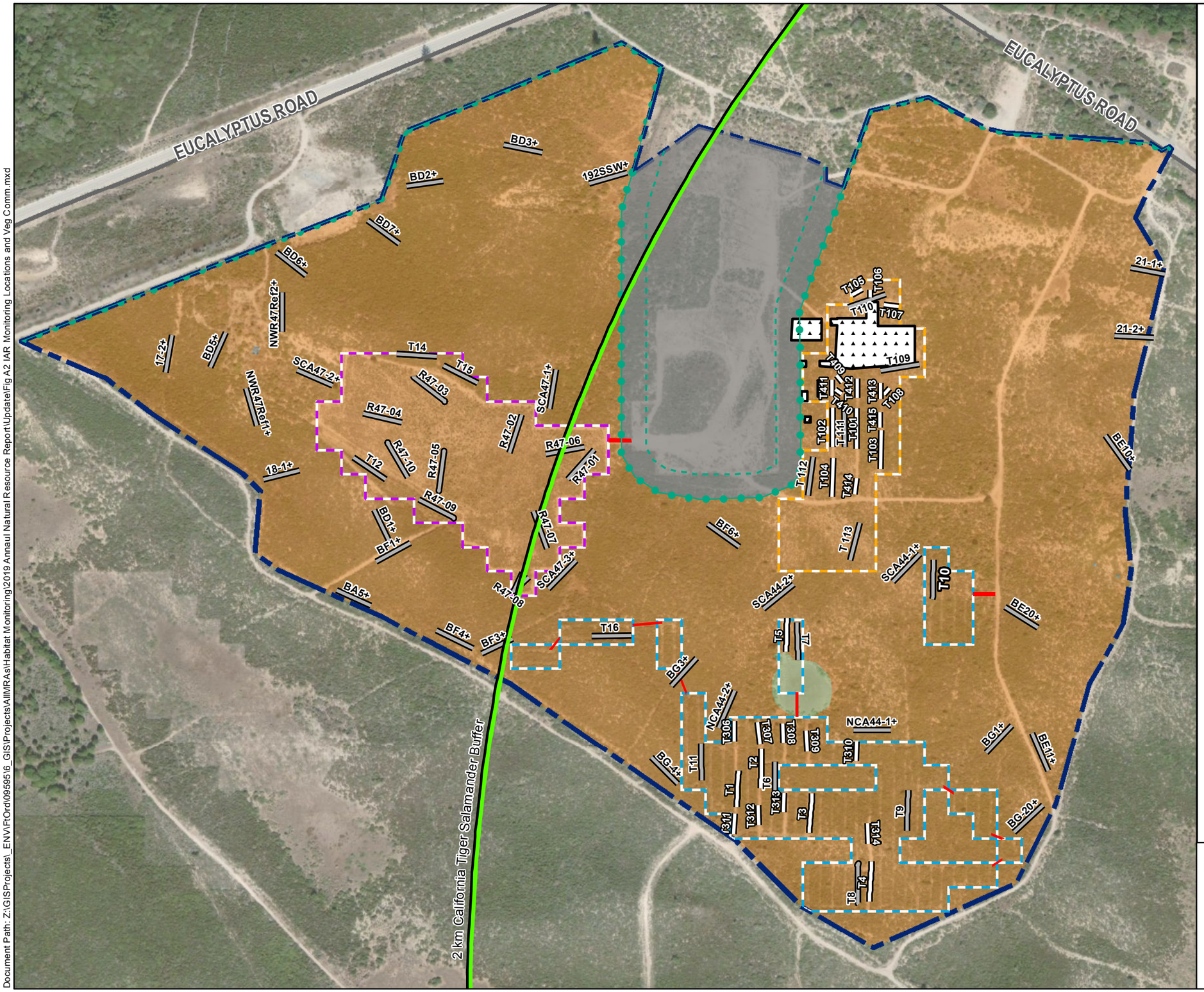
2019 Annual Natural Resource Report
Appendix A
Interim Action Ranges MRA
Location Map
FORA ESCA RP
Monterey County, California

Figure A1



Document Path: Z:\GISProjects_ENV\FtOrd\095916_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\Fig A2 IAR Monitoring Locations and Veg Comm.mxd

Legend

- Munitions Response Area
- Major Road
- Development Parcel
- Improved Ingress/Egress Established by ESCA RP Team
- Site 39 (HA44) US Army Action
- North Range 44 SCA
- South Range 44 SCA/Central Area NCA
- Range 47 SCA
- 2019 Vegetation Transects (Monitored Annually per HRP)
- Baseline Transects

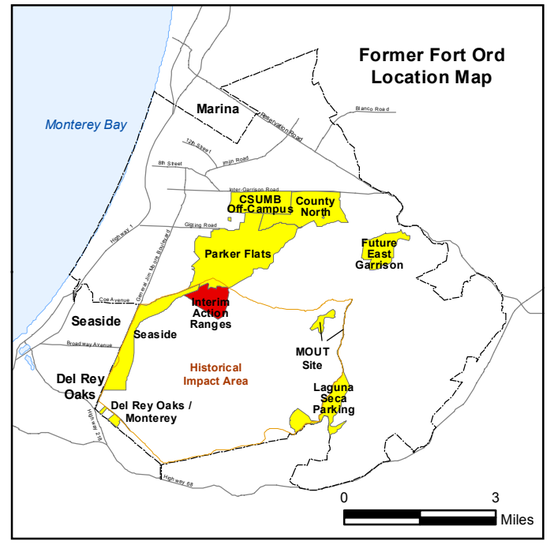
Note: + = baseline transect

- Borderland Interface
- 100-Foot Buffer from Borderland Interface

Vegetation Types*

- Grassland
- Central Maritime Chaparral

*Source: Flora and Fauna Baseline Study of Fort Ord, California, Jones and Stokes Association Inc., December 1992. Vegetation mapping modified from 2011 Annual Natural Resource Report.



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Interim Action Ranges MRA
Vegetation Monitoring Locations

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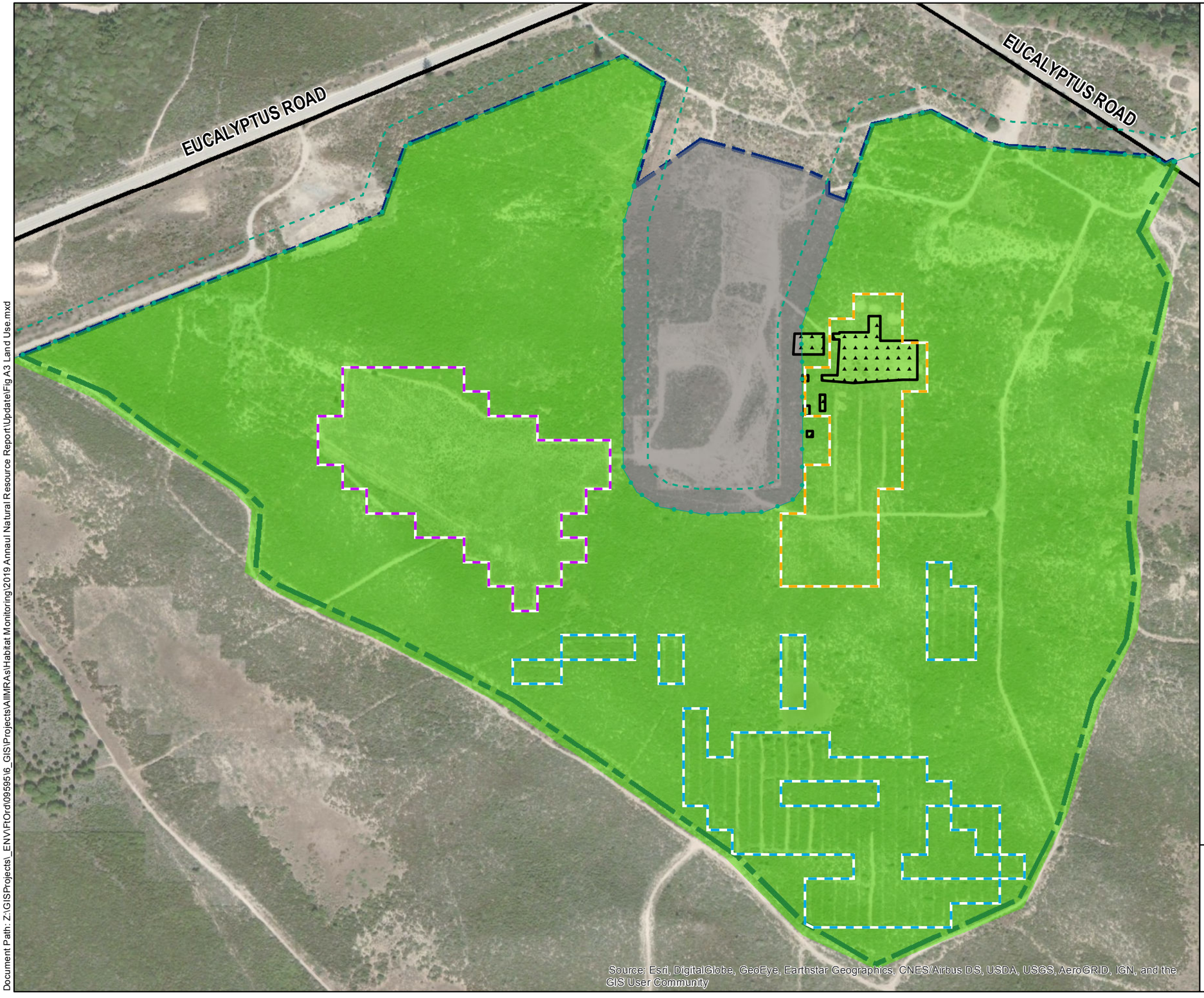
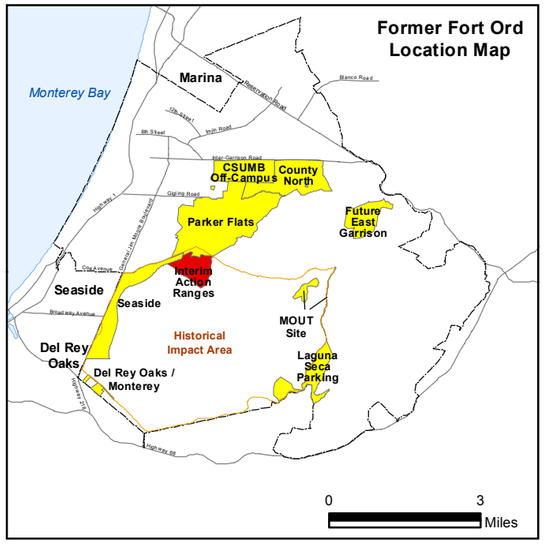
Figure A2



Legend

- Munitions Response Area
- Major Road
- Site 39 (HA44) US Army Action
- North Range 44 SCA
- South Range 44 SCA/Central Area NCAs
- Range 47 SCA
- Borderland Interface
- 100-Foot Buffer from Borderland Interface
- Habitat Reserve
- Development Parcel



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Appendix A
Interim Action Ranges MRA

Designated Future Land Use

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Figure A3

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EUCALYPTUS ROAD

EUCALYPTUS ROAD

Escarpment

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Major Road
- Munitions Response Area
- Site 39 (HA44) US Army Action

Monitoring Only

- Monitoring of Improved Ingress/Egress Areas Established by ESCA RP Team
- Monitoring of Vegetation Cutting and Target-specific Areas
- Monitoring of Low-recruitment Escarpment Subject to Small-scale and Target-specific Excavation Areas

Passive Restoration

- Seeding of Small-scale Excavation Areas
- Topsoil Replacement and Seeding of Large-scale Soil Excavation Area

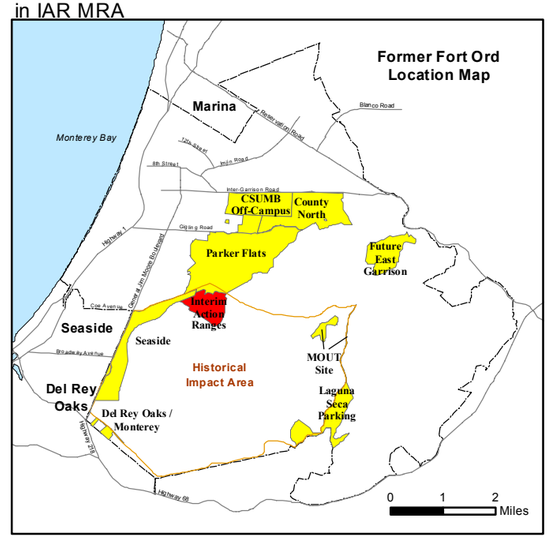
Active Restoration

- Topsoil Replacement, Seeding, and Container Planting of Large-scale Excavation Area

Vegetation Types

- Grassland

NOTE: Schematic representation of restoration activities in IAR MRA



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Restoration Activities

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Figure A4

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Subarea C

Subarea A

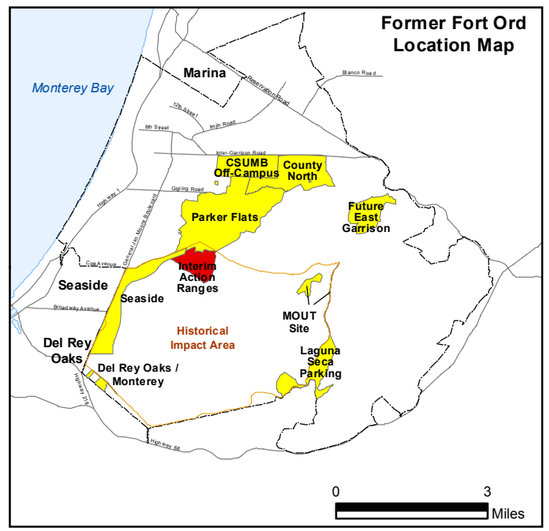
Subarea B

Escarpment

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Munitions Response Area
- Range 47 SCA
- Subarea A - Topsoil Replacement and Seeding of Large-scale Soil Excavation Area
- Subarea B - Topsoil Replacement, Seeding, and Container Planting of Large-scale Soil Excavation Area
- Subarea C - Vegetation Cutting and Target-specific Areas, and Seeding of Small-scale Excavation Areas
- Subarea C - Low-recruitment Escarpment Subject to Small-scale and Target-specific Excavation Areas



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Appendix A
Interim Action Ranges MRA

Range 47 SCA Subareas

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Figure A5

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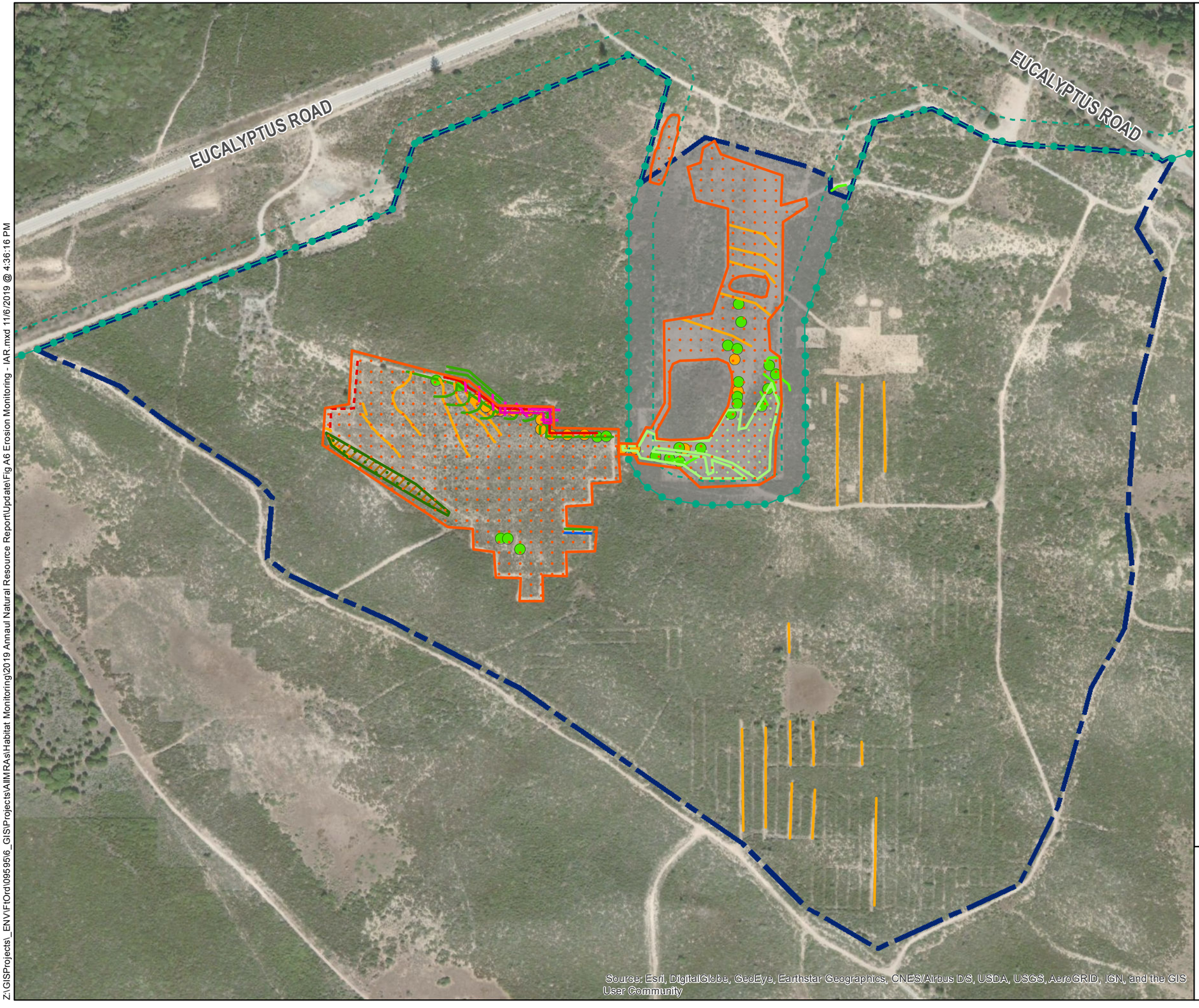

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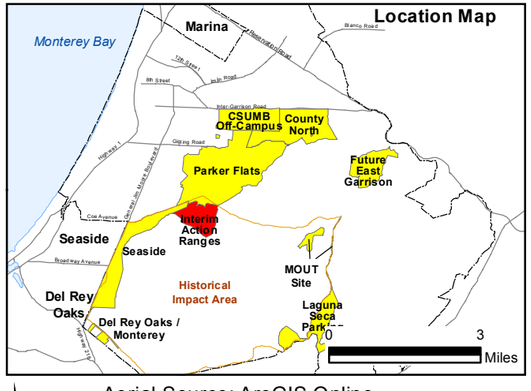
Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface
- 2018 Mulch, Straw Wattles and Water Bars

Erosion Control Measures

- 2013 Silt Fencing
- 2013 Wind Screen
- 2013 Straw Wattles/Water Bars
- 2014 Silt Fencing
- 2014 Straw Wattles/Water Bars
- 2016 Silt Fencing
- 2016 Straw Wattles
- 2013 Sand Bags/Straw Bales/ Erosion Control Blanket
- 2014 Sand Bags/Straw Bales/ Erosion Control Blanket
- 2013 Hydromulch Areas
- 2013 Erosion Control Blanket
- 2014 Hydromulch Areas
- 2014 Hydroseed Areas
- 2016 Erosion Blanket



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Appendix A
Interim Action Ranges MRA

Erosion Control BMPs in Interim Action Ranges MRA
FORA ESCA RP
Monterey County, California

Figure A6

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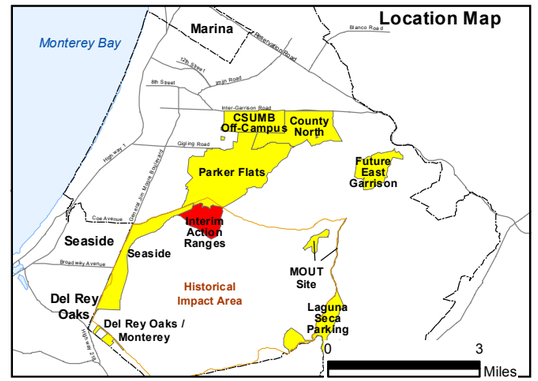
Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface



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Appendix A
Interim Action Ranges MRA

Interim Action Ranges MRA North
Range 44 2009 Aerial Imagery

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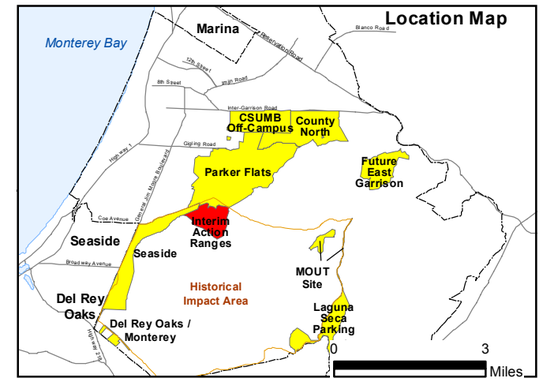
Monterey County, California

Figure A7a

Z:\GISProjects_ENV\FtOrd\09595\6_GIS\Projects\AIMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\FinalReport\Fig A7B Erosion Monitoring - Range 44.mxd 1/15/2020 @ 3:45:46 PM

Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface



Aerial Source: ArcGis Online
Accessed 1/14/2020 - Image Date: 10/25/2018

N

0 125 250 Feet

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WESTCLIFFE ENGINEERS

2019 Annual Natural Resource Report
Appendix A
Interim Action Ranges MRA

Interim Action Ranges MRA North
Range 44 2018 Aerial Imagery

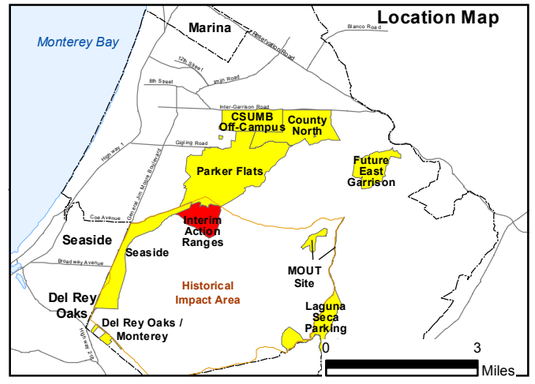
FORA ESCA RP
Monterey County, California

Figure A7b

Z:\GISProjects_ENV\FtOrd\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\FinalReport\Fig A87A Erosion Monitoring - Range 44.mxd 1/15/2020 @ 3:59:52 PM

Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface



Aerial Source: Google Earth Pro
Accessed 1/14/2020 - Image Date: 9/15/2009

N

0 100 200 Feet

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2019 Annual Natural Resource Report
Appendix A
Interim Action Ranges MRA

Interim Action Ranges MRA South Range 44 2009 Aerial Imagery

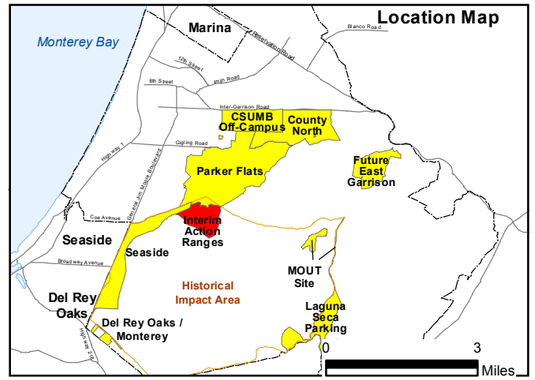
FORA ESCA RP
Monterey County, California

Figure A8a

Z:\GISProjects_ENV\FtOrd\095956_GIS\Projects\AllMRAs\Habitat Monitoring\2019 Annaul Natural Resource Report\Update\FinalReport\Fig A87B Erosion Monitoring - Range 44.mxd 1/15/2020 @ 3:58:36 PM

Legend

- Major Road
- Munitions Response Area
- Development Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface



Aerial Source: ArcGis Online
Accessed 1/14/2020 - Image Date: 10/25/2018

N

0 105 210
Feet

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WESTCLIFFE | ENGINEERS

2019 Annual Natural Resource Report
Appendix A
Interim Action Ranges MRA

Interim Action Ranges MRA South
Range 44 2018 Aerial Imagery

FORA ESCA RP
Monterey County, California

Figure A8b

Figure A9
North Range 44 SCA – Mean Cover of Native Species after Small-scale Excavation 2013 – 2019

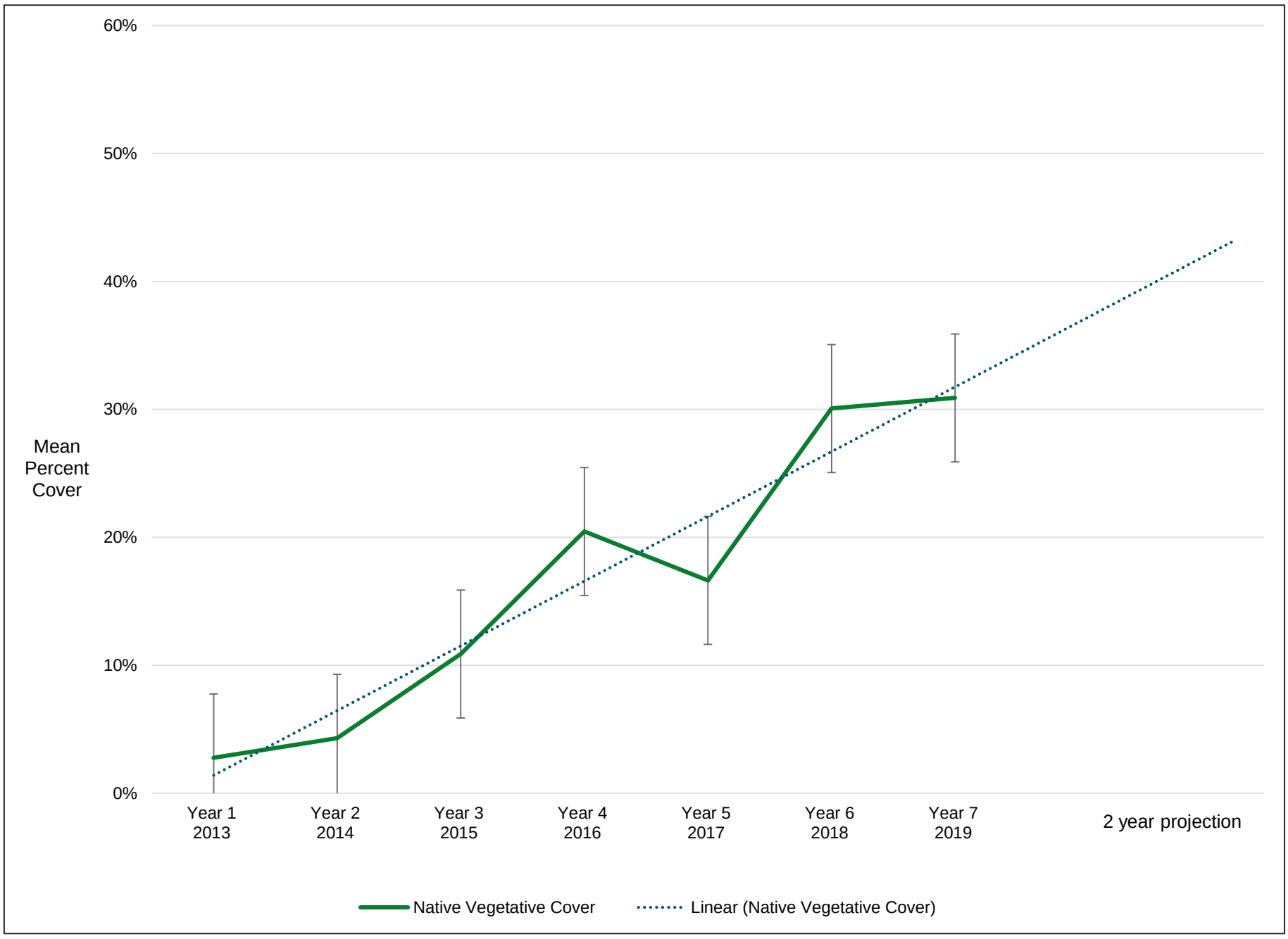
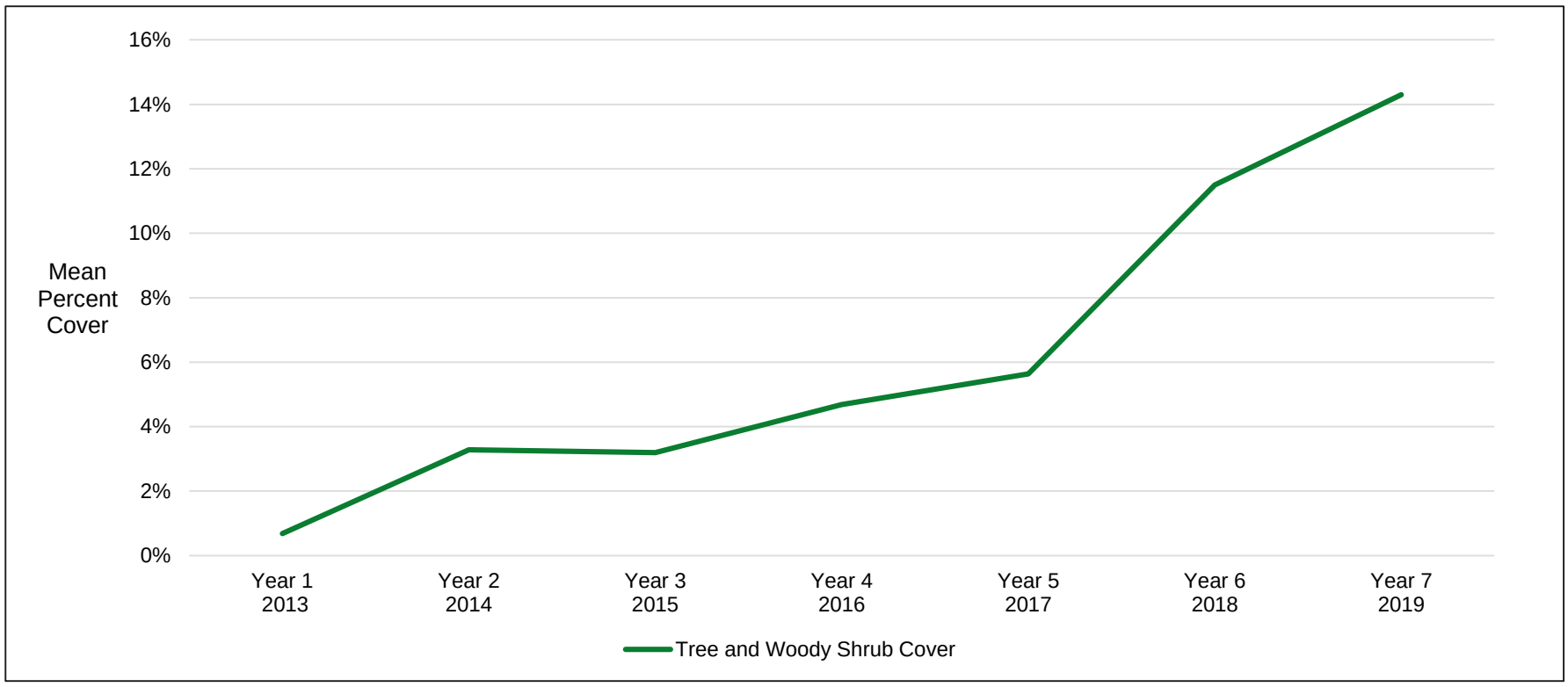
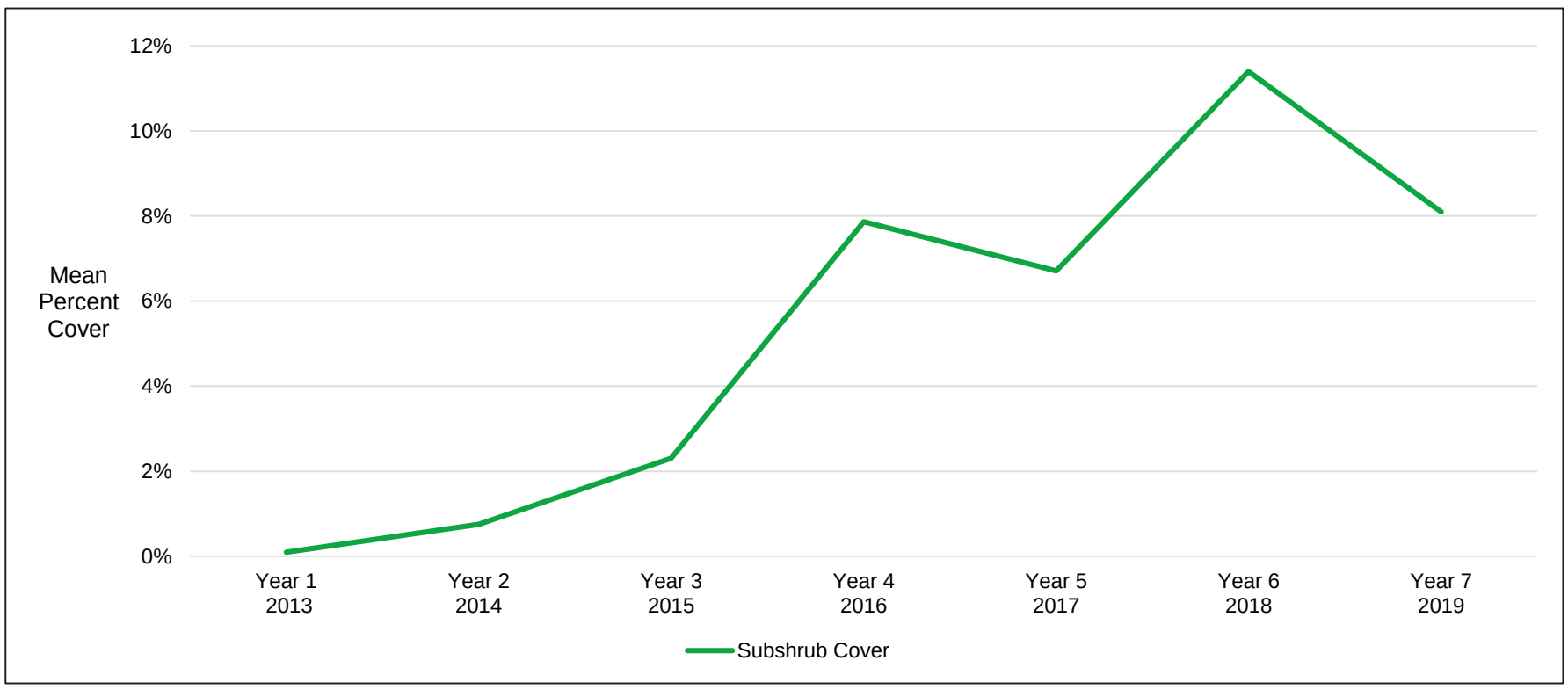


Figure A10
North Range 44 SCA – Mean Cover of Native Species by Growth Habit after Small-scale Excavation 2013 – 2019





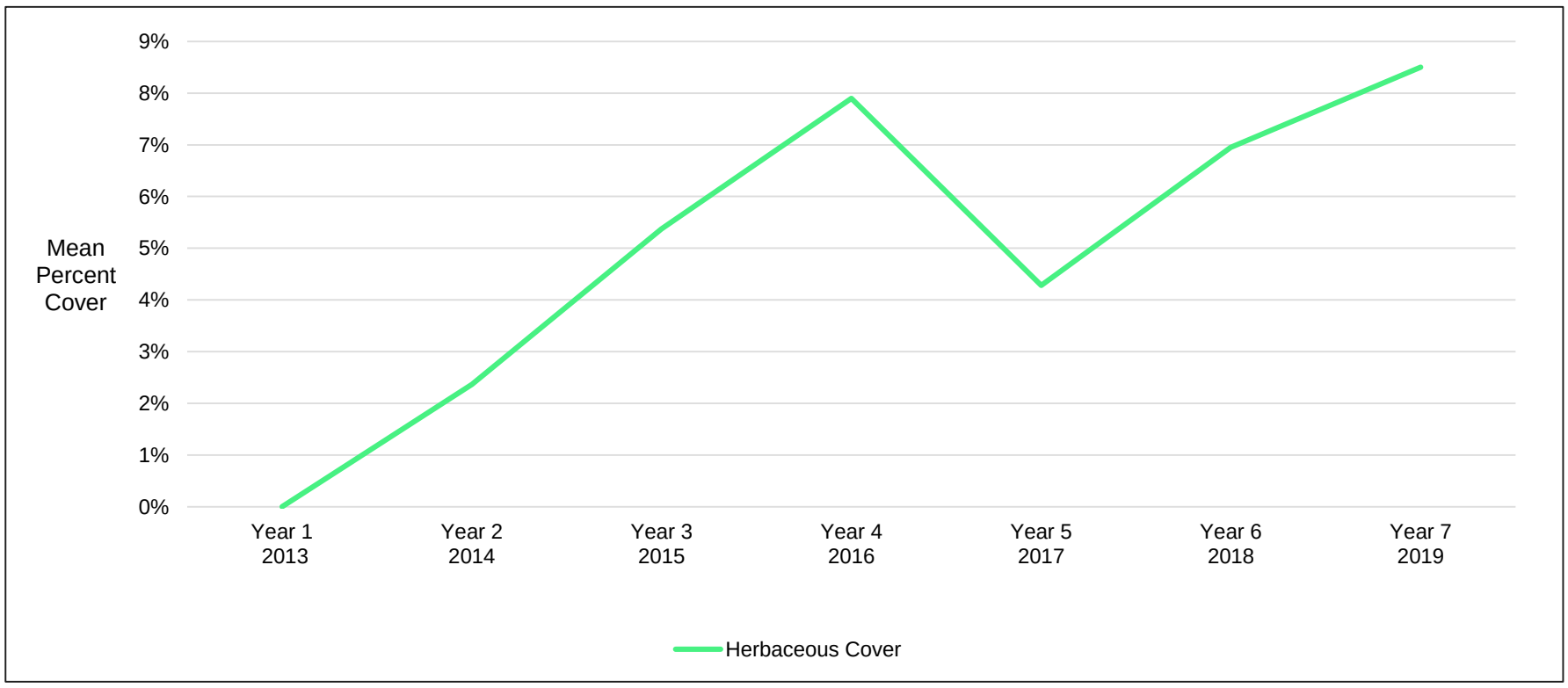


Figure A11
North Range 44 SCA – Mean Shrub Cover by Species after Small-scale Excavation

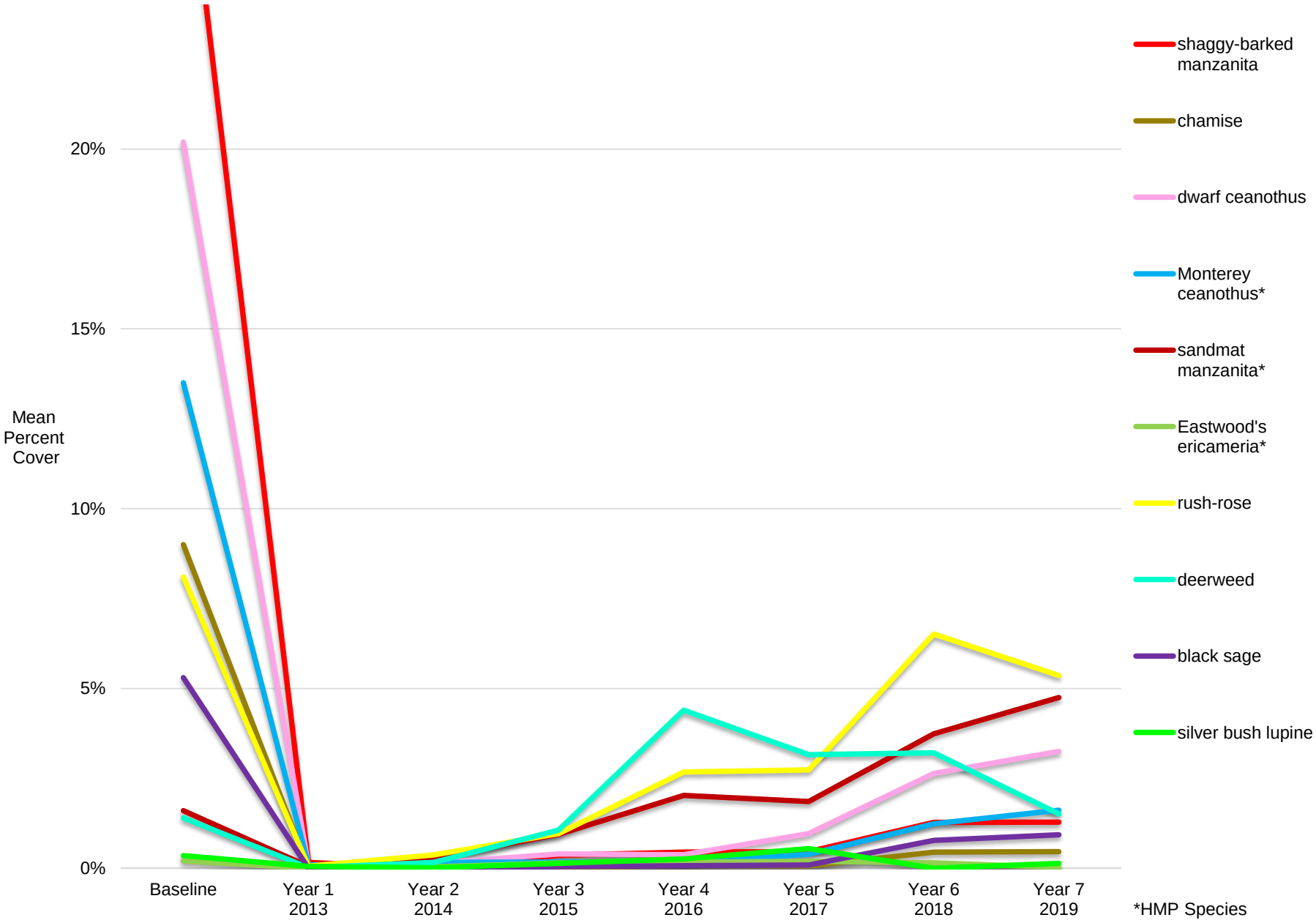
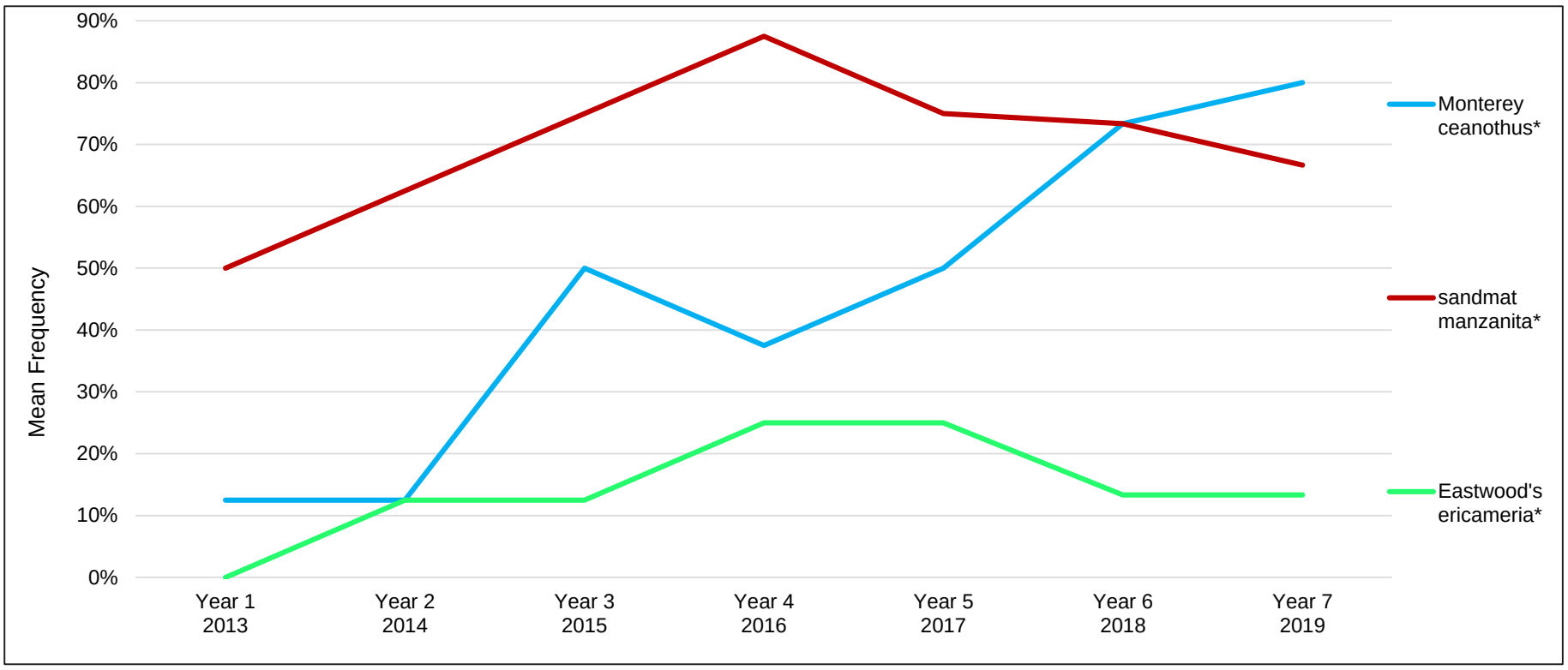
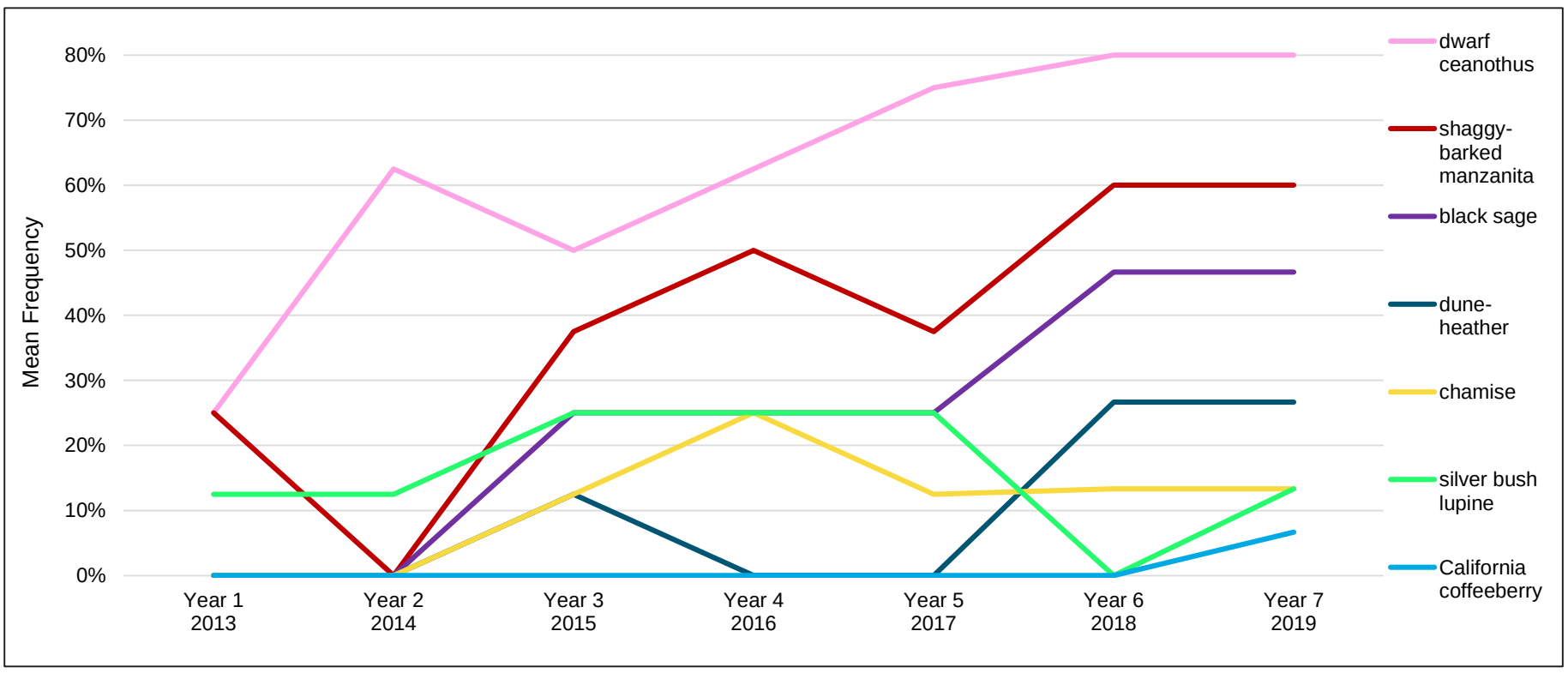


Figure A12
North Range 44 SCA – Mean Frequency of Shrub Species after Small-scale Excavation





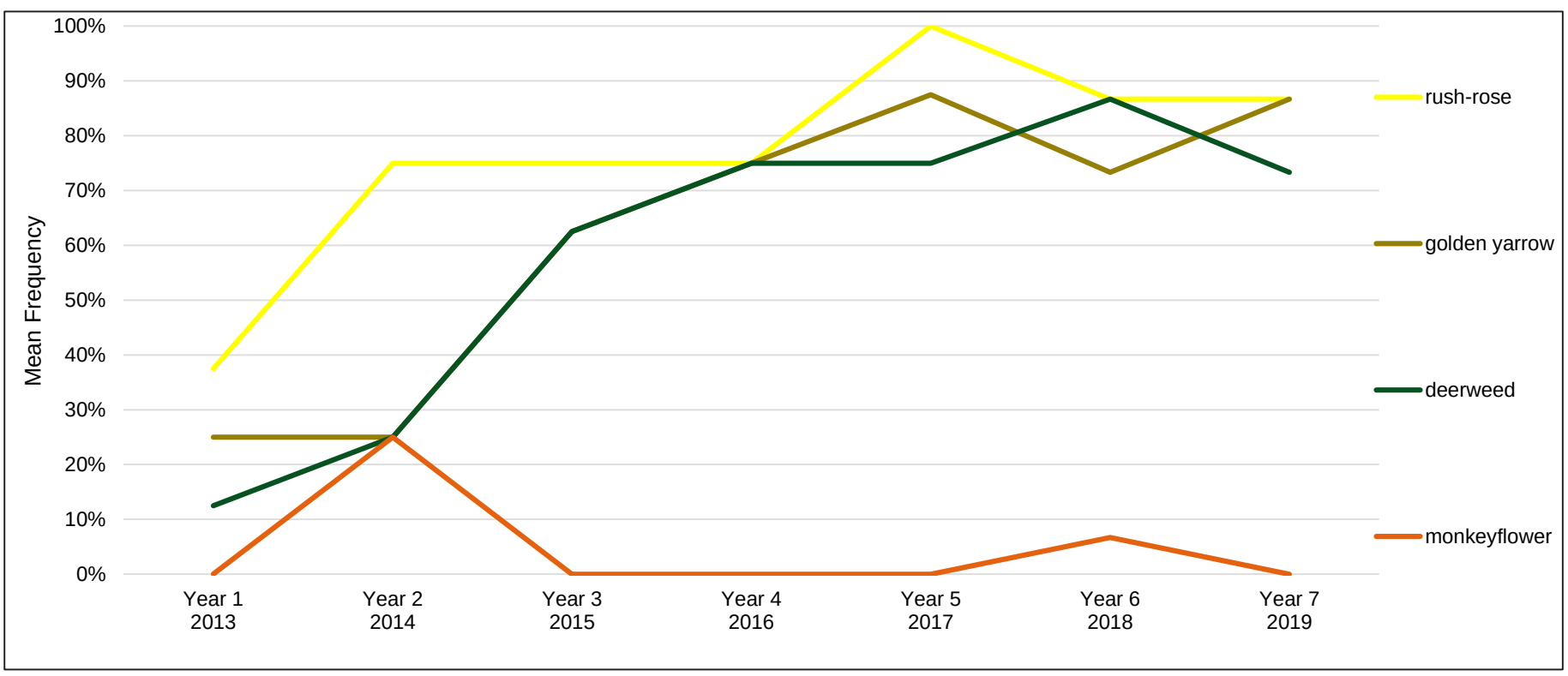


Figure A13
South Range 44 SCA – Mean Cover of Native Species after Small-scale Excavation 2013 – 2019

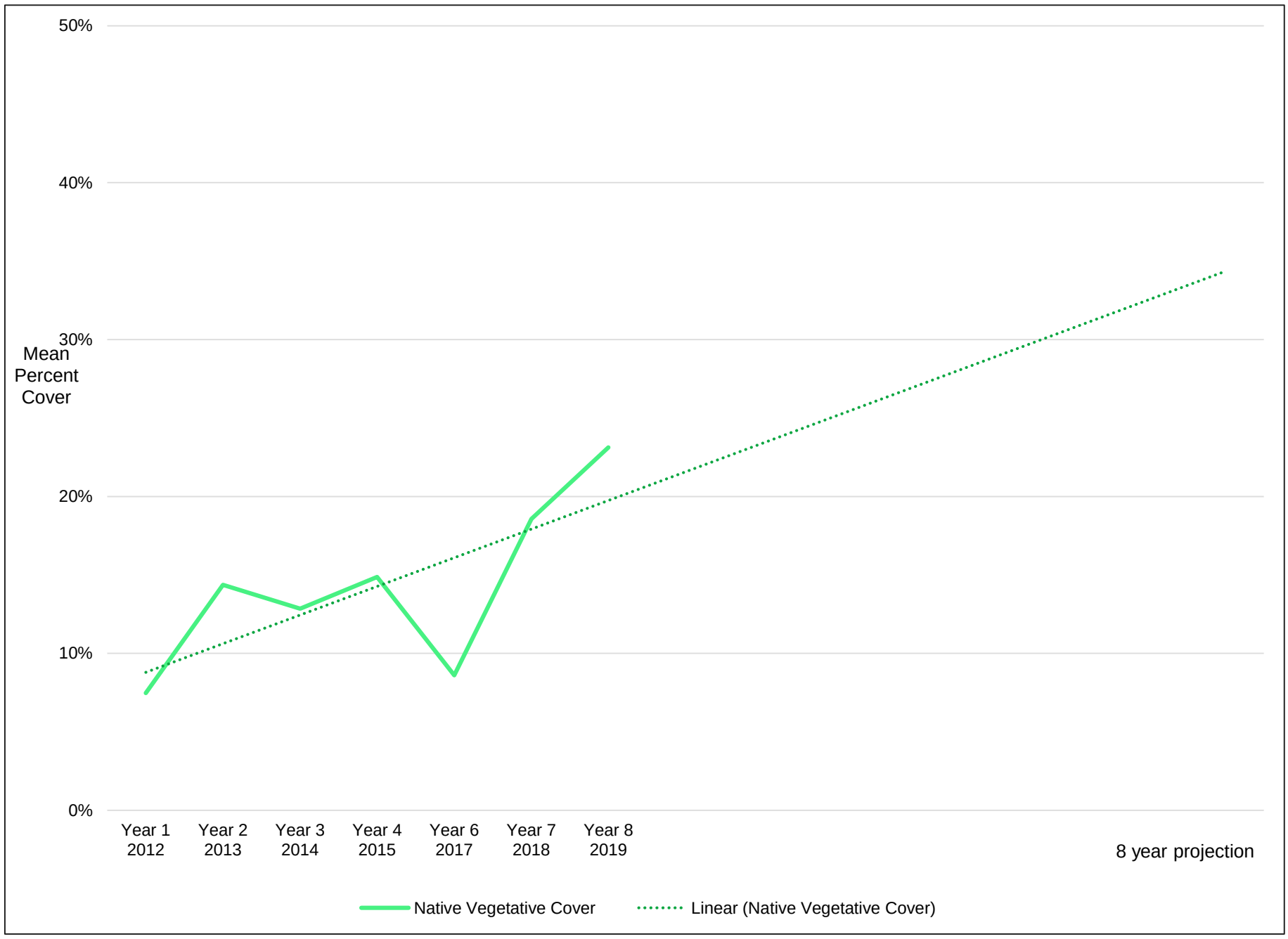
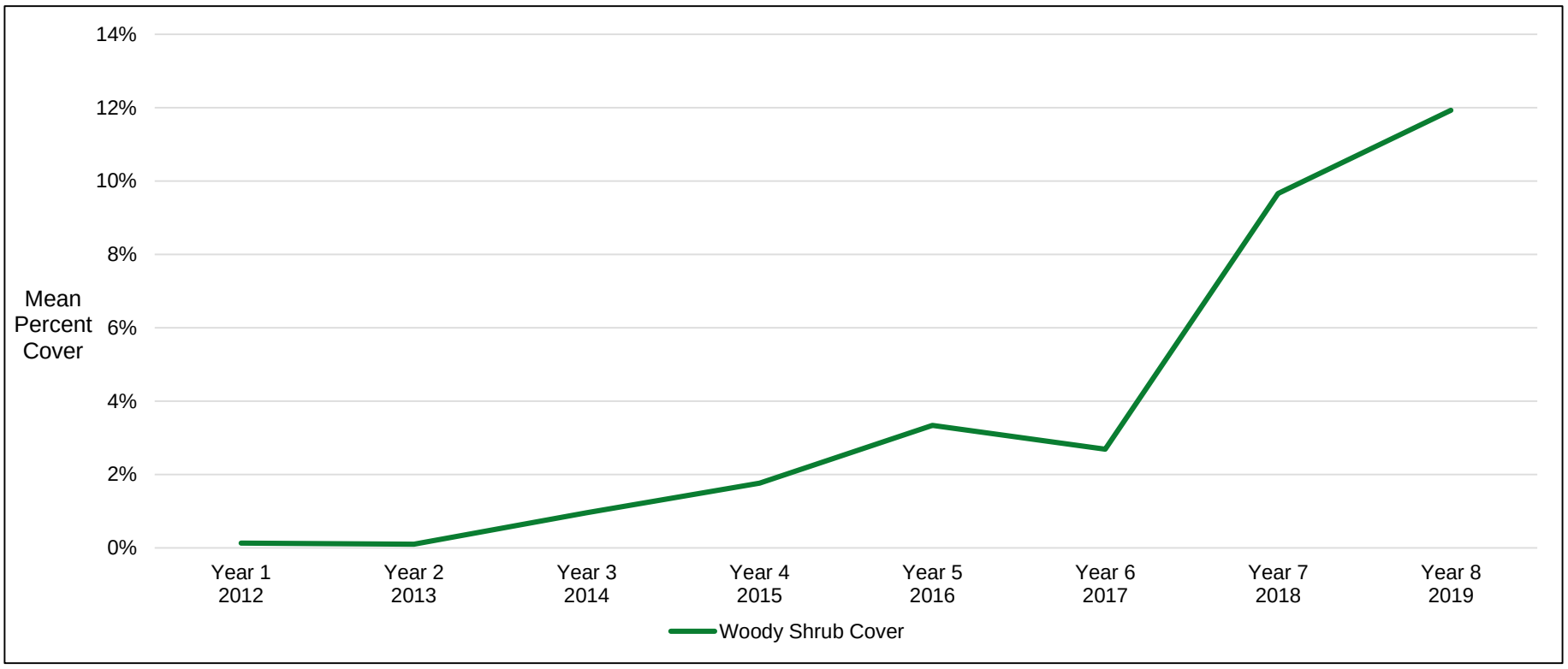
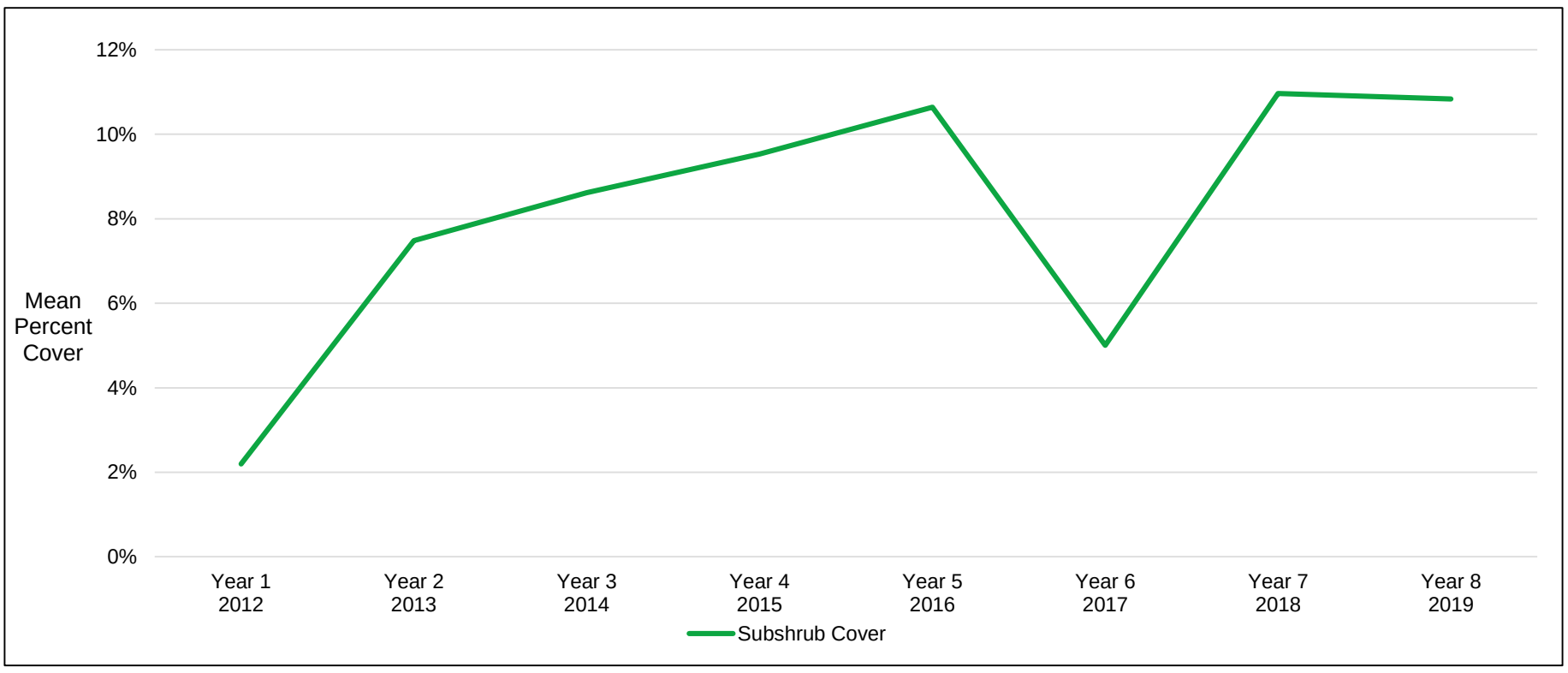


Figure A14
South Range 44 SCA and Central NCAs - Mean Cover of Native Species by Growth Habit after Small-scale Excavation 2013 – 2019





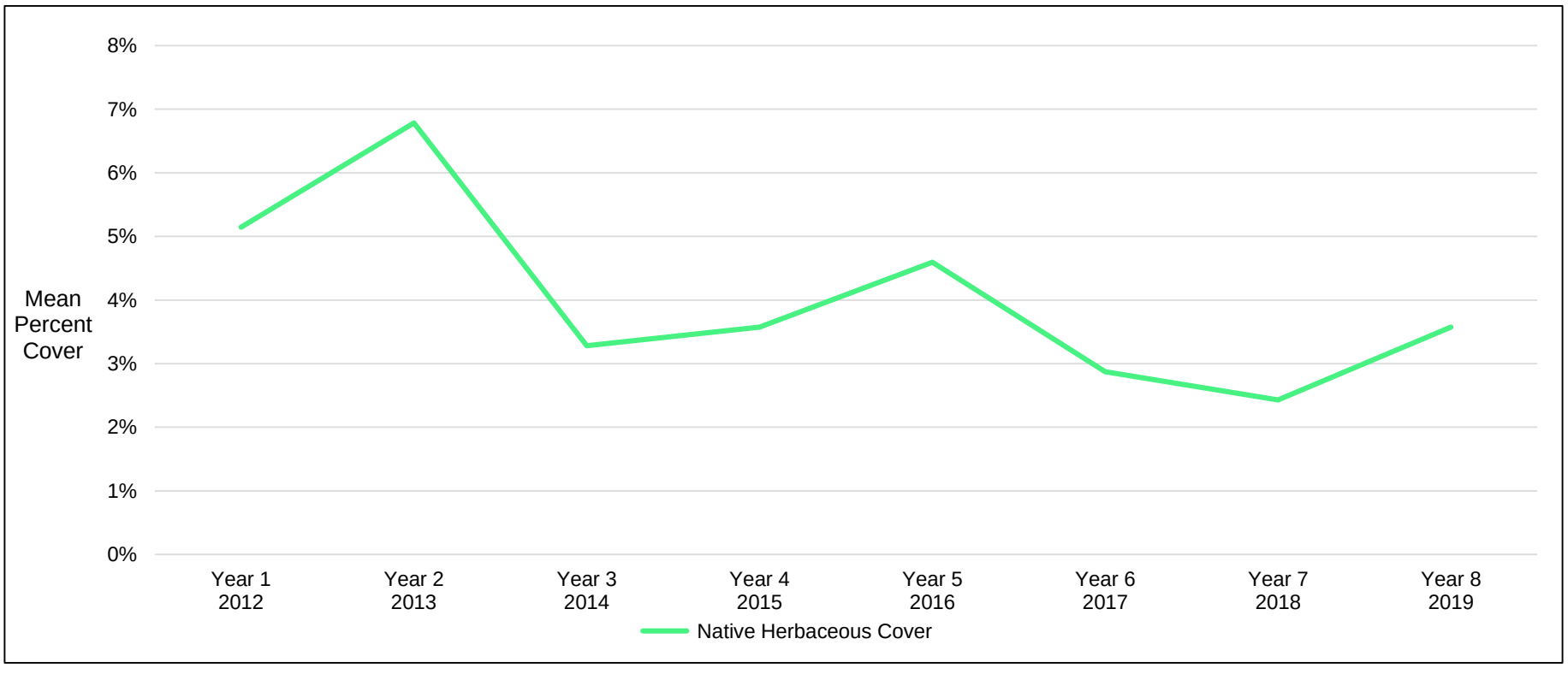


Figure A15
South Range 44 SCA and Central NCAs – Mean Shrub Cover by Species after Small-scale Excavation

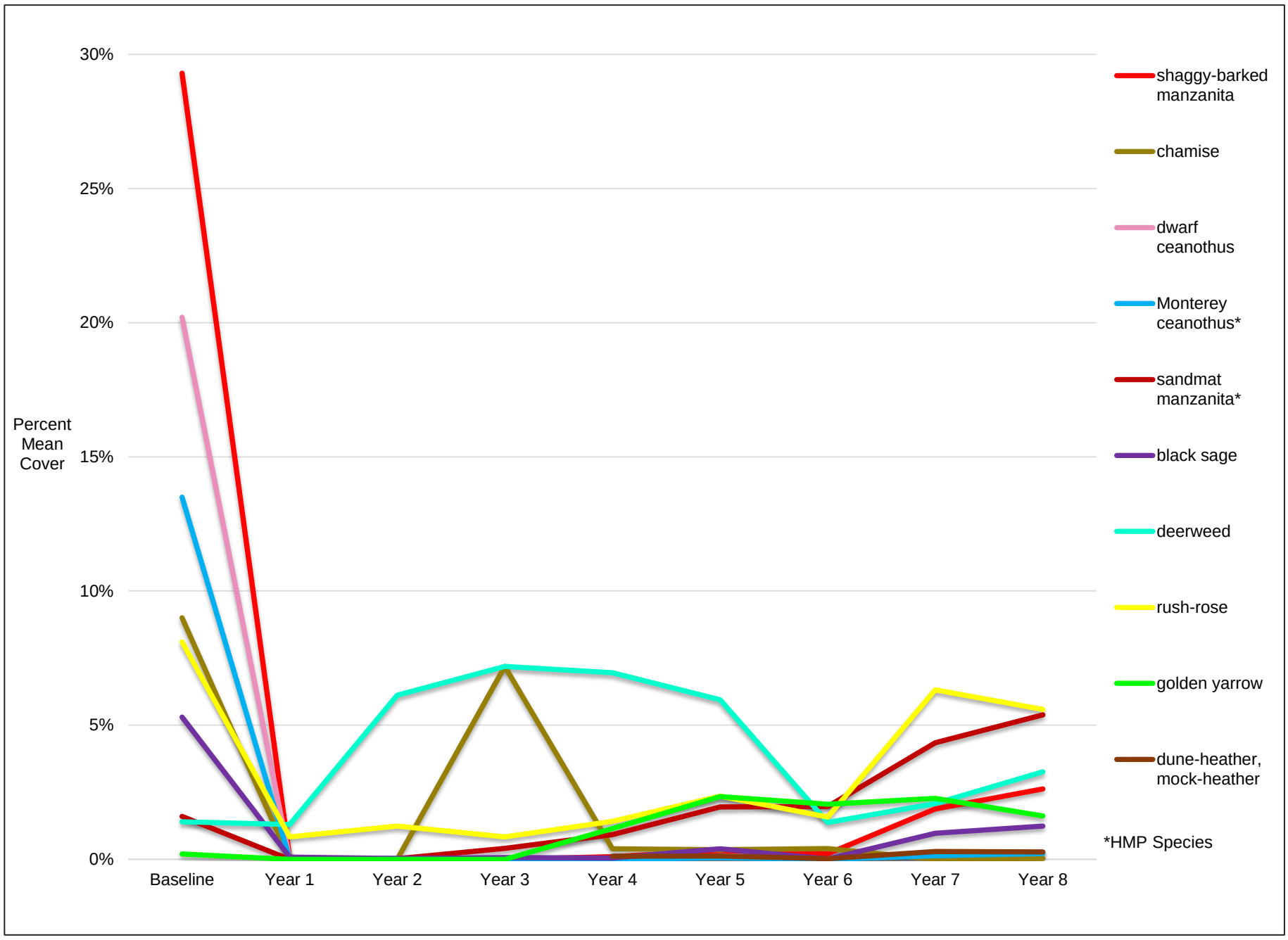
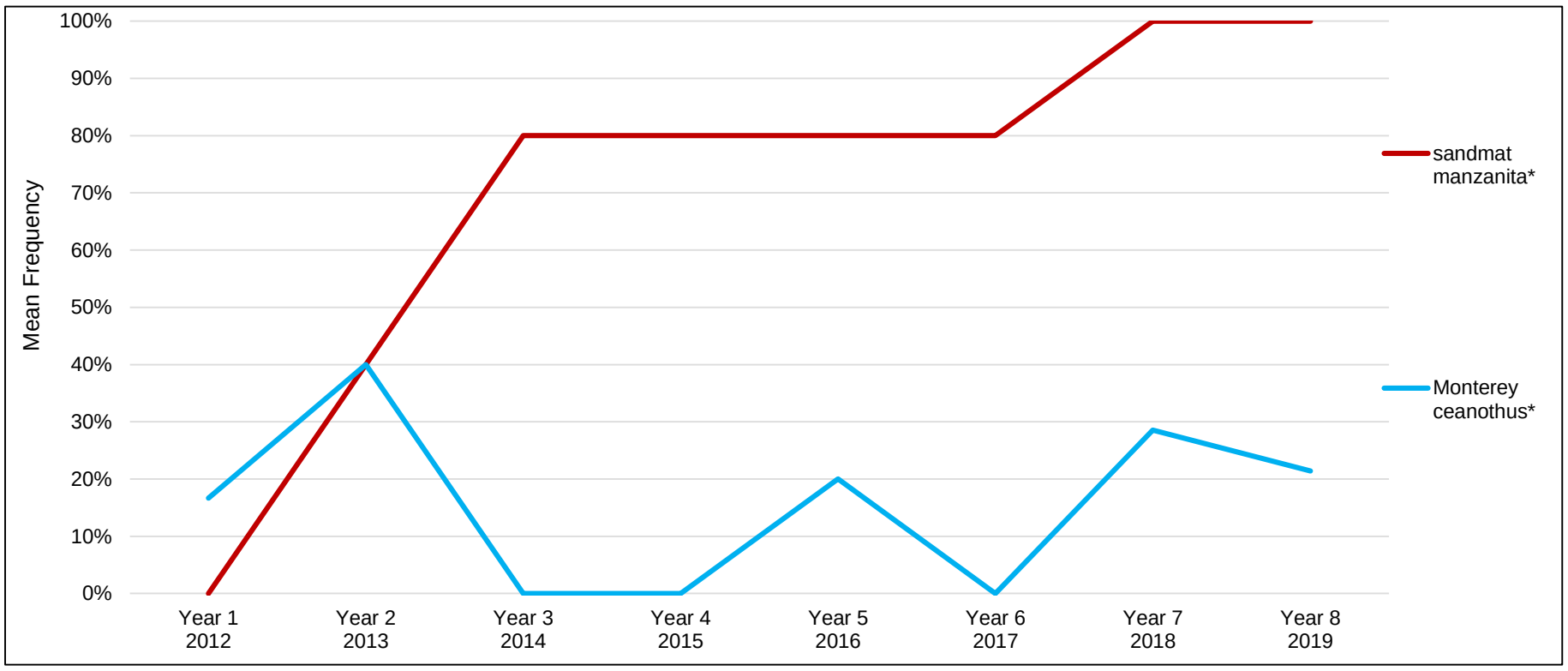
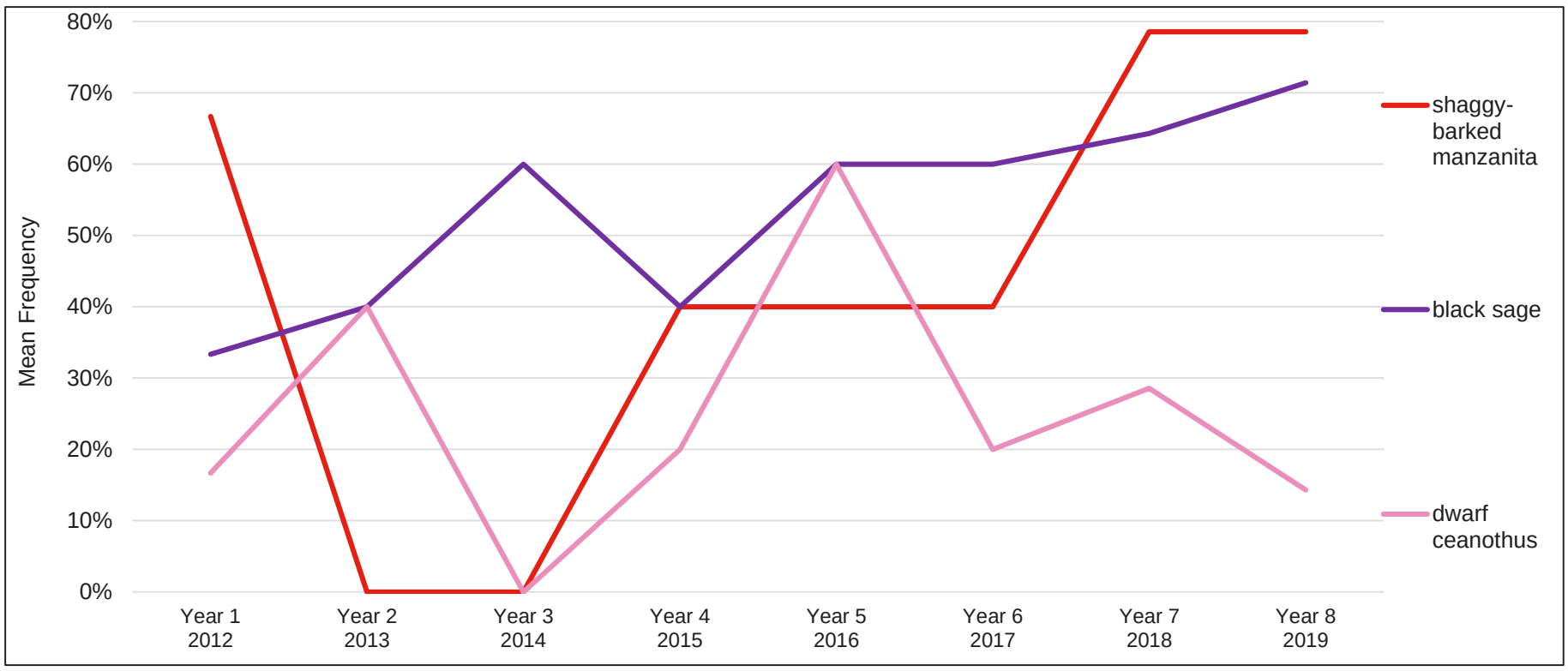


Figure A16

South Range 44 SCA and Central NCAs– Mean Frequency of Shrub Species after Small-scale Excavation





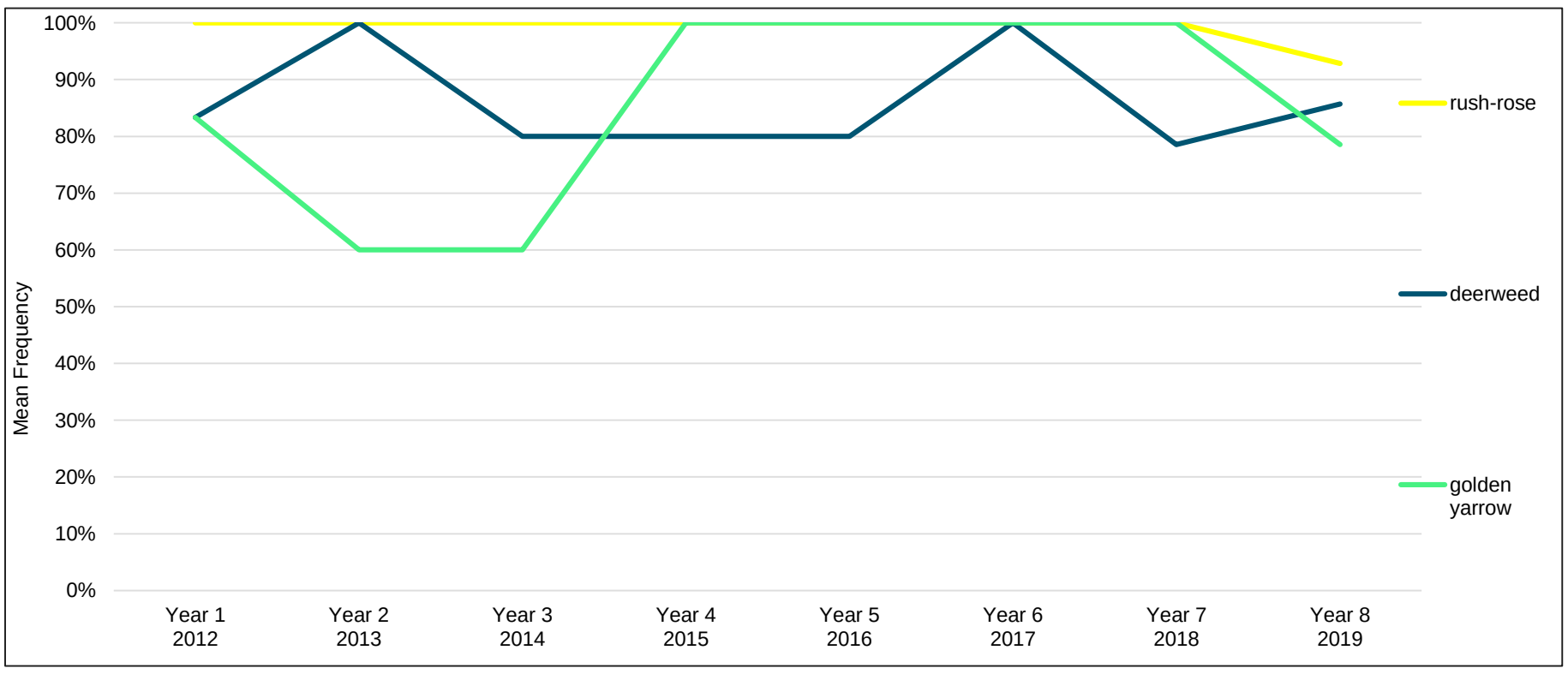
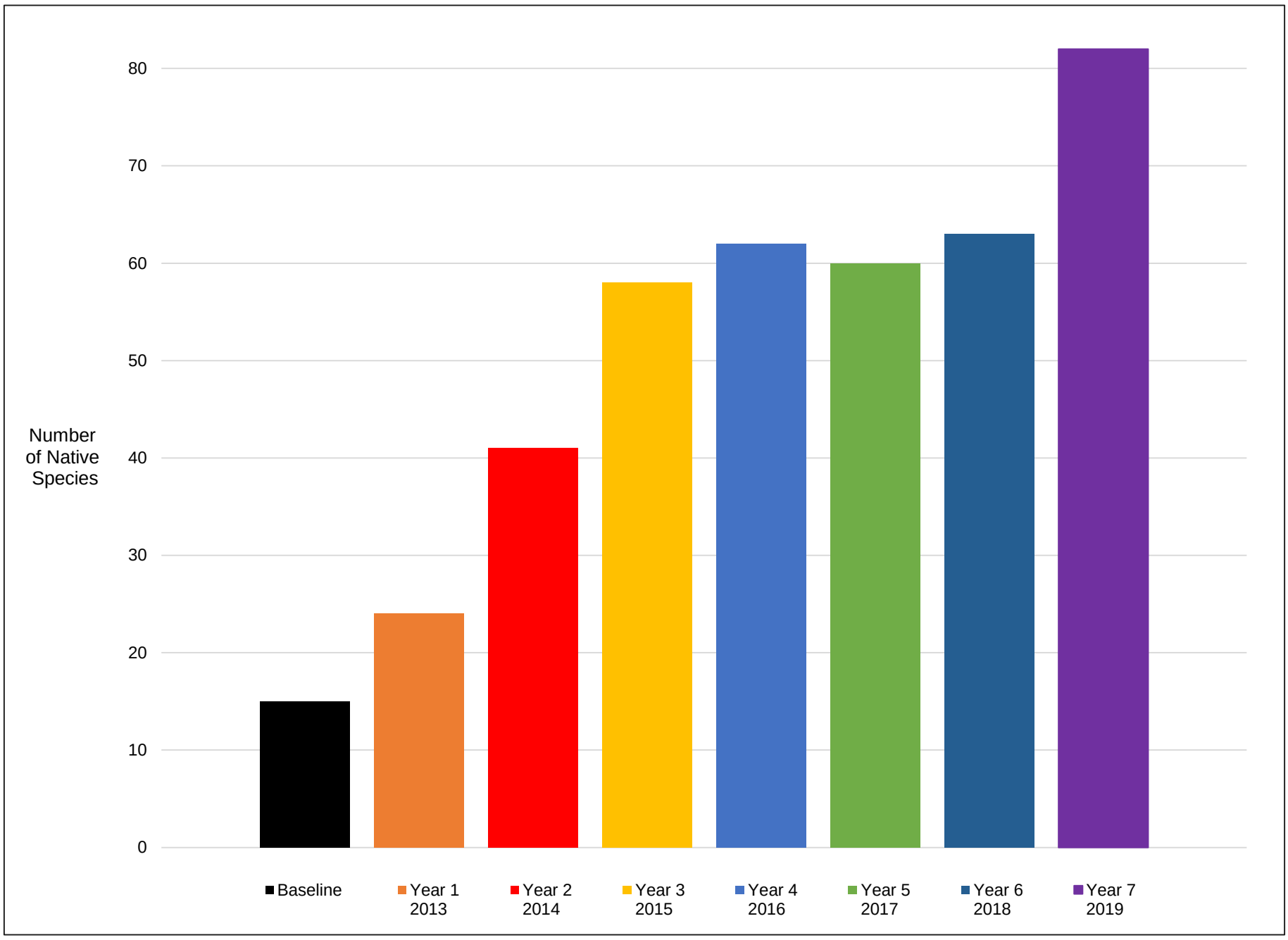


Figure A17

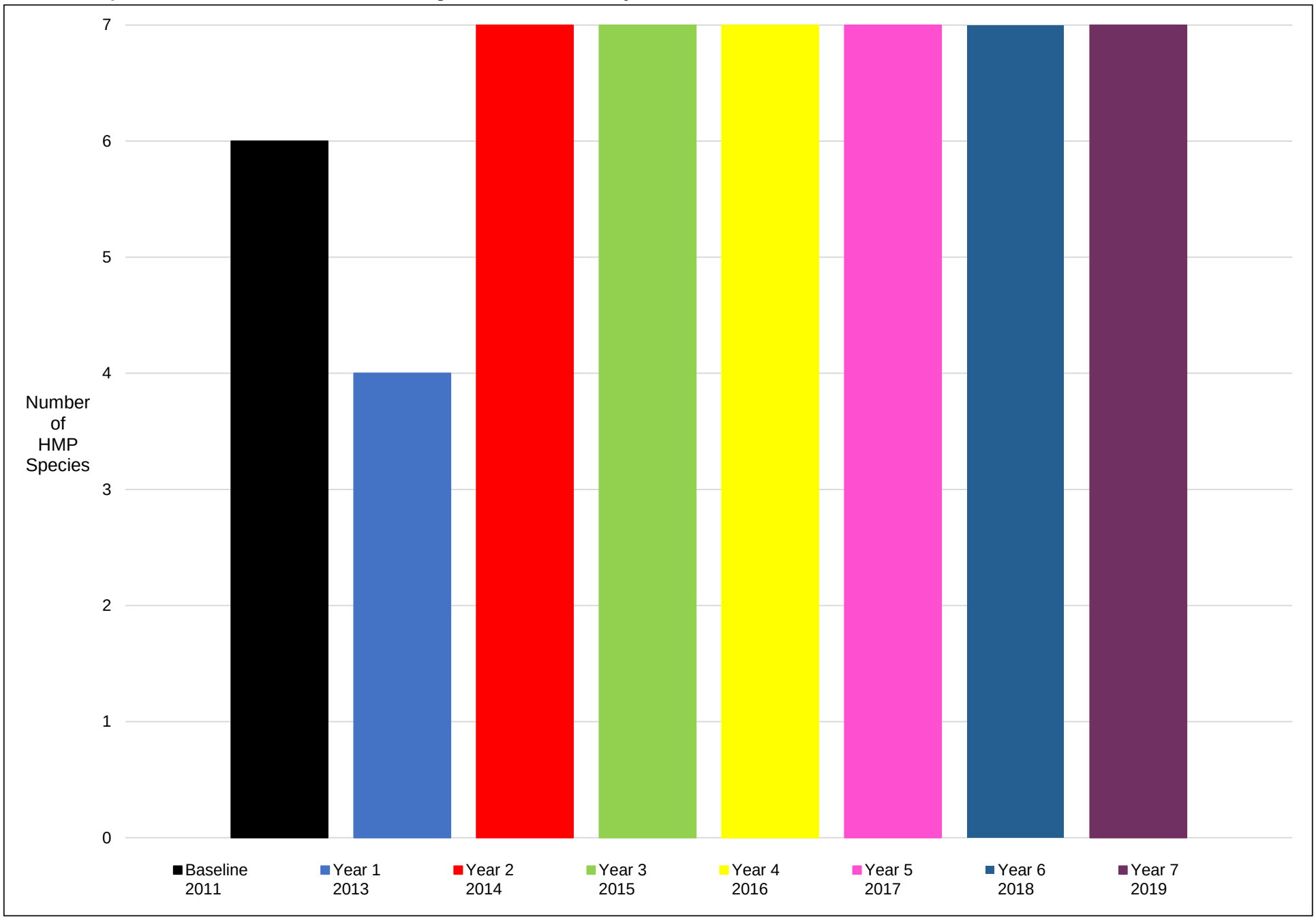
Native Species Richness Observed within Transects in Interim Action Ranges MRA in Areas Subject to Small-scale Excavation 2013 – 2019



Additional transects were monitored in Interim Action Ranges MRA North Range 44 and South Range 44 in 2018 and 2019

Figure A18

HMP Species Presence in Interim Action Ranges MRA in Areas Subject to Small-scale Excavation 2013 - 2019



Maximum number of HMP species in Interim Action Ranges is seven.
Observed HMP species sandmat manzanita, Monterey ceanothus, Eastwood's ericameria, Monterey spineflower, seaside bird's-beak, coast wallflower, and sand (Monterey) gilia.

Appendix A – 2019 Interim Action Ranges MRA Photo-documentation

Photograph 1

Interim Action Ranges (IAR) Munitions Response Area (MRA), North Range 44

Seeds broadcast in December 2018 to enhance native cover observed germinating. Mulch was spread around existing plants to accelerate growth.

15 January 2019

Photograph 2

IAR MRA, North Range 44.

Seedlings germinating in created depressions ("divots") in small scale excavation areas in April 2019.

30 April 2019

Photograph 3

IAR MRA, South Range 44

Seeds were broadcast and raked in this small-scale excavation area during December 2018 to enhance native cover.

15 January 2019

Photograph 4

IAR MRA, South Range 44.

Mulch spread around shrubs to deter water loss and provide nutrients to young plants, such as dune-heather (*Ericameria ericoides*).

15 January 2019

Photograph 5

North Range 44

Vegetation Transect 104 in small-scale excavation area. Large sandmat manzanita visible in foreground.

14 March 2019

Photograph 6

South Range 44

Vegetation Transect 5 in small-scale excavation area, with patches of green sandmat manzanita visible in background.

14 March 2019

Photograph 7

North Range 44

Vegetation Transect 413 in small-scale excavation area supporting coast horkelia (*Horkelia cuneata*) and other native species.

14 March 2019

Photograph 8

South Range 44

Vegetation Transect 311 located in small-scale excavation area; note scattered small shrubs and narrowing corridor as adjacent vegetation grows into the linear area.

14 March 2019

Photograph 9

North Range 44

Vegetation Transect 308 in small-scale excavation area supporting poison-oak (*Toxicodendron diversilobum*) and other native species.

30 April 2019

Photograph 10

South Range 44

Vegetation Transect 415 located in small-scale excavation area supporting dwarf ceanothus (*Ceanothus dentatus)* and black sage (*Salvia mellifera*).

30 April 2019

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
2008-TA-0164

February 8, 2008

Phillip A. Lebednik, Ph.D.
Ecosystems Services Group
LFR, Inc.
1900 Powell Street, 12th Floor
Emeryville, California 94608-1814

Subject: Authorization of Biologists for the Former Fort Ord Munitions and Explosives Cleanup (MEC) for ESCA Parcels, Monterey County, California (1-8-05-F-47)

Dear Dr. Lebednik:

We have reviewed your request to approve yourself, John Grattan, Pablo R. Martos, and Mitch C. Siemens to monitor, survey for, capture, and relocate individuals of the federally threatened California tiger salamander (*Ambystoma californiense*), as authorized biologists, during munitions and explosives cleanup (MEC) on the former Fort Ord. Your request, dated December 12, 2007, was received in our office, via electronic mail message, the same day. You would perform the requested activities pursuant to the terms and conditions of the biological opinion (1-8-05-F-47), issued to the U.S. Army on March 14, 2005.

After reviewing the materials you submitted with your request, we have concluded that Mr. Siemens possesses the necessary training and experience to conduct the requested activities for the former Fort Ord MEC project. Therefore, Mr. Siemens is hereby authorized to monitor, survey for, capture, and relocate California tiger salamander pursuant to the terms and conditions of the subject biological opinion.

However, after reviewing the materials you submitted with your request, we have concluded that you, Mr. Grattan, and Mr. Martos do not possess the necessary training and experience to conduct the requested activities for the former Fort Ord MEC project. Therefore, we cannot approve you, Mr. Grattan, or Mr. Martos as authorized biologists at this time.

However, we authorize you, Mr. Grattan, and Mr. Martos to conduct surveys and associated activities for the subject biological opinion under the direct supervision of Mr. Siemens or another Service-approved biologist. Furthermore, you, Mr. Grattan, and Mr. Martos are approved to implement term and condition 6(b), found on page 64 of the March 14, 2005, Biological Opinion: "In unforeseen circumstances, such as when live California tiger salamanders are encountered during a munitions response or soil remediation action, Mr. William Collins, Army biologist, may relocate California tiger salamanders out of the path of danger. When Mr. Collins is unavailable, a resident lead field designee who has received

appropriate training by the Service-authorized biologist, may handle California tiger salamanders for the sole purpose of removing them from the path of danger." This is the only circumstance under which you, Mr. Grattan, and Mr. Martos are authorized to capture or handle a California tiger salamander without being under the direct supervision of a Service-approved biologist.

To receive future approval as an authorized biologist, you should gain additional experience or show that you currently have experience in capture, relocation, and handling techniques for California tiger salamander adults, larvae, and eggs. You can gain this experience while working as a California tiger salamander monitor under the direct supervision of an authorized biologist.

If you have any questions regarding this authorization, please contact Douglass Cooper of my staff at (805) 644-1766, extension 272.

Sincerely,

David M. Pereksta
Assistant Field Supervisor

cc: Bill Collins, U.S. Army

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2011-TA-0408

August 12, 2011

Phil Lebednik, Ph.D.
ESCA RP Senior Qualified Biologist
ARCADIS U.S., Inc.
2033 North Main Street, Suite 340
Walnut Creek, California 94596-3727

Subject: Approval of Biologists to Conduct California Tiger Salamander Capture and Relocation Activities during Munitions and Explosives of Concern Cleanup on Former Fort Ord (1-8-04-F-25R)

Dear Dr. Lebednik:

We have reviewed your request, dated July 1, 2011, for our approval of Thomas A. Graham and Joshua T. Tallis, to conduct capture and relocation activities involving the federally threatened California tiger salamander (*Ambystoma californiense*), pursuant to the subject biological opinion. Your request for approval is made pursuant to term and condition 6(b) of the subject biological opinion.

Based on the information you provided, we have determined that Mr. Graham and Mr. Tallis have sufficient training and experience to capture and relocate California tiger salamanders. We therefore approve these individuals as lead field designees pursuant to the subject biological opinion. Please note that this authorization is valid only for activities conducted in association with the biological opinion, Cleanup and Reuse of Former Fort Ord, Monterey, County, California, as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R (Service 2005)).

If you have any questions, please contact Lena Chang of my staff at (805) 644-1766, extension 302.

Sincerely,

Douglass M. Cooper
Deputy Assistant Field Supervisor

REFERENCES CITED

[Service] U.S. Fish and Wildlife Service. 2005. Biological opinion for the cleanup and reuse of former Fort Ord, Monterey County, California, as it affects California tiger salamander and critical habitat for Contra Costa goldfields (1-8-04-F-25R). U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office, Ventura, California.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
O8EVEN00-2012-TA-0484

September 20, 2012

William K. Collins
Fort Ord Base Realignment and Closure Office
Building 4463 Gigling Road, Room 101
P.O. Box 5008
Monterey, CA 93944-5008

Subject: Authorization of Biologists under the Biological Opinion Cleanup and Reuse of Former Fort Ord, Monterey County, California, as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R)

Dear Mr. Collins:

We have reviewed a request, submitted by ARCADIS U.S., Inc. on August 16, 2012, for our authorization of Cynthia Fenter and Danielle Muir to capture and relocate federally threatened California tiger salamanders (*Ambystoma californiense*). In an electronic message to Kirstina Barry of my staff on August 27, 2012, you confirmed that this request was made on behalf of the U.S. Army. Your request is made pursuant to term and condition 6(b) of the subject biological opinion, which requires our approval of all persons proposed to handle and relocate California tiger salamanders in association with the subject project.

After reviewing the qualifications you submitted with your request, we have concluded that Ms. Fenter and Ms. Muir possess the necessary training and experience to independently conduct the requested activities. We hereby authorize the above-named biologists to capture and relocate federally threatened California tiger salamanders pursuant to the terms and conditions outlined in the biological opinion for the cleanup and reuse former of Fort Ord. Please note that this authorization is valid for the subject project only. We recommend that these biologists review the project description, protective measures, and terms and conditions of biological opinion 1-8-04-F-25R prior to conducting the proposed activities. If you have any questions regarding this authorization, please contact Kirstina Barry at (805) 644-1766, extension 357.

Sincerely,

for

Douglass M. Cooper
Deputy Assistant Field Supervisor

Appendix C – 2019 Aquatic Feature Monitoring Photo-documentation

Photograph 1

Future East Garrison (FEG) Munitions Response Area (MRA), Grenade Range

Restored Aquatic Feature AF09-1A during wet season.

15 January 2019

Photograph 2

FEG MRA, Grenade Range

Reference Aquatic Feature AF09-2.

15 January 2019

Photograph 3

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A during wet season.

13 February 2019

Photograph 4

FEG MRA,
Grenade Range

Reference Aquatic Feature AF09-2.

13 February 2019

Photograph 5

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A.

15 January 2019

Photograph 6

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A (looking west).

13 February 2019

Photograph 7

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A (looking east).

13 February 2019

Photograph 8

FEG MRA,
Grenade Range

Reference Aquatic Feature AF09-2.

13 February 2019

Appendix C – 2019 Aquatic Feature Monitoring Photo-documentation

Photograph 9

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A (left). Reference Aquatic Feature AF09-2 (right).

14 March 2019

Photograph 10

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A (looking east)

14 March 2019

Appendix C – 2019 Aquatic Feature Monitoring Photo-documentation

Photograph 11

FEG MRA,
Grenade Range

Reference Aquatic Feature AF09-1B.

14 March 2019

Photograph 12

FEG MRA,
Grenade Range

Reference Aquatic Feature AF09-1B.

14 March 2019

Photograph 13

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A shortly before seasonal drying (looking west)

17 June 2019

Photograph 14

FEG MRA,
Grenade Range

Restored Aquatic Feature AF09-1A in autumn prior to seasonal precipitation (looking east).

October 21, 2019

Appendix C – 2019 Aquatic Feature Monitoring Photo-documentation

Photograph 15

FEG MRA,
Grenade Range

Reference Aquatic Feature AF09-2 in autumn prior to seasonal precipitation (looking west).

October 21, 2019

Photograph 16

FEG MRA,
Grenade Range

Reference Aquatic Feature AF09-1B in autumn prior to seasonal precipitation (looking north).

October 21, 2019

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date:	Time begin monitoring/treatment:	Time end monitoring/treatment:
1/15/2019	10:00	10:25

Observer(s) - please list all persons present:
J. Tallis

Weather conditions:
Lightly raining after night of rain

General location (MRA, nearby crossroads, etc):	Specific location description:
FEC	Grenade Range

Coordinates:
—

Describe any ongoing human disturbance in location where infestation occurs along with any related observations:
None

Target (or other highly invasive) weed species observed:
Iceplant

Diagnostic features observed:
vegetative growth

Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%

Surrounding vegetation type:
Central Maritime Chaparral

Wildlife observed in area (if relevant to weed treatment efforts):
—

Weed treatment activities:
Hand pulled 15 plants

Photographs:
uploaded to CA/NV Bio Sharepoint

Notes, non-target weeds observed or treated:
No, except for abundant Tribolium obliterum

Followup activities and dates:
No

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 1/15/2019	Time begin monitoring/treatment: 11:00	Time end monitoring/treatment: 11:35

Observer(s) - please list all persons present: J. Tallis

Weather conditions: Overcast, occasionally sprinkling

General location (MRA, nearby crossroads, etc): IAR	Specific location description: NR44 + SR44

Coordinates: —

Describe any ongoing human disturbance in location where infestation occurs along with any related observations: No

Target (or other highly invasive) weed species observed: Pampas Grass / Iceplant

Diagnostic features observed: Both vegetative young plants but not seedlings.

Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%

Surrounding vegetation type: Central Maritime chaparral

Wildlife observed in area (if relevant to weed treatment efforts): No

Weed treatment activities: Hand pulled 8 iceplant in SR44. Hand pulled 3 pampas grass in habitat area 150 ft north of NR44

Photographs: Sharepoint

Notes, non-target weeds observed or treated: —

Followup activities and dates: —

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date:	Time begin monitoring/treatment:	Time end monitoring/treatment:
2/13/2019	11:30am	12:00pm

Observer(s) - please list all persons present:
J. Tallis

Weather conditions:
Cloudy, ~~rain~~ + raining in morning

General location (MRA, nearby crossroads, etc):	Specific location description:
FEG	Grenade Range

Coordinates:
—

Describe any ongoing human disturbance in location where infestation occurs along with any related observations:
ND

Target (or other highly invasive) weed species observed:
None observed

Diagnostic features observed:
NA

Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%

Surrounding vegetation type:
Central Maritime Chaparral/oak woodland

Wildlife observed in area (if relevant to weed treatment efforts):
ND

Weed treatment activities:
None needed

Photographs:

Notes, non-target weeds observed or treated:
Capetown grass (Tribolium obliterum) is very widespread but is helping with soil stabilization.

Followup activities and dates:

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 2/13/2019	Time begin monitoring/treatment: 1300	Time end monitoring/treatment: ~~15:30~~ 14:00

Observer(s) - please list all persons present: J. Tallis

Weather conditions: Overcast. Rain fell in morning, 62°F

General location (MRA, nearby crossroads, etc): IAR	Specific location description: NR44

Coordinates: —

Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None

Target (or other highly invasive) weed species observed: Pampas grass

Diagnostic features observed: Mainly vegetative with few flowering stocks

Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%

Surrounding vegetation type: Central Maritime chaparral

Wildlife observed in area (if relevant to weed treatment efforts): Coyote + deer prints but likely unrelated to weeds

Weed treatment activities: Removed 4 medium sized pampas grass plants with shovel

Photographs:

Notes, non-target weeds observed or treated: None

Followup activities and dates: None scheduled until March when vegetation monitoring likely to occurs

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 2/14/2019	Time begin monitoring/treatment: 14:00	Time end monitoring/treatment: 15:30
Observer(s) - please list all persons present: J. Tallis		
Weather conditions: Cloudy, 60's °F,		
General location (MRA, nearby crossroads, etc): 1AR	Specific location description: SR 44	
Coordinates: —		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None		
Target (or other highly invasive) weed species observed: Iceplant		
Diagnostic features observed: Vegetative		
Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime Chaparral		
Wildlife observed in area (if relevant to weed treatment efforts): NO		
Weed treatment activities: Removed approx. 1 wheelbarrow		
Photographs: JTT iPhone backed up to Sharepoint		
Notes, non-target weeds observed or treated: None		
Followup activities and dates: March 2019 monitoring		

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 3/14/2019	Time begin monitoring/treatment: 11:30	Time end monitoring/treatment: 12:30
Observer(s) - please list all persons present: J. Tallis		
Weather conditions: Clear		
General location (MRA, nearby crossroads, etc): FEG	Specific location description: Grenade Range	
Coordinates: —		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None		
Target (or other highly invasive) weed species observed: Iceplant		
Diagnostic features observed: Vegetative		
Estimated population size:	1	2-30 (3 tiny plants)
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime Chaparral + Oak woodland		
Wildlife observed in area (if relevant to weed treatment efforts): None		
Weed treatment activities: Hand Removal		
Photographs: JT iPhone		
Notes, non-target weeds observed or treated: —		
Followup activities and dates: —		

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 3/14/2019	Time begin monitoring/treatment: 10:30	Time end monitoring/treatment: 11:30
Observer(s) - please list all persons present: J. Tallis		
Weather conditions: Clear, 60's °F		
General location (MRA, nearby crossroads, etc): IAR	Specific location description: NR44 + SR44	
Coordinates: —		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None		
Target (or other highly invasive) weed species observed: Ice plant		
Diagnostic features observed: Vegetative and adjacent flowering.		
Estimated population size:	1	2-30 2 medium sized
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime Chaparral.		
Wildlife observed in area (if relevant to weed treatment efforts): No		
Weed treatment activities: Hand removal		
Photographs:		
Notes, non-target weeds observed or treated: No		
Followup activities and dates: No		

ESCA RP at the Former Fort Ord

Weed Management Program

Target Weed Monitoring and Treatment Field Form

Date: 6/17/2019	Time begin monitoring/treatment: 1400	Time end monitoring/treatment: 1500
Observer(s) - please list all persons present: J. Tellis, S. Gomez, A. Taylor		
Weather conditions: Partly cloudy, 68°F		
General location (MRA, nearby crossroads, etc): IAR	Specific location description: 1247	
Coordinates: —		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None		
Target (or other highly invasive) weed species observed: Pampas grass + iceplant		
Diagnostic features observed: Vegetative		
Estimated population size:	1 pampas	2-30 iceplant
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime Chaparral		
Wildlife observed in area (if relevant to weed treatment efforts): None		
Weed treatment activities: Hand pulled all ice plant (19 plants)		
Photographs: JT iPhone		
Notes, non-target weeds observed or treated: No		
Followup activities and dates: Ongoing monitoring		

ESCA RP at the Former Fort Ord

Weed Management Program

Target Weed Monitoring and Treatment Field Form

Date: 6/17/2019	Time begin monitoring/treatment: 1300	Time end monitoring/treatment: 1400
Observer(s) - please list all persons present: J. Tallis, J. Gamez, A. Taylor		
Weather conditions: Partly cloudy, 60°F		
General location (MRA, nearby crossroads, etc): IAR	Specific location description: R44	
Coordinates: —		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None		
Target (or other highly invasive) weed species observed: iceplant		
Diagnostic features observed: Vegetative		
Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1%	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime Chaparral		
Wildlife observed in area (if relevant to weed treatment efforts): None		
Weed treatment activities: Hand pull iceplant clones growing into small-scale excavations.		
Photographs: JT_IMG_		
Notes, non-target weeds observed or treated: Minimal annual grasses + forbs		
Followup activities and dates: None		

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 6/17/2019	Time begin monitoring/treatment: 09:30	Time end monitoring/treatment: 10:30
Observer(s) - please list all persons present: J. Tallis, J. Gomez, A. Taylor		
Weather conditions: Overcast, 66°		
General location (MRA, nearby crossroads, etc): FEG	Specific location description: Grenade Range	
Coordinates: —		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None		
Target (or other highly invasive) weed species observed: 1 Ice plant		
Diagnostic features observed: Vegetative		
Estimated population size:	1	2-30
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1% 0%	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime chaparral		
Wildlife observed in area (if relevant to weed treatment efforts): Coyote, jack rabbit, hummingbird		
Weed treatment activities: Hand pulled 20 iceplant seedlings		
Photographs: JT iPhone > Sharepoint		
Notes, non-target weeds observed or treated: Tribolium obliterum		
Followup activities and dates: None		

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: J. Talbs
2019-R47-1	6/17/2019	Other surveyors: J. Gamez, A. Taylor
	UID:	Location Name: IAR Range 47

GPS name: iPhone — For Relevé only: Bearing°, left axis at ID point ____ of Long / Short side

UTME ____ UTMN ____ WGS 84 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.6236971 LONG -121.7955189

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: JG phone Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1), 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ____ m

Exposure, Actual °: 0° NE NW SE SW Flat Variable | Steepness, Actual °: 2° 0° 1-5° >5-25° >25

Topography: Macro: top upper (mid) (lower) bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_2O: 0 BA Stems: | Litter: 7 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 92 =100%

% Current year bioturbation 1 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 site burnt, 2017-2012 excavation for munitions excavation

Disturbance code / Intensity (L,M,H): ___/___ ___/___ ___/___ ___/___ ___/___ "Other" ____/___

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3 mature (1-25% dead)), S4 decadent (>25% dead)

Herbaceous: (H1 (<12" plant ht.)), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Baccharis pilularis shrubland alliance

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____ / ____ / ____ / ____

Confidence in Alliance identification: L M (H) Explain: >50% Baccharis absolute cover

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification of mapping information: ____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R47-Sq 1 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 55 **Total % Vasc Veg cover:** 60

% Cover - **Conifer tree / Hardwood tree:** 0 / 0 **Regenerating Tree:** 0 **Shrub:** 50 **Herbaceous:** 20

Height Class - Conifer tree / Hardwood tree: 0 / 0 **Regenerating Tree:** 0 **Shrub:** 3 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Baccharis pilularis ssp	45		
S	Adenostoma fasciculata	3		
S	Ceanothus dentatus	1		
S	Ceanothus rigidus	1		
S	Arctostaphylos tomentosa	<1		
S	Frangula californica	<1		
S	Diplacus aurantiacus	<1		
S	Salvia mellifera	<1		
S	Arctostaphylos pumila	<1		
H	Acmispon glaber	6		
H	Navarretia intertexta	r		
H	Horkelia cuneata	1		
H	Astragalus arrensis	r		
	Madia sp	r		
	Festuca myuros	10		
	Chorizanthe diffusa	r		
↓	Erigeron canadensis	r		

No pampas grass, French broom, ice plant

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: Alyssa Taylor
2019-R47-2	6/17/19	Other surveyors: J. Gamez, J. Tallis
	UID:	Location Name: IAR RANGE 47

GPS name: iphone — For Relevé only: **Bearing°**, left axis at ID point____ **of Long / Short** side

UTME ____ UTMN ____ W6584____ Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.623156 LONG -121.796662

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: **Base point ID** ____ **Projected UTMs: UTME** ____ **UTMN** ____

Camera Name: iG phone **Cardinal photos at ID point:** NESW

Other photos:

Stand Size (acres): (≤1,) 1-5, >5 | **Plot Area (m²):** 100 / 400 | **Plot Dimensions** 20 x 20 m | **RA Radius** ____ m

Exposure, Actual °: 0° NE NW SE SW Flat Variable | **Steepness, Actual °:** ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) lower bottom | **Micro:** convex (flat) concave undulating

Geology code: SAND **Soil Texture code:** MESA | (Upland) or **Wetland/Riparian** (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H20: 0 **BA Stems:** 3 **Litter:** 12 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 6 **Fines:** 85 =100%

% Current year bioturbation 1 **Past bioturbation present?** Yes / (No) | **% Hoof punch** 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 Site burned - no fire evidence remaining

2011-2012 - excavations for munitions clearance

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ **"Other"** ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), **T4** (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), **S2** young (<1% dead), (**S3** mature (1-25% dead), **S4** decadent (>25% dead)

Herbaceous (**H1**) (<12" plant ht.), **H2** (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), **2** (2-10ft. ht.), **3** (10-20ft. ht.), **4** (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), **2** (1.5-6" diam.), **3** (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ____

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M H Explain: ____

Phenology (E,P,L): Herb P L **Shrub** P **Tree** ____ **Other identification or mapping information:**

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R47-2 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 45 **Total % Vasc Veg cover:** 55

% Cover - **Conifer tree / Hardwood tree:** 0 / 0 **Regenerating Tree:** 0 **Shrub:** 70 **Herbaceous:** 30

Height Class - Conifer tree / Hardwood tree: — / — **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Ericameria ericoides	15		
S	Ericameria fasciculata	15		
S	Salvia mellifera	5		
S	Chemise/Adenostoma fasciculata	9		
S	Baccharis pillularis	5		
S	Ceanothus rigidus	10		
S	Ceanothus dentatus	10		
S	Actostaphyllus tomentose	1		
~~S~~	~~Actostaphyllus~~	—	—	
S	Diplacus aurantiacus	3		
S	Crochanthemum scoparium			
H	Horkelia cuneata	5		
H	Acmispon glaber	5		
H	Castellea exerta	5		
H	Navaretia intertexta	3		
H	Logfia gallica	1		
S	Eriophyllum confertiflorum	1		
H	festuca Myros	10		
H	Anagalus arvensis	1		
S	Arctostaphyllus pumella	<1		
	No ice plant			
	No French broom			
	No pampas grass			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type: Alliance / Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: Alyssa Taylor
2019-247-13	6/17/19	Other surveyors: J. Gomez, J. Tallis
	UID:	Location Name: IAR Range 47

GPS name: iphone — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ____ UTMN ____ WGS84 ____ Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.62267 11 LONG -121.7958451

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: J6 phone Cardinal photos at ID point: E S W N

Other photos:

Stand Size (acres): (<1) 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ____ m

Exposure, Actual °: 0° NE NW SE SW Flat Variable | Steepness, Actual °: ____ 0° 1-5° (>5-25°) >25

Topography: Macro: top (upper) (mid) lower bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESIL | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_2O: 0 BA Stems: 3 Litter: 5 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 92 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 - fire, no fire sign remaining

2011-2012. Excavations for munitions clearance

pre-existing ice-plant mats East and South of work area.

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ____

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M H Explain: ____

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R47-3 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 3 **Total % Vasc Veg cover:** 480

% Cover - **Conifer tree / Hardwood tree:** / / **Regenerating Tree:** / **Shrub:** 63 **Herbaceous:** 32

Height Class - Conifer tree / Hardwood tree: / / **Regenerating Tree:** / **Shrub:** 3 **Herbaceous:** ____

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Baccharis pilularis	35		
S	Arctostaphyllus tomentosa	8		
S	Salvia mellifera	43		
S	Arctostaphyllus pumella	25		
S	Toxicodendron diversolubum	R		
S	Ericamera ericoides	17		
S	Ericamera fasciculata	5		
S	Diplacus aurantiacus	2		
S	Crochanthemum scoparium	2		
S	Adenostoma fasciculatum	3		
S	Ceanothus rigidus	1		
H	Artemisia glabor	5		
H	Chorizanthe diffusa	R		
H	Horkelia cuneata	4		
H	Carex globosa	R		
H	CORTADERIA SELLOANA	R		1 plant
	No French Broom			
	No Ice plant			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type: Alliance / Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: JOSEPH GAMEZ
2019-R47-4	6/17/19	Other surveyors: ALYSSA TAYLOR, JOSHUA ~~TAYLOR~~ TALLIS
	UID:	Location Name: IAR RANGE 47

GPS name: iphone — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ___ UTMN -WGS84 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 34.622543 LONG -121.795330

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing° ____ inclination° ____

and record: Base point ID _____ Projected UTMs: UTME ___ UTMN ___

Camera Name: J6 Phone Cardinal photos at ID point: ESWN

Other photos:

Stand Size (acres): (<1), 1-5, >5 | Plot Area (m^2): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius____ m

Exposure, Actual °: 0° NE NW SE SW Flat Variable | Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) lower bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_20: 0 BA Stems: 3 Litter: 5 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 92 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 - FIRE, NO FIRE SIGN REMAINING

2011-2012 - EXCAVATIONS FOR MUNITIONS, CLEARANCE

Disturbance code / Intensity (L,M,H): ___/___ ___/___ ___/___ ___/___ ___/___ "Other" _____/___

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ____

Field-assessed Association name (optional): _____

Adjacent Alliances/direction: _____/_____, _____/_____

Confidence in Alliance identification: L M H Explain: _____

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification or mapping information: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R47-4 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 35 **Total % Vasc Veg cover:** 80

% Cover - **Conifer tree / Hardwood tree:** - / - **Regenerating Tree:** - **Shrub:** 75 **Herbaceous:** 7

Height Class - Conifer tree / Hardwood tree: - / - **Regenerating Tree:** - **Shrub:** 2 **Herbaceous:** ____

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	CEANOTHUS DENTATUS	17		
S	SALVIA MELLIFERA	16		
S	BACCHARIS PILULARIS	7		
S	ARCTOSTOPHYLLUS TOMENTOSA	5		
S	CEANOTHUS RIGIDUS	10		
S	ERICAMERIA ERICOIDES	9		
S	ERICAMERIA FASCICULATA	5		
S	DIPLACUS AURANTIACUS	6		
	[illegible]			
H	ACMISPON GLABER	4		
S	CROCANTHEMUM SCOPARIUM	6		
S	ADENOSTOMA FASCICULATUM	3		
S	ARCTOSTOPHYLLUS PUMILA	2		
S	HORKELIA RUNEATA	6		
H	CHORIZANTHE DIFFUSA	R		
	NO PAMPAS GRASS			
	NO ICE PLANT			
	NO FRENCH BROOM			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: JOSEPH GAMEZ
2019-R47-5	6/17/2019	Other surveyors: ALYSSA TAYLOR, JOSHUA TALLIS
	UID:	Location Name: IAR RANGE 47

GPS name: iphone — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ___ UTMN -WG5847 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.622439 LONG -121.794372

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ___ UTMN ___

Camera Name: JG PHONE Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1) 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ___ m

Exposure, Actual °: 0 NE NW SE SW Flat Variable | Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) lower bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H2O: 0 BA Stems: 3 Litter: 6 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 91 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004: FIRE, NO FIRE SIGN REMAINING

2011-2012: EXCAVATIONS FOR MUNITIONS CLEARANCE

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ARCTOSTOPHYLLUS TOMENTOSA SHRUBLAND ALLIANCE

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M H Explain: ____

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R47-5 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 35 **Total % Vasc Veg cover:** 85

% Cover - Conifer tree / Hardwood tree: - / - Regenerating Tree: - Shrub: 75 Herbaceous: 6

Height Class - Conifer tree / Hardwood tree: - / - Regenerating Tree: - Shrub: 2 Herbaceous: ____

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	SALVIA MELLIFERA	28		
S	ADENOSTOMA FASCICULATA	8		
S	ARCTOSTOPHYLLUS PUMELLA	2		
S	ARCTOSTOPHYLLUS TOMENTOSA	7		
S	CROCANTHEMUM SCOPARIUM	7		
S	ERICAMERIA FASCICULATUM	3		
S	ERICAMERIA ERICOIDES	6		
S	BACCHARIS PILULARIS	4		
S	CEANOTHUS RIGIDUS	7		
S	CEANOTHUS DENTATUS	5		
S	HORKELIA CUNEATA	2		
H	ACMISPON GLABER	1		
S	ERIOGERON CANADENSIS	T		
S	CARPOBROTUS EDULIS	T		HAS BEEN REMOVED
	NO FRENCH BROOM			
	NO PAMPAS GRASS			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type: Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: JOSEPH GAMEZ
2019-R44-1	6/18/2019	Other surveyors: J. Tallis
	UID:	Location Name: IAR RANGE 44

GPS name: JG phone — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ____ UTMN -WGS84 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.625414 LONG -121.789635

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: JG Phone Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1) 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ____ m

Exposure, Actual °: ____ NE NW SE (SW) Flat Variable | Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) lower bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESIL | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_20: 0 BA Stems: 3 Litter: 7 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 90 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004: FIRE, NO FIRE SIGN REMAINING

2011-2012: EXCAVATIONS FOR MUNITIONS, CLEARANCE

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ARCTOSTAPHYLLIS TOMENTOSA SHRUBLAND ALLIANCE

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M (H) Explain: ____

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification or mapping information: ____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

SPECIES SHEET

Database #: 2019-R44-1

IV. VEGETATION DESCRIPTION

% NonVasc cover: 30 **Total % Vasc Veg cover:** 82

% Cover - **Conifer tree / Hardwood tree:** - / - **Regenerating Tree:** - **Shrub:** 75 **Herbaceous:** 7

Height Class - Conifer tree / Hardwood tree: - / - **Regenerating Tree:** - **Shrub:** 2 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	SALVIA MELLIFERA	9		
S	ARCTOSTAPHYLLIS PUMELLA	18		
S	A. TOMENTOSA	20		
S	ADENOSTOMA FASCICULATA	9		
S	CEANOTHUS RIGIDUS	10		
S	C. DENTATUS	7		
S	DENNSTAEDTIACEAE SP. 1	2	✓	
S	UNKNOWN SP. 1	3	✓	
S	ERIOPHYLLUM SP. 1	2	✓	
S	CROCANTHEMUM SCOPARIUM	1		
H	HORKELIA CUNEATA	R		
S	QUERCUS SP. 1	2		
H	CHORIZANTHE DIFFUSA	R		
	NO ICE PLANT			
	NO PAMPAS GRASS			
	NO FRENCH BROOM			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type: Alliance / Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: Joseph Gamez
2019-R44-2	6/18/2019	Other surveyors: J. Tallis
	UID:	Location Name: IAR RANGE 44

GPS name: JG Phone — For Relevé only: Bearing°, left axis at ID point ____ of Long / Short side

UTME ____ UTMN -WGS84 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.624359 LONG -121.789131

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: JG Phone Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1) 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ____ m

Exposure, Actual °: ____ NE NW SE (SW) Flat Variable | Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) (lower) bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESIL | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H20: ○ BA Stems: 4 Litter: 8 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 88 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004! FIRE, NO FIRE SIGN REMAINING

2011-2012' ~~EXCAVATIONS FOR MUNITIONS, CLEARANCE~~ Veg removal for munitions clearance

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ARCTOSTAPHYLLOS TOMENTOSA SHRUBLAND ALLIANCE

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M (H) Explain: ____

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R44-2 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 25 **Total % Vasc Veg cover:** 86

% Cover - **Conifer tree / Hardwood tree:** — / — **Regenerating Tree:** — **Shrub:** 80 **Herbaceous:** 10

Height Class - Conifer tree / Hardwood tree: — / — **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	ARCTOSTAPHYLLIS TOMENTOSA	30		
S	A. PUMELLA	8		
S	ERICAMERIA FASCICULATA	5		
S	E. ERICOIDES	8		
S	BACCHARIS PILULARIS	3		
S	CEANOTHUS RIGIDUS	20		
S	C. DENTATUS	5		
S	CROCANTHEMUM SCOPARIUM	1		
S	UNKNOWN SP. 1	3		FRAGULA
S	UNKNOWN SP. 2	2	✓	GARRYA
S	ERIGERON SP. 1	R	✓	~~ERAM~~ PSEUDOGNAPHALIUM RAMMOSISSUM
S	ADENOSTOMA FASCICULATA	R		
H	HORKELIA CUNEATA	1		
H	ACMISPON GLABER	2		
H	CHORIZANTHE PUNGENS	2		
H	UNKNOWN SP. 3	4	✓	ERIASTRUM VIRGATUM
S	ERIOPHYLLUM SP. 1	1		

ICE PLANT JUST NORTH
- NOT REMOVED DUE TO ANTS
NO PAMPAS GRASS
NO FRENCH BROOM

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance / Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION circle: **Relevé** (circled) or **RA**

Database #:	Date:	Name of recorder: JOSEPH GAMEZ
2019-R44-3	6/18/2019	Other surveyors: J. Tallis
	UID:	Location Name: IAR RANGE 44

GPS name: JG PHONE — For Relevé only: **Bearing°**, left axis at ID point ____ of **Long / Short** side

UTME — ____ UTMN — WG 5 8 4 **Zone: 11 NAD83** GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.623812 LONG -121.789964

GPS within stand? **Yes** (circled) / **No** If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____ .
and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: JG Phone **Cardinal photos at ID point:** NESW
Other photos:

Stand Size (acres): <1 (circled), 1-5, >5 | **Plot Area (m²):** 100 / 400 | **Plot Dimensions** 20 x 20 m | **RA Radius** ____ m
Exposure, Actual °: 0° NE NW SE SW Flat Variable | **Steepness, Actual °:** ____ 0° 1-5° (circled) >5-25° >25

Topography: Macro: top upper mid lower (circled) bottom | **Micro:** convex flat (circled) concave undulating
Geology code: SAND **Soil Texture code:** MESIL | **Upland** (circled) or **Wetland/Riparian** (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)
H₂0: 0 **BA Stems:** 3 **Litter:** 5 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 0 **Fines:** 92 =100%

% Current year bioturbation 3 **Past bioturbation present?** Yes / **No** (circled) | **% Hoof punch** 0
Fire evidence: Yes / **No** (circled) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:
2004: FIRE, NO FIRE SIGN REMAINING
2011-2012: ~~EXCAVATIONS FOR MUNITIONS, CLEARANCE~~ Vegetation clearance to ground level for munitions clearance.

Disturbance code / Intensity (L,M,H): ___/___ ___/___ ___/___ ___/___ ___/___ "Other" ___/___

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), **T4** (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover)
Shrub: S1 seedling (<3 yr. old), **S2** young (<1% dead), **S3** (circled) mature (1-25% dead), **S4** decadent (>25% dead)
Herbaceous: H1 (circled) (<12" plant ht.), **H2** (>12" ht.)
Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), **2** (2-10ft. ht.), **3** (10-20ft. ht.), **4** (>20ft. ht.)
Desert Palm/Joshua Tree: 1 (<1.5" base diameter), **2** (1.5-6" diam.), **3** (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ARCTOSTAPHYLLUS TOMENTOSA SHRUBLAND ALLIANCE
Field-assessed Association name (optional):
Adjacent Alliances/direction: ____/____, ____/____
Confidence in Alliance identification: L M **H** (circled) **Explain:**
Phenology (E,P,L): Herb L Shrub P Tree ____ **Other identification or mapping information:**

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R44-3 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 28 **Total % Vasc Veg cover:** 80

% Cover - **Conifer tree / Hardwood tree:** — / — **Regenerating Tree:** — **Shrub:** 73 **Herbaceous:** 7

Height Class - Conifer tree / Hardwood tree: — / — **Regenerating Tree:** — **Shrub:** 2 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	ARCTOSTAPHYLLIS TOMENTOSA	25		
S	A. PUMELLA	22		
S	CEANOTHUS RIGIDUS	13		
S	C. DENTATUS	3		
S	ADENOSTOMA FASCICULATA	5		
S	SALVIA MELLIFERA	R		
S	QUERCUS SP.	1		
S	ERICAMERIA FASCICULATA	R		
S	ERIOPHYLLUM SP.	3		
S	CROCANTHEMUM SCOPARIUM	R		
H	ACMISPON GLABER	1		
H	HORKELIA CUNEATA	3		
H	ASTER SP. 1	R	✓	CORETHROGYNE FILAGINIFOLIA
S	FRAGULA SP.	1		
	NO ICE PLANT			
	NO FRENCH BROOM			
	NO PAMPAS GRASS			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: JOSEPH GAMEZ
2019-R44-4	6/18/2019	Other surveyors: J. Tallis
	UID:	Location Name: IAR RANGE 44

GPS name: JG PHONE — For Relevé only: Bearing°, left axis at ID point ____ of Long / Short side

UTME ____ UTMN -WGS84 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.622452 LONG -121.790244

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: JG PHONE Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1), 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ____ m

Exposure, Actual °: ____ NE NW SE SW (Flat) Variable | Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) lower bottom | Micro: convex (flat) concave undulating

Geology code: SAND Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_2O: 0 BA Stems: 2 Litter: 3 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 95 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004: FIRE, NO FIRE SIGN REMAINING

2011-2012: ~~EXCAVATIONS FOR MUNITIONS, CLEARANCE~~ Vegetation cut to ground level for munitions clearance

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ARCTOSTAPHYLLIS TOMENTOSA SHRUBLAND ALLIANCE

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M (H) Explain: ____

Phenology (E,P,L): Herb L Shrub P Tree ____ Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

SPECIES SHEET

Database #: 2019-R44-4

IV. VEGETATION DESCRIPTION

% NonVasc cover: 28 **Total % Vasc Veg cover:** 78

% Cover - Conifer tree / Hardwood tree: — / — Regenerating Tree: — Shrub: 73 Herbaceous: 8

Height Class - Conifer tree / Hardwood tree: — / — Regenerating Tree: — Shrub: 2 Herbaceous: 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + =<1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	ARCTOSTAPHYLLIS TOMENTOSA	23		
S	A. PUMELLA	2		
S	SALVIA MELLIFERA	15		
S	ADENOSTOMA FASCICULATA	7		
S	ERICAMERIA FASCICULATA	4		
S	CEANOTHUS DENTATUS	5		
S	C. RIGIDUS	8		
S	ERIOPHYLLUM SP.	2		
S	CROCANTHEMUM SCOPARIUM	6		
H	ACMISPON GLABER	4		
H	HORKELIA CUNEATA	4		
H	NAVARRETIA HAMATA	R		
H	CHORIZANTHE PUNGENS	1		
	NO ICE PLAT			
	NO PAMPAS GRASS			
	NO FRENCH BROOM			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: JOSEPH GAMEZ
2019-R44-5	6/18/2019	Other surveyors: J. Tallis
	UID:	Location Name: JAR RANGE 44

GPS name: JG PHONE — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ___ UTMN ~WGS84 Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.622399 LONG -121.790774

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ___ UTMN ___

Camera Name: JG PHONE Cardinal photos at ID point: ~~NESW~~ NESW

Other photos:

Stand Size (acres): (<1,) 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 20 x 20 m | RA Radius ___ m

Exposure, Actual °: ____ NE NW SE SW (Flat) Variable | Steepness, Actual °: ____ (0°) 1-5° >5-25° >25

Topography: Macro: top upper (mid) lower bottom | Micro: convex (flat) concave undulating

Geology code: SANO Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_20: ○ BA Stems: 2 Litter: 4 Bedrock: 0 Boulder: 0 Stone: 6 Cobble: 0 Gravel: 0 Fines: 94 =100%

% Current year bioturbation 3 Past bioturbation present? Yes / (No) | % Hoof punch 0

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004: FIRE, NO FIRE SIGN REMAINING

2011-2012: ~~EXCAVATION FOR MUNITIONS, CLEARANCE~~ Vegetation cut to ground level for munitions clearance.

Disturbance code / Intensity (L,M,H): ___/___ ___/___ ___/___ ___/___ ___/___ "Other" ___/___

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3 mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: ARCTOSTAPHYLLIS TOMENTOSA SHRUBLAND ALLIANCE

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ___/___, ___/___

Confidence in Alliance identification: L M (H) Explain: ____

Phenology (E,P,L): Herb C Shrub P Tree — Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-R44-5 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 30 Total % Vasc Veg cover: 76

% Cover - Conifer tree / Hardwood tree: — / — Regenerating Tree: — Shrub: 70 Herbaceous: 10

Height Class - Conifer tree / Hardwood tree: — / — Regenerating Tree: — Shrub: 2 Herbaceous: 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	ARCTOSTAPHYLLIS TOMENTOSA	20		
S	A. PUMELLA	5		
S	ADENOSTOMA FASCICULATA	6		
S	CEANOTHUS RIGIDUS	5		
S	C. DENTATUS	2		
S	SALVIA MELLIFERA	18		
S	DIPLACUS AURANTIACUS	7		
S	ERICAMERIA FASCICULATA	5		
S	ERIOPHYLLUM SP.	1		
S	CROCANTHEMUM SCOPARIUM	4		
H	HORKELIA CUNEATA	3		
H	ACMISPON GLABER	2		
H	CHORIZANTHE PUNGENS	1		
H	NAVARRETIA HAMATA	1		
	NO ICE PLANT			
	NO PAMPAS GRASS			
	NO FRENCH BROOM			

Unusual species: _____

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 10/21/2019	Time begin monitoring/treatment: ~~0930~~ 1000	Time end monitoring/treatment: 1115
Observer(s) - please list all persons present: A. Taylor / J. Gamez		
Weather conditions: Sunny, 65°F AM		
General location (MRA, nearby crossroads, etc): FEG	Specific location description: Grenade Range	
Coordinates: 36.6349529, -121.7326841		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: Signs of horses (hoof prints) in aquatic features		
Target (or other highly invasive) weed species observed: Ice plant		
Diagnostic features observed: vegetative, Collector map		
Estimated population size:	1	(2-30) ice plant
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	(<1%) no reproductive (0%) structures observ'd	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Central Maritime Chaparral		
Wildlife observed in area (if relevant to weed treatment efforts): fence lizard, scrubjay, wrentit		
Weed treatment activities: Hand pulling (~20-30 ice plant individuals)		
Photographs: 10:20 AM ; Alyssa iPhone > SharePoint		
Notes, non-target weeds observed or treated: Tribolium obliterum - very few, pulled on sight		
Followup activities and dates: None		

ESCA RP at the Former Fort Ord

Weed Management Program

Target Weed Monitoring and Treatment Field Form

Date:	Time begin monitoring/treatment:	Time end monitoring/treatment:
10/21/2019	1330	1600

Observer(s) - please list all persons present:
A. TAYLOR, J. GAMEZ

Weather conditions:
sunny, clear, low wind, 76°F

General location (MRA, nearby crossroads, etc):	Specific location description:
IAR	SR44

Coordinates:

Describe any ongoing human disturbance in location where infestation occurs along with any related observations: new fenceline & disturbed native veg. creating open space for ice plant. (SW fence line)

Target (or other highly invasive) weed species observed:
ice plant

Diagnostic features observed:
Vegetative

Estimated population size:		
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	<1% no repro. 0% structures	1-10%
11-25%	26-50%	>50%

Surrounding vegetation type:
Central maritime Chaparral

Wildlife observed in area (if relevant to weed treatment efforts):

Weed treatment activities:
Hand pulled where feasible

Photographs: AT; phone

Notes, non-target weeds observed or treated:
NO. ice plant throughout, needs treatment.

Followup activities and dates:
weed crew needed along fenceline

ESCA RP at the Former Fort Ord
Weed Management Program
Target Weed Monitoring and Treatment Field Form

Date: 10/22/2019	Time begin monitoring/treatment: 0900	Time end monitoring/treatment: 1200
Observer(s) - please list all persons present: A. Taylor, J. Gamez		
Weather conditions: Sunny Clear, 65°F. Low winds		
General location (MRA, nearby crossroads, etc): IAR	Specific location description: NR 44	
Coordinates: ✓		
Describe any ongoing human disturbance in location where infestation occurs along with any related observations: None outside of existing scrapes		
Target (or other highly invasive) weed species observed: Ice plant		
Diagnostic features observed: Vegetative		
Estimated population size:	1	(2-30)
31-100	101-500	>500
Proportion of population with reproductive structures (indicate buds, flowers, fruits):	(<1%) one patch had repro. structures	1-10%
11-25%	26-50%	>50%
Surrounding vegetation type: Arctostaphylos tomentosa Shrubland		
Wildlife observed in area (if relevant to weed treatment efforts): W. fence lizard; Wrentit; CA towhee; N. Harrier		
Weed treatment activities: Hand pulling where feasible; weed crew needed		
Photographs: iPhone > SharePoint		
Notes, non-target weeds observed or treated: Italian thistle in N area of NR44		
Followup activities and dates: Weed crew needed in all IAR areas		

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance ARCTOSTAPHYLOS TOMENTOSA SHRUBLAND ALLIANCE Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: Relevé or RA

Database #:	Date:	Name of recorder: Alyssa Taylor
2019-SR44-01	10/21/19	Other surveyors: J. Gamez
	UID:	Location Name: IAR SR44

GPS name: iphone — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ____ UTMN ____ Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.6201210 LONG -121.7919257

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: J6 phone Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1,) 1-5, >5 | Plot Area (m²): 100 / 406 | Plot Dimensions 20 x 20 m | RA Radius____ m

Exposure, Actual °: ____ NE (NW) SE SW Flat ~~Variable~~ Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top upper (mid) lower bottom | Micro: convex flat concave (undulating)

Geology code: SAND Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_2O: 0 BA Stems: 3 Litter: 20 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 0 Fines: 77 =100%

% Current year bioturbation 1 Past bioturbation present? (Yes) / No | % Hoof punch 1

Fire evidence: Yes / (No) (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 - fire; no fire sign remains

2011-2012; excavations for munitions clearance

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), T2 (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Arctostaphylos tomentosa shrubland Alliance

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M (H) Explain: MCV

Phenology (E,P,L): Herb L Shrub L Tree / Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised March 27, 2018)
SPECIES SHEET

Database #: 2019-SCM-01

IV. VEGETATION DESCRIPTION

% NonVasc cover: 0 **Total % Vasc Veg cover:** 75

% Cover - **Conifer tree / Hardwood tree:** / 3 **Regenerating Tree:** / **Shrub:** 70 **Herbaceous:** 2

Height Class - Conifer tree / Hardwood tree: — / 2 **Regenerating Tree:** — **Shrub:** 3 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular
% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Arctostaphylos tomentosa	25		
S	Salvia mellifera	23		
S	Ceanothus rigida	9		
S	Arctostaphylos pumella	5		
S	Diplacus aurantiacus	2		
H	~~Eriophyllum~~ Navarretia hamata	<1		
H	Acmispon glaber	1		
~~T~~ S	Fragula californica	<1		
~~T~~	Quercus agrifolia	2		
H	Herkelia cuneata	2		
~~H~~	ICE PLANT	(2)		
	NO FRENCH BROOM			
	NO PAMPUS GRASS			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance / Association: Arctostaphylos tomentosa Shrubland Alliance

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: (Relevé) or RA

Database #:	Date:	Name of recorder: Alyssa Taylor
2019-SR44-02	10/21/2019	Other surveyors: Joseph Gamez
	UID:	Location Name: IAR SR 44

GPS name: 3G iPhone — For Relevé only: Bearing°, left axis at ID point____ of Long / Short side

UTME ____ UTMN ____ Zone: 11 NAD83 GPS error: ft./ m./ PDOP ____

Decimal degrees: LAT 36.61916614 LONG -121.7902644

GPS within stand? (Yes) / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: Base point ID ____ Projected UTMs: UTME ____ UTMN ____

Camera Name: iPhone Cardinal photos at ID point: NESW

Other photos:

Stand Size (acres): (<1) 1-5, >5 | Plot Area (m²): 100 / 400 | Plot Dimensions 70 x 70 m | RA Radius____ m

Exposure, Actual °: ____ NE (NW) SE SW Flat Variable | Steepness, Actual °: ____ 0° (1-5°) >5-25° >25

Topography: Macro: top (upper) mid lower bottom | Micro: convex flat concave (undulating)

Geology code: SAND Soil Texture code: MESA | (Upland) or Wetland/Riparian (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_2O: 0 BA Stems: 3 Litter: 28 Bedrock: 0 Boulder: 0 Stone: 0 Cobble: 0 Gravel: 1 Fines: 69 =100%

% Current year bioturbation 0 Past bioturbation present? Yes / (No) | % Hoof punch 1

Fire evidence: (Yes) / No (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

Some charred woody debris from 2004 fire present.

Disturbance code / Intensity (L,M,H): ____/____ ____/____ ____/____ ____/____ ____/____ "Other" ____/____

II. HABITAT DESCRIPTION

Tree DBH : T1 (<1" dbh), (T2) (1-6" dbh), T3 (6-11" dbh), T4 (11-24" dbh), T5 (>24" dbh), T6 multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: S1 seedling (<3 yr. old), S2 young (<1% dead), (S3) mature (1-25% dead), S4 decadent (>25% dead)

Herbaceous: (H1) (<12" plant ht.), H2 (>12" ht.)

Desert Riparian Tree/Shrub: 1 (<2ft. stem ht.), 2 (2-10ft. ht.), 3 (10-20ft. ht.), 4 (>20ft. ht.)

Desert Palm/Joshua Tree: 1 (<1.5" base diameter), 2 (1.5-6" diam.), 3 (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Arctostaphylos tomentosa Shrubland Alliance

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M (H) Explain: MCV

Phenology (E,P,L): Herb L Shrub L Tree V Other identification or mapping information:

Combined Vegetation Rapid Assessment and Relevé Field Form
(Revised March 27, 2018)
SPECIES SHEET

Database #: 7019-SR44-02

IV. VEGETATION DESCRIPTION

% NonVasc cover: 0 **Total % Vasc Veg cover:** 78

% Cover - **Conifer tree / Hardwood tree:** 0 / 1 **Regenerating Tree:** 0 **Shrub:** 72 **Herbaceous:** 5

Height Class - Conifer tree / Hardwood tree: 0 / 3 **Regenerating Tree:** 0 **Shrub:** 3 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular
% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Arcostaphyllos tomentosa	30		
S	A. pumera	8		
S	Salvia melifera	17		
S	Ericameria fasciculatum	10		
S	Adenostoma fasiculatum	9		
S	Ceanothus rigidas	12		
S	C. dentatus	7		
H	Horkelia cuneata	4		
H	Aemispon glaber	7		
T	Quercus agrifolia	1		
H	Grass sp.	1		poa secunda
H	Navaretia hamata	<1		
A	ICE PLANT	1		(pulled)
	NO FRENCH BROOM			
	NO PAMPUS GRASS			

Unusual species: _____

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance ARCTOSTAPHYLOS TOMENTOSA SHRUBLAND ALLIANCE Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION circle: **Relevé** or **RA**

Database #:	Date:	Name of recorder: Alyssa Taylor
2019-NR44-01	10/22/2019	Other surveyors: J. Gamez
	UID:	Location Name: IAR NR44

GPS name: JG iPhone For Relevé only: **Bearing°**, left axis at ID point____ **of Long / Short** side

UTME ___ ___ ___ ___ ___ ___ **UTMN** ___ ___ ___ ___ ___ ___ ___ **Zone: 11** **NAD83** GPS error: **ft./ m./ PDOP** ____

Decimal degrees: **LAT** 36 . 6235849 **LONG** -121 . 7899801

GPS within stand? **Yes** / **No** If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: **Base point ID** _____ **Projected UTMs: UTME** ___ ___ ___ ___ ___ ___ **UTMN** ___ ___ ___ ___ ___ ___ ___

Camera Name: iPhone **Cardinal photos at ID point:**

Other photos:

Stand Size (acres): **<1**, 1-5, >5 | **Plot Area (m²):** 100 / 400 | **Plot Dimensions** 20 x 20 m | **RA Radius**____ m

Exposure, Actual °: N NE NW SE SW Flat Variable | **Steepness, Actual °:** _____ 0° **1-5°** > 5-25° > 25

Topography: Macro: top upper mid **lower** bottom | **Micro:** convex flat concave **undulating**

Geology code: SAND **Soil Texture code:** MESA | **Upland** or **Wetland/Riparian** (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_20: 0 **BA Stems:** 3 **Litter:** 25 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 2 **Fines:** 70 **=100%**

% Current year bioturbation 2 **Past bioturbation present?** **Yes** / **No** | **% Hoof punch** 3

Fire evidence: **Yes** / **No** (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 fire; no fire evidence

Disturbance code / Intensity (L,M,H): ____/___ ____/___ ____/___ ____/___ ____/___ **"Other"** _____/___

II. HABITAT DESCRIPTION

Tree DBH : **T1** (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), **T4** (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: **S1** seedling (<3 yr. old), **S2** young (<1% dead), **S3** mature (1-25% dead), **S4** decadent (>25% dead)

Herbaceous: **H1** (<12" plant ht.), **H2** (>12" ht.)

Desert Riparian Tree/Shrub: **1** (<2ft. stem ht.), **2** (2-10ft. ht.), **3** (10-20ft. ht.), **4** (>20ft. ht.)

Desert Palm/Joshua Tree: **1** (<1.5" base diameter), **2** (1.5-6" diam.), **3** (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Arctostaphylos tomentosa shrubland Alliance

Field-assessed Association name (optional): _____

Adjacent Alliances/direction: _____/_____, _____/_____

Confidence in Alliance identification: L M **H** **Explain:** MCV

Phenology (E,P,L): Herb L **Shrub** L **Tree** L **Other identification or mapping information:**

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-NR44-01 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 0 **Total % Vasc Veg cover:** 85

% Cover - **Conifer tree / Hardwood tree:** - / 1 **Regenerating Tree:** - **Shrub:** 80 **Herbaceous:** 4

Height Class - Conifer tree / Hardwood tree: - / 2 **Regenerating Tree:** - **Shrub:** 2 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Arctostaphylos tomentosa	35		
S	A. pumela	30		
S	Adenostoma fasiculatum	27		
S	Ceanothus rigida	12		
S	Salvia melifea	8		
S	Ceanothus dentata	3		
S	Baccharis pilularis	1		
S	Toyon	1		
H	Horkelia cuneata	5		
H	Crocanthemum SCOPARIUM	8		
H	Eriameria ericoides	1		
H	Navaretia hamata	<1		
H	Aster sp.	<1		CORETHROGYNE FILAGINIFOLIA
H	Acmispon glaber	<1		
S	Fragula californica	<1		FRANGULA CALIFORNICA
H	Diplacus aurantiacus	<1		
T	Quercus agrifolia	1		
S	poison oak	<1		Toxicodendron diversilobum
S	Encameria fasciculata	<1		

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

For Office Use:	Final database #:	Final vegetation type:	Alliance: Arctostaphylos tomentosa Shrubland Alliance Association

I. LOCATIONAL/ENVIRONMENTAL DESCRIPTION — circle: **Relevé** or **RA**

Database #:	Date:	Name of recorder: Alyssa Taylor
2019-NR44-02	10/22/2019	Other surveyors: J. Gamez
	UID:	Location Name: IAR NR 44

GPS name: J6 iPhone — For Relevé only: **Bearing°**, left axis at ID point ____ **of Long / Short** side

UTME ___ **UTMN** ___ **Zone: 11** **NAD83** GPS error: **ft./ m./ PDOP** ____

Decimal degrees: **LAT** 36.6224424 **LONG** -121.7900505

GPS within stand? Yes / No If No, cite from GPS to stand: distance (m) ____ bearing ° ____ inclination ° ____

and record: **Base point ID** ____ **Projected UTMs: UTME** ___ **UTMN** ___

Camera Name: iPhone **Cardinal photos at ID point:** NESW

Other photos:

Stand Size (acres): <1, 1-5, >5 | **Plot Area (m²):** 100 / 400 | **Plot Dimensions** 20 x 20 m | **RA Radius** ____ m

Exposure, Actual °: ____ NE NW SE SW Flat Variable | **Steepness, Actual °:** ____ 0° 1-5° > 5-25° > 25

Topography: Macro: top upper mid lower bottom | **Micro:** convex flat concave undulating

Geology code: SAND **Soil Texture code:** MESA | Upland or **Wetland/Riparian** (circle one)

% Surface cover: (Incl. outcrops) (>60cm diam) (25-60cm) (7.5-25cm) (2mm-7.5cm) (Incl sand, mud)

H_20: 0 **BA Stems:** 2 **Litter:** 20 **Bedrock:** 0 **Boulder:** 0 **Stone:** 0 **Cobble:** 0 **Gravel:** 1 **Fines:** 77 =100%

% Current year bioturbation 3 **Past bioturbation present?** Yes / No | **% Hoof punch** 5

Fire evidence: Yes / No (circle one) If yes, describe in Site history section, including date of fire, if known.

Site history, stand age, comments:

2004 fire - no fire evidence

Old munitions practice area

Disturbance code / Intensity (L,M,H): ____/___ ____/___ ____/___ ____/___ ____/___ **"Other"** ____/___

II. HABITAT DESCRIPTION

Tree DBH : **T1** (<1" dbh), **T2** (1-6" dbh), **T3** (6-11" dbh), **T4** (11-24" dbh), **T5** (>24" dbh), **T6** multi-layered (T3 or T4 layer under T5, >60% cover)

Shrub: **S1** seedling (<3 yr. old), **S2** young (<1% dead), **S3** mature (1-25% dead), **S4** decadent (>25% dead)

Herbaceous: **H1** (<12" plant ht.), **H2** (>12" ht.)

Desert Riparian Tree/Shrub: **1** (<2ft. stem ht.), **2** (2-10ft. ht.), **3** (10-20ft. ht.), **4** (>20ft. ht.)

Desert Palm/Joshua Tree: **1** (<1.5" base diameter), **2** (1.5-6" diam.), **3** (>6" diam.)

III. INTERPRETATION OF STAND

Field-assessed vegetation Alliance name: Arctostaphylos tomentosa Shrubland Alliance

Field-assessed Association name (optional): ____

Adjacent Alliances/direction: ____/____, ____/____

Confidence in Alliance identification: L M H **Explain:** MCV, vegetation

Phenology (E,P,L): Herb L Shrub L Tree L **Other identification or mapping information:**

Combined Vegetation Rapid Assessment and Relevé Field Form

(Revised March 27, 2018)

Database #: 2019-NRH4-02 SPECIES SHEET

IV. VEGETATION DESCRIPTION

% NonVasc cover: 1 **Total % Vasc Veg cover:** 77

% Cover - **Conifer tree / Hardwood tree:** — / 1 **Regenerating Tree:** — **Shrub:** 65 **Herbaceous:** 11

Height Class - Conifer tree / Hardwood tree: — / 3 **Regenerating Tree:** — **Shrub:** 2 **Herbaceous:** 1

Height classes: 1=<1/2m, 2=1/2-1m, 3=1-2m, 4=2-5m, 5=5-10m, 6=10-15m, 7=15-20m, 8=20-35m, 9=35-50m, 10=>50m

Stratum categories: T=Tree, A = SApling, E = SEedling, S = Shrub, H= Herb, N= Non-vascular

% Cover Intervals for reference: r = trace, + = <1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, >75%

Stratum	Species	% cover	C	Final species determination
S	Arctostaphylos tomentosa	23		
S	A. pumila	6		
S	Salvia mellifera	12		
S	Adenostoma fasciculatum	10		
S	Ceanothus rigida	6		
S	Ceanothus dentata	1		
S	Ericameria fasiculatum	4		
~~T~~	Quercus agrifolia	1		
H	Horkelia cuneata	7		
S	Fragula California	<1		
H	Crocanthemum SCOPARIUM	18		
H	Aster sp.	1		CORETHROGYNE FILAGINIFOLIA
H	Diplacus AURANTIACUS	1		
H	Navarretia hamatum	1		
S	Lupinus Chamissonis	1		

Unusual species: _____

Appendix D - Weed Monitoring and Maintenance Photo-documentation

Photograph 1

FEG MRA
Grenade Range

Iceplant (*Carpobrotus edulis*) hand-pulled in Grenade Range.

15 January 2019

Photograph 2

IAR MRA

Young pampas grass (*Cortaderia jubata*) pulled within the borderland parcel in the FEG MRA.

15 January 2019

Appendix D - Weed Monitoring and Maintenance Photo-documentation

Photograph 3

FEG MRA,
Grenade Range

Preexisting iceplant on the east side of the disturbance area starting to encroach into former remediation area.

21 October 2019

Photograph 4

FEG MRA,
Grenade Range

Iceplant hand pulled on east slope of the grenade range.

Appendix D - Weed Monitoring and Maintenance Photo-documentation

Photograph 5

IAR MRA, Northeast of North Range 44

Pampas grass removed by shovel.

13 February 2019

Photograph 6

IAR MRA

Young pampas grass pulled within the borderland parcel in the FEG MRA.

13 February 2019

Photograph 7

IAR MRA, South Range 44

Red outline indicates where iceplant has been removed.

13 February 2019

Table D-1
2019 Weed Monitoring and Maintenance

2019 Annual Natural Resource Report - Appendix D

Date	MRA	Location	Type	Findings	Treatment
1/15/2019	FEG	Grenade Range	Monitoring and Treatment	-Several tiny iceplant seedlings.	-Hand pulled 15 iceplant seedlings.
1/15/2019	IAR	North and South Range 44	Monitoring and Treatment	-Iceplant observed in the steep area of FEG east of Aquatic Features.	-Hand pulled 8 iceplant seedlings in south range.
2/13/2019	IAR	North Range 44	Monitoring and Treatment	-Two pampas grass small plants observed.	-Two pampas grass plants removed with shovel.
2/13/2019	FEG	Grenade Range	Monitoring	Capetown grass (*Tribolium obliterum*) is widespread but helping with erosion control.	-None
2/14/2019	IAR	South Range 44	Monitoring and Treatment	-Preexisting iceplant slowly growing into small scale excavation from sides.	-Removed one wheelbarrow of iceplant from small scale excavation.
3/14/2019	FEG	Grenade Range	Monitoring and Treatment	-Few iceplant observed.	-Hand pulled three iceplant seedlings.
3/14/2019	IAR	North and South Range 44	Monitoring and Treatment	-Two medium sized (2-foot diameter) iceplant individuals.	-Removed both iceplant individuals.
4/23/2019	FEG	Grenade Range	Monitoring	-Weed presence documented during vegetation transect monitoring.	-None needed.
5/1/2019	IAR	North and South Range 44	Monitoring	- Potential weed presence documented during vegetation transect monitoring.	-None needed.

Table D-1
2019 Weed Monitoring and Maintenance

2019 Annual Natural Resource Report - Appendix D

Date	MRA	Location	Type	Findings	Treatment
6/17/2019	IAR	Range 47	Monitoring and Treatment	-Minimal iceplant and one pampas seedling (non-flowering) observed.	-Hand pulled 19 iceplant seedlings.
6/17/2019	IAR	North and South Range 44	Monitoring and Treatment	-Minimal iceplant growing beside small scale excavations in South Range 44.	-Hand pulled edges of large iceplant individuals when growing into small-scale excavation areas.
6/17/2019	FEG	Grenade Range	Monitoring and Treatment	-Twenty iceplant seedlings observed on east-facing slope. Capetown grass (*Tribolium obliterum)* growing abundantly.	-Hand pulled all 20 iceplant seedlings.
6/17/2019 and 6/18/2019	IAR	Range 47	Monitoring and Treatment	-Five CNPS releve forms completed using stratified random sampling method. No French broom, no iceplant, no pampas grass observed in any of the sampling locations.	-None needed.
6/17/2019 and 6/18/2019	IAR	North and South Range 44	Monitoring and Treatment	-Five CNPS releve forms completed in using stratified random sampling method. No French broom, no iceplant, no pampas grass observed in any of the sampling locations.	-None needed.
10/21/2019	FEG	Grenade Range	Monitoring and Treatment	-Ice plant patches were found in small areas throughout site and were hand-pulled where feasible. East of aquatic feature AF09-1A a preexisting patch of ice plant (10' x 8') located outside the restoration area was documented with a point and a photo was taken. -No French broom or pampas grass observed within restoration area.	-Hand pulled all isolated iceplant individuals as well as runners of a large mat growing into restoration site.

Table D-1
2019 Weed Monitoring and Maintenance

2019 Annual Natural Resource Report - Appendix D

Date	MRA	Location	Type	Findings	Treatment
10/21/2019	IAR	South Range 44	Monitoring and Treatment	-Ice plant patches were observed on the edges of small-scale excavations and were hand pulled. -No French broom or pampas grass observed. -Two CNPS Rapid Assessment forms were completed for SR44 (database numbers: 2019-SR44-01 and 2019-SR44-02).	-Hand pull iceplant in small-scale excavations.
10/22/2019	IAR	North Range 44	Monitoring and Treatment	-Five ice plant seedlings are present in the eastern most area. A large patch located just outside the restoration area, approximately 6 feet in diameter, contained few flowers in October. -No pampas grass or French broom observed within the restoration area.	-Iceplant removed by hand. -Approximately 6 Italian thistle plants were removed by hand.
12/17/2019	FEG	Grenade Range	Monitoring and Treatment	-Removed majority of ice plant patches within the restoration area, few individuals remain on east slope. No reproductive structures observed. -No French broom or pampas grass observed within restoration area.	-Hand pulled iceplant individuals.
12/17/2019	IAR	South Range 44	Monitoring and Treatment	- Greater than 30 ice plant individuals are present and will need to be addressed by a weeding crew. -No French broom or pampas grass observed. -Two CNPS Rapid Assessment forms were completed for SR44 (database numbers: 2019-SR44-01 and 2019-SR44-02).	-Hand pull iceplant in small-scale excavations.

Table D-1
2019 Weed Monitoring and Maintenance

2019 Annual Natural Resource Report - Appendix D

Date	MRA	Location	Type	Findings	Treatment
12/17/2019	IAR	North Range 44	Monitoring and Treatment	-Ten ice plants are present with one individual containing two flowers late in its phenology. -No pampas grass, French broom, or non-target weeds observed -Two CNPS Rapid Assessment forms were completed for NR44 (database numbers: 2019-NR44-01 and 2019-NR44-02).	-Iceplant removed by hand.

Appendix E – 2019 Erosion Monitoring Photo-documentation

Photograph 1

Interim Action Ranges (IAR) Munitions Response Area (MRA), North Range 44

Water bars (red arrows) functioning properly. Mulch and seedlings are stabilizing soil.

15 January 2019

Photograph 2

Future East Garrison (FEG) MRA, Grenade Range

Water bar (yellow line) functioning properly since 2013. Water (red line) during rain event flowing south along contour into stable vegetated area.

15 January 2019

Appendix E – 2019 Erosion Monitoring Photo-documentation

Photograph 3

IAR MRA, North Range 44

Depressions (shovel dig to form "divot") from 2018 support more seedlings than surrounding areas. Note green blades of blue wildrye (*Elymus glaucus*).

15 January 2019

Photograph 4

IAR MRA, North Range 44

Sandmat manzanita (*Arctostaphylos pumila*) in small-scale excavation area expanding in size and stabilizing sandy substrate. Mulch spread to reduce water loss, add nutrients, and stabilize soil.

15 January 2019

Appendix E – 2019 Erosion Monitoring Photo-documentation

Photograph 5

FEG MRA,
Grenade Range

Manzanitas and other shrubs and subshrubs successfully colonizing and stabilizing the grenade range (looking south from aquatic feature AF09-2).

15 January 2019

Photograph 6

FEG MRA,
Grenade Range

Looking north at escarpment where ponding occurs (yellow oval) and area is revegetating rapidly.

15 January 2019

Appendix E – 2019 Erosion Monitoring Photo-documentation

Photograph 7

IAR MRA, South Range 44

Looking north along small-scale excavation area ("scrape"). Water bars functioning properly.

13 February 2019

Photograph 8

IAR MRA, South Range 44.

Looking south along small-scale excavation area. Water bars functioning properly.

14 March 2019

Appendix E – 2019 Erosion Monitoring Photo-documentation

Photograph 9

Future East Garrison MRA, Grenade Range

East slope of grenade range (facing south). Conditions continue to be stable despite considerable rain of the past weeks.

14 March 2019

Photograph 10

FEG MRA, Grenade Range

The water bar installed in 2013 (dashed line) at the west end of grenade range is still functioning properly to direct any sheet flow north (looking northeast).

21 October 2019

ESCA RP at the Former Fort Ord

ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: FEG Grenade Range

Monitoring Date: 1/15/2019

Weather: Raining gently

Type of Monitoring: Pre-rain event - Post rain-event - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	None		
Blanket	Yes	No	~2-year old erosion blanket still in place and functioning on east slope.
Silt Fence	None		
Sand Bags	Some yes Some no	No	There are some old sand bags that are not functioning but are not needed any longer. Other sand bags are functioning perfectly.

2. Are there signs of water erosion? Y - N - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment:

3. Are there signs of wind erosion? Y - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? Y / N Size and depth:

The only ponding appears beneficial because vegetation does seem to be growing more in these location and ponding doesn't appear to cause erosion.

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No.

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JTT iPhone photos uploaded to SharePoint

ESCA RP at the Former Fort Ord

ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: IAR - NR44

Monitoring Date: 1/15/2019

Weather: Cloudy, occasional drizzle

Type of Monitoring: Pre-rain event - Post rain-event - (Routine) - Other

1. Existing Erosion/Sediment Control Measures Present? (Y) or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	—		
Blanket	—		
Silt Fence	—		
Sand Bags	—		
Water Bar	Yes	No	Includes water diversion bars made of soil and made w/ rolled coir erosion blanket and wooden stakes

2. Are there signs of water erosion? Y - N - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment:

3. Are there signs of wind erosion? (Y) - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments: Very limited erosion of mulch spread last month in polygons (north & small scale excavations).

4. Are there areas of ponding? Y (N) Size and depth:

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, (not present)? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

Newly seeded blue wildrye is sprouting abundantly and is 1-2" tall.

NO. New water diversions are successfully diverting water from flowing down scrapes.

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. Photos uploaded to CA/NV BRO Sharepoint site.

ESCA RP at the Former Fort Ord

ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: IAR - SR44

Monitoring Date: 1/15/2019

Weather: Raining gently

Type of Monitoring: Pre-rain event - Post rain-event - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	—		
Blanket	—		
Silt Fence	—		
Sand Bags	—		
water diversion channels	Yes	No	Water diversion ditches directing stormwater from linear scrapes into adjacent mature habitat are working well.

2. Are there signs of water erosion? Y - N - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment: Circled Y and N because most areas are stable but surface erosion still occurring

3. Are there signs of wind erosion? Y - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? Y / N Size and depth:

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

Newly seeded blue wildrye sprouting in scrapes, mainly in depressions.

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47.

ESCA RP at the Former Fort Ord

ESCA RP Erosion Monitoring Form

Conducted By: J Talls

MRA: FEG

Monitoring Date: 7/13/2019

Weather: Cloudy, raining in morning before survey

Type of Monitoring: Pre-rain event - (Post rain-event) - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? (Y) or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	—		
Blanket	Yes	No	
Silt Fence	—		
Sand Bags	Yes	No	
Water Bars	Yes	No	

2. Are there signs of water erosion? Y - (N) - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment:

3. Are there signs of wind erosion? Y - (N) - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? (Y) N Size and depth:

Several ponds that are a few inches deep and 5-20 ft² exist in the west end of grenade range and behind water bars

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JT iPhone

Uploaded to Sharepoint

ESCA RP at the Former Fort Ord

ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: IAR - NR44

Monitoring Date: 2/13/2019

Weather: Overcast, 60's°F, Rain in AM

Type of Monitoring: Pre-rain event - Post rain-event - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	Yes, generally	Yes, minor	A wattle is working as a water bar to direct water out of a scrape. Sand was cleaned out behind it.
Blanket	—		
Silt Fence	—		
Sand Bags	—		
Water Bars	Yes	No	More water bars could be built in the scrapes but not until the end of Spring growth and vegetation monitoring because it will remove plants.

2. Are there signs of water erosion? Y - N - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment: In a few areas water bars are needed.

3. Are there signs of wind erosion? Y - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? Y / N Size and depth:

In 2 of the polygon small-scale excavations water ponds and helps regrowth.

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No

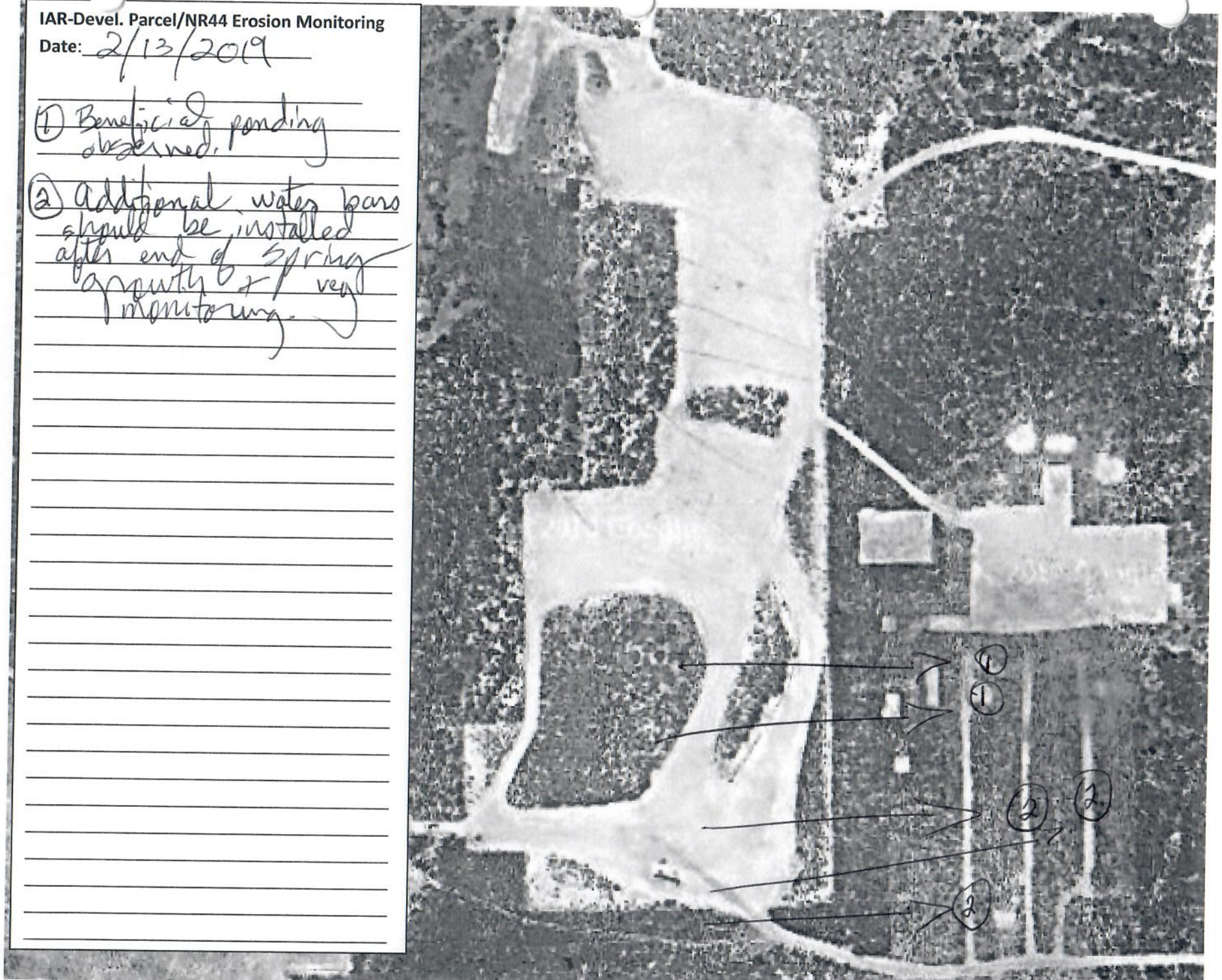
Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JTT iPhone + Sharepoint.

IAR-Devel. Parcel/NR44 Erosion Monitoring

Date: 2/13/2019

① Beneficial ponding observed.

② additional water bars should be installed after end of Spring growth & veg monitoring.



ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: IAR - SR44

Monitoring Date: 2/13/2019

Weather: Cloudy, 60's°F, Rain in AM and prior night

Type of Monitoring: Pre-rain event - Post rain-event - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	—		
Blanket	—		
Silt Fence	—		
Sand Bags	—		
water bars	Yes	No	
Seeding	Yes, barely	No	The blue wildrye appears strangely red and in some case turning brown. Could be due to the cold.

2. Are there signs of water erosion? Y / N / N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment: The water bars are working perfectly but more are needed after vegetation monitoring and spring growth is complete

3. Are there signs of wind erosion? Y - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? Y / N Size and depth:

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No.

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JT iPhone + SP.

ESCA RP Erosion Monitoring Form

Conducted By: Jo Tallis

MRA: FEG - Grenade Range

Monitoring Date: 3/14/2019

Weather: Clear, 65°F

Type of Monitoring: Pre-rain event - Post rain-event - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	NA		
Blanket	Yes	No	area has regrown through blanket
Silt Fence	NA		
Sand Bags	Yes	No	

2. Are there signs of water erosion? Y - (N) - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment

3. Are there signs of wind erosion? Y - (N) - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? (Y) / N Size and depth:

small ponds visible but conditions stable

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JT iPhone

ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: IAR - NR 44

Monitoring Date: 3/14/2019

Weather: Clear

Type of Monitoring: Pre-rain event - (Post rain-event) - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or (N). If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	NA		
Blanket	NA		
Silt Fence	NA		
Sand Bags	NA		
Water Bars	Yes	No	

2. Are there signs of water erosion? (Y) - N - N/A

Rilling - gullying - (Loss of fines from surface) - (Sand/silt deposit in fans/basins)

Comment: Erosion is reduced with new water bars but minimal erosion continues.

3. Are there signs of wind erosion? (Y) - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments: In craters/polygons minor wind erosion has filled micro depressions

4. Are there areas of ponding? Y / (N) Size and depth:

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JT iPhone

ESCA RP Erosion Monitoring Form

Conducted By: J. Tallis

MRA: IAR - SR44

Monitoring Date: 3/14/2019

Weather: Clear

Type of Monitoring: Pre-rain event - Post rain-event - Routine - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	NA		
Blanket	NA		
Silt Fence	NA		
Sand Bags	NA		
Water Bars	Yes	No	More sand on sand-bag water bars could be constructed on steep slopes

2. Are there signs of water erosion? Y - N - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment: On steep areas scraped of slope and there are some barren depo

3. Are there signs of wind erosion? Y - N - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? Y / N Size and depth:

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

6. Do you have other erosion concerns?

No

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. JT iPhone

ESCA RP Erosion Monitoring Form

Conducted By: *J. Tallis*

MRA: *FEG - Grenade Range*

Monitoring Date: *06/17/19*

Weather: *Clear, 74 degrees F*

Type of Monitoring: ***Routine***

1. Existing Erosion/Sediment Control Measures Present? **Y**. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	*None*	*No*	
Blanket	*Present and functioning properly. Now largely grown over.*	*No*	
Silt Fence	*None*	*No*	
Sand Bags	*Present and functioning properly.*	*No*	

2. Are there signs of water erosion? **N**

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comment:

3. Are there signs of wind erosion? **N**

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments: *The site has a lot of hardpan/sandstone that doesn't allow much wind erosion*

4. Are there areas of ponding? Y / N Size and depth:
No ponding observed. Site is dry except for restored aquatic feature.

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe: *Not present*

6. Do you have other erosion concerns?
None. The site is quite stable.

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47.

ESCA RP Erosion Monitoring Form

Conducted By: A. Taylor / J. Gamez

MRA: FEG Grenade Range

Monitoring Date: 10/21/2019

Weather: Sunny, Clear, 70°F

Type of Monitoring: Pre-rain event - Post rain-event - (Routine) - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	None	—	
Blanket	None	—	
Silt Fence	none	—	
Sand Bags	In some areas	NO	Old sand bags in areas with directional flow. Sand bags have deteriorated with time but have created appropriate berms to slow water flow.

2. Are there signs of water erosion? (Y) - N - N/A

(Rilling) - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comments: very Slight rilling

3. Are there signs of wind erosion? Y / (N) - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

N/A

4. Are there areas of ponding? Y / (N) Size and depth:

very dry

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, not present? (Circle applicable)

Describe:

N/A

6. Do you have other erosion concerns?

NO

Alyssa iPhone has site photos. Site location photo is the last photo for this area.

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47.

ESCA RP Erosion Monitoring Form

Conducted By: A. TAYLOR / J. GOMEZ

MRA: IAR SR44

Monitoring Date: 10/21/2019

Weather: Sunny, Clear, 76° F

Type of Monitoring: Pre-rain event - Post rain-event - (Routine) - Other

1. Existing Erosion/Sediment Control Measures Present? (Y) or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles	none	✓	
Blanket	none	✓	
Silt Fence	none	✓	
Sand Bags	none	✓	
water diversion channels	yes	NO	Channels are catching & diverting water from linear scrapes & into mature vegetation as designed.

2. Are there signs of water erosion? (Y) - N - N/A

(Rilling) - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comments: minor rilling - no action needed;

3. Are there signs of wind erosion? Y (N) N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments:

4. Are there areas of ponding? Y (N) Size and depth:

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, (not present?) (Circle applicable)

Describe: no work areas

6. Do you have other erosion concerns?

No

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47. iPhone (AT/JG) > SharePoint

ESCA RP Erosion Monitoring Form

Conducted By: A. Taylor, J. Gamez

MRA: IAR NR 44

Monitoring Date: 10/22/2019

Weather: Sunny, Clear, 65 F; low winds

Type of Monitoring: Pre-rain event - Post rain-event - (Routine) - Other

1. Existing Erosion/Sediment Control Measures Present? Y or N. If N skip to 2.

Type	Functioning Properly? (Evidence of overtopping, undermining or flow around?	Need repair or correction?	Comments/Notes
Wattles NO	✓	✓	
Blanket	Yes, discarded on ROW side	NO	needs removal
Silt Fence NO	✓	✓	
Sand Bags NO	✓	✓	

2. Are there signs of water erosion? Y - (N) - N/A

Rilling - gullying - Loss of fines from surface - Sand/silt deposit in fans/basins

Comments: Stable soils

3. Are there signs of wind erosion? Y - (N) - N/A

Loss of fines on surface - Dunes - Soil on leaves - Other

Comments: Stable vegetation

4. Are there areas of ponding? Y (N) Size and depth:

very dry

5. Work Areas

Stockpiles are surrounded with wattles, covered, compacted, (not present)? (Circle applicable)

Describe: NO work areas outside of scrapes

6. Do you have other erosion concerns?

Soils look very stable with existing vegetation

Note: Photograph all BMPs and areas where flow might become concentrated. In IAR photograph the steep, bare parts of the development parcel adjacent to range 47.

Table E-1
2019 Erosion Monitoring and Maintenance

ESCA RP 2019 Annual Natural Resource Report - Appendix E

Date	MRA	Location	Type of Monitoring	Findings	Actions
1/15/2019	FEG	Grenade Range	Routine/Post-Rain Event	-2+ year old erosion control blanket still in place and functioning on east-facing slope of grenade range. -There are old sand bags that are still functioning effectively and others that are no longer working but not needed. -The grenade range has more native vegetation than before the remediation efforts.	-None required.
1/15/2019	IAR	North Range 44	Routine/Post-Rain Event	-Native seed broadcast in December 2018 is starting to grow, especially the blue wildrye, which is 2-3 inches tall in most small scale excavations (scrapes). The blue wildrye is less prevalent in the small scale excavation areas at north end of NR44 where erosion is not an issue. -Water diversion bars made of soil, rolled erosion blanket, and wooden stakes are present and functioning well.	-None required.
1/15/2019	IAR	South Range 44	Routine/Post-Rain Event	-Native seed broadcast in December 2018 is starting to grow, especially the blue wildrye, which is 2-3 inches tall in most small scale excavations (scrapes). -Water diversion bars made of soil are present and functioning well.	-None required.
2/13/2019	FEG	Grenade Range	Post-Rain Event	-Stormwater control working properly. Ponding observed at west end of grenade range below escarpment. This area is relatively flat and stable.	-None required

Table E-1
2019 Erosion Monitoring and Maintenance

ESCA RP 2019 Annual Natural Resource Report - Appendix E

Date	MRA	Location	Type of Monitoring	Findings	Actions
2/13/2019	IAR	North Range 44	Post-Rain Event	-Sand cleaned out behind wattle acting as a water bar.	-Several water bars should be cleaned out when HMP herbaceous plants have died for the season.
2/13/2019	IAR	South Range 44	Post-Rain Event	-Water bars working well but more are needed. Blue wildrye is turning reddish.	-More water bars needed
3/14/2019	FEG	Grenade Range	Post-Rain Event	-Sand bags functioning properly. Vegetation is growing through the erosion blanket.	-None required
3/14/2019	IAR	North Range 44	Post-Rain Event	-Erosion is reduced by new water bars but minor erosion continues between water bars.	-Construct additional water bars or install erosion blanket between bars.
3/14/2019	IAR	South Range 44	Post-Rain Event	-Water bars are functioning properly.	-Additional water bars or new erosion blanket would reduce more erosion from sheet flow on steep slopes.
4/23/2019	FEG	Grenade Range	Routine/Post-Rain Event	-Erosion BMPs are functioning properly. Shrub cover is increasing despite intermittent die-off of shrubs.	-None required.
4/30/2019	IAR	North and South Range 44	Routine Monitoring	-Water bars functioning properly. Minor erosion of mulch placed in December 2019. Conditions stable.	-None required.

Table E-1
2019 Erosion Monitoring and Maintenance

ESCA RP 2019 Annual Natural Resource Report - Appendix E

Date	MRA	Location	Type of Monitoring	Findings	Actions
6/17/2019	FEG	Grenade Range	Routine Monitoring	-Site appears stable and well vegetated.	-None required.
6/18/2019	IAR	North and South Range 44	Routine Monitoring	-Minor wind erosion visible. Sand was observed starting to pile on newly placed mulch.	-None required.
10/21/2019	FEG	Grenade Range	Pre-Rain Event	-Soils appear stable, with minor erosion appearing in down-slope (east) areas. These minor erosion areas are effectively being controlled by deteriorated sand bags, straw wattles, and vegetation (including non-native *Tribolium obliterum*).	-None required
10/21/2019	IAR	South Range 44	Pre-Rain Event	-Soils appear stable with little to no erosion observed throughout. Minimal erosion observed in linear scrapes, but is being controlled by existing water diversion channels that redirect flow into mature vegetation. Existing vegetation is functioning well for soil stabilization.	-None required
10/22/2019	IAR	North Range 44	Pre-Rain Event	-Soil appears to be stable throughout NR44, including within scrapes where minimal erosion has occurred. No wattles, silt fences, or sandbags observed.	-None required
12/17/2019	FEG	Grenade Range	Post-Rain Event	-Soil appears to be stable with minor erosion present. Sandbags functioning as designed, however, small depressions have formed where water is being diverted. The depressions did not contain water during time of visit but could temporarily hold water.	-None required

Table E-1
2019 Erosion Monitoring and Maintenance

ESCA RP 2019 Annual Natural Resource Report - Appendix E

Date	MRA	Location	Type of Monitoring	Findings	Actions
12/17/2019	IAR	South Range 44	Post-Rain Event	-Soil appears to be stable with existing vegetation, including within scrapes where minimal erosion has occurred. Water bars functioning as designed.	-None required
12/17/2019	IAR	North Range 44	Post-Rain Event	-Soil appears to be stable with existing vegetation, including within scrapes where minimal erosion has occurred. Wattles and water bars functioning as designed.	-None required