

**2016 ANNUAL REPORT  
FORMER FORT ORD SITE 39 HABITAT RESTORATION  
CONTRACT NO. W91238-14-D-0010-0001**

**FORMER FORT ORD**



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**Burleson Consulting Inc.**

Woman-Owned Small Business  
*Environmental Services*

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## APPENDICES

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Appendix A - Seed and Plant Tables

Appendix B - Restoration Activities

Appendix C - Photo Log

Appendix D - Photo Points

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**ACRONYMS AND ABBREVIATIONS**

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Army	US Department of the Army
BRAC	Base Realignment and Closure Division
Burleson	Burleson Consulting Inc.
BMP	Best Management Practice
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CTS	California Tiger Salamander
HA	Historic Area
HMP	Habitat Management Plan
HRP	Habitat Restoration Plan
lb	pound
Site 39	Site 39 Inland Ranges
SSRP	Site Specific Restoration Plan
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
UXO	Unexploded Ordnance

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## 1. INTRODUCTION

Burleson Consulting Inc. (Burleson) was issued ID/IQ Contract Number W91238-14-D-0010 by the US Army Corps of Engineers (USACE) to continue habitat restoration at Site 39 Remedial Action Areas at former Fort Ord, Monterey, California. This annual report summarizes all restoration activities completed during the 2016 calendar year.

### 1.1 Purpose

Former military ranges are currently undergoing soil remediation and subsequent habitat restoration in areas that range in size from 0.05 to 14 acres and are scattered around the perimeter of the Site 39 Inland Ranges area (Site 39) of former Fort Ord. Approximately 60 acres of soil remediation area needs restoration at Historic Areas (HA) 18, 19, 22, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 38, 39/40, 43, 44, 48, and Austin Road Stockpile. Burleson's objective is to provide seed/plant material collection, propagation, planting, and minor erosion control repairs necessary to restore the area to the requirements of the Site 39 Habitat Restoration Plan (HRP) (Shaw, 2009). The restoration area contains primarily rare central maritime chaparral habitat with smaller inclusions of coastal sage scrub, oak woodland, grassland, and vernal pool habitats.

Previously, Burleson developed Site Specific Restoration Plans (SSRP) for HAs 18, 19, 22, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 38, 39/40, 43, 44, 48, and Austin Road Stockpile which provide detailed information (site conditions, baseline vegetation, targets, and collection/propagation requirements) for each HA (Burleson, 2013). In 2010, Burleson prepared the Plant Material, Collection, Storage, and Propagation Protocols for Site Restoration at Site 39 (Burleson, 2010). These documents provide the necessary information and guidance to conduct restoration activities at Site 39. This annual report provides the details involved with the execution of habitat restoration on Site 39 for the year 2016 as well as a progress summary for each HA and recommendations.

Work performed during 2016 consisted of:

- Storage of previously collected plant material
- Propagation of the collected plant material
- Restoration activities at HAs 19, 26, 27A, 28, 29, 34, 36 and 37
- Erosion control repairs at HAs 27A, 28, 34 and 37
- Monitoring of all restoration sites to evaluate vegetative establishment

### 1.2 General Site Conditions

Site 39 is dominated by maritime chaparral; a regionally rare, fire-dependent plant community found within the coastal fog zone on sandy to rocky soils. Chaparral habitats are dominated by drought-deciduous or evergreen sclerophyllous shrubs. This unique species-rich plant community changes in species composition from the western edges of the Site 39, which are frequently foggy and cool, to the eastern edges which are less foggy, warmer, and drier.

### 1.3 Site 39 Restoration Progress

SSRPs have been developed for 18 HAs and one stockpile area requiring habitat restoration for 61.71 acres. The 19 SSRPs have prescribed passive restoration (seeding) for all 61.71 acres and active restoration (planting) to 29.84 acres. Active restoration requires installation of approximately 52,000

plants. Figure 1-1 presents the current status of restoration sites within Site 39.

Both active and passive restoration activities began in 2011 and are ongoing. By the end of the 2016 calendar year, approximately 48 acres had been seeded (passive restoration) and about 26,000 plants had been installed (active restoration). Thirteen of the 19 restoration sites have received their full SSRP restoration prescription and are currently in a monitoring phase. Four of the sites have received some level of restoration and two sites have not received any restoration to date.

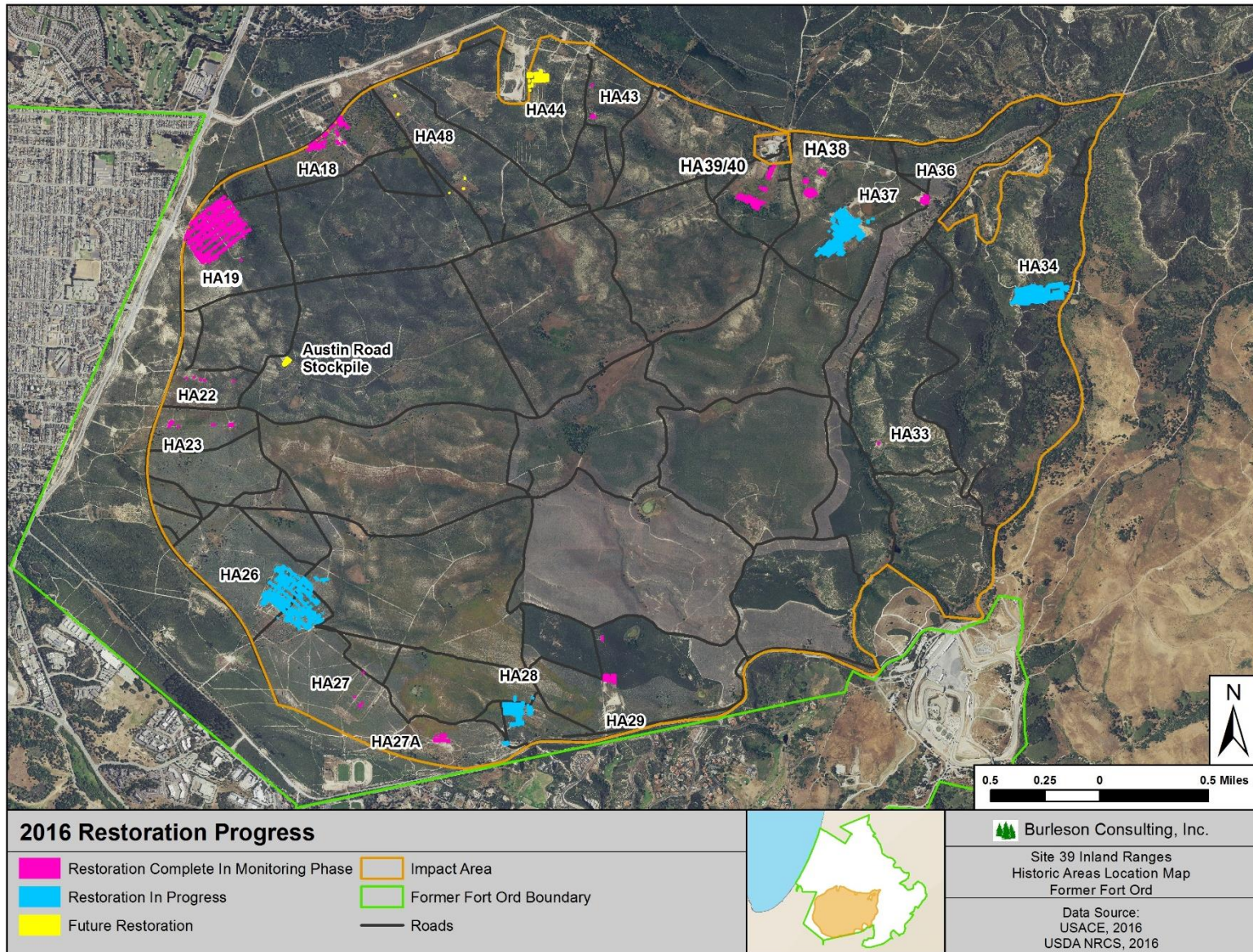


Figure 1-1. Restoration Progress Map

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## 2. RESTORATION PROTOCOLS AND SITE SPECIFIC RESTORATION PLANS

Burleson developed the Site 39 Plant Material Collection, Storage, and Propagation Protocols and SSRPs for each HA that detail quantities and types of plant material to be collected for former Fort Ord (Burleson, 2010; Burleson, 2013). The protocols contain detailed information on specific salvage and propagation techniques to be followed by field crews. Additionally, Hedgerow Farms/S&S Seed supported Burleson with seed production as discussed in Section 3.1.

In accordance with the protocol, field crews collected Habitat Management Plan (HMP) species within a 1-kilometer radius centered on each HA (Burleson, 2010). Common species were collected within a 10-mile radius of each HA. Collected seeds were processed manually to remove residual hull, stems, leaves, and chaff, as much as possible. Seed weight totals were entered into the plant inventory database after seed processing was complete.

Collected plant material was stored at Burleson's native plant nursery in Carmel Valley in cool, dry locations until ready to be processed. Labeling and tracking of all plant material followed the storage protocol (Burleson, 2010). Burleson's biologists maintain the spreadsheet database so that plant and seed inventories are readily available. The database contains the following information:

- Scientific name and common name
- Container size (if applicable)
- Quantity (in nursery)
- Quantity (delivered)
- Seed/cutting origin
- Client
- Batch name and date sown
- Experimental treatments used during propagation (when applicable)

Burleson staff entered GPS data, collection quantities, and species of plants salvaged into the plant inventory database to track each species collected.

### 2.1 Burleson Carmel Valley Native Plant Nursery

Burleson continues to work closely with the California Department of Food and Agriculture and Monterey County Agricultural Commission to improve and implement recommended Best Management Practices (BMP) for plant pathogens at the native plant nursery. The BMPs that have been implemented include foot baths at critical access points, limited access points, mandatory use of new plant containers, sanitation of tools and off-site cuttings, designated areas for soil storage, raised plant platforms, cautionary distance of plants to one another, as well as quarantine and treatment of questionable plants.

In addition, pear tests were performed for any suspect plants in 2016. A pear test is an initial indicator for pathogens and is preliminary to sending samples for a laboratory test (Erwin, 1996). The test consists of placing healthy, green pears to act as bait in a water sample collected from plants of concern. If the pears develop brown lesions after exposure to the water samples, then there is the possibility of *Phytophthora* and further testing is recommended. The Burleson Greenhouse Manager performed pear tests in the months of May, November, and December using water samples from suspect plants. All test

results were negative. Therefore, no further action was recommended. During 2016, Burleson's nursery did not have any concerns about pathogen outbreaks.

### 3. SEED COLLECTION

In 2016, 4.0 acres worth of seed was collected specifically for HA 19 (see Table A-1, Appendix A). An acre worth of seed is defined as the amount of seed, as prescribed by each SSRP, to restore 1 acre at a specific restoration site. All common and HMP species were collected in accordance with the protocol. All seed collection target goals were met for 2016. In addition, 1.0 pound (lb) of purple needle grass (*Stipa pulchra*) seed was collected to make up for a missed 2015 target.

#### 3.1 Seed Production

In addition to on-site seed collection, Burleson contracts with Hedgerow Farms/S&S Seed to grow former Fort Ord-specific seed for four species. All four production seed species were successful in 2016. Seed production species and quantities produced in 2016 are listed below.

- blue wild-rye (*Elymus glaucus*): 200.0 lb
- purple needle grass (*Stipa pulchra*): 58.7 lb
- deerweed (*Acmispon glaber*): 88.0 lb
- common yarrow (*Achillea millefolium*): 56.3 lb

Seed test results for all four species are presented in Table A-2, Appendix A. All four seed production plots will be continued in 2017.

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#### **4. PLANT PROPAGATION**

All 2016 plant propagation activities occurred at Burleson's native plant nursery in Carmel Valley. Propagation activities were conducted in accordance with the Plant Material, Collection, Storage, and Propagation Protocols for Site Restoration at Site 39 for 18 different common and HMP species used in active restoration (Burleson, 2010). Total 2016 plant quantity targets, requiring 8,631 plants for HAs 34 and 37, were achieved. However, some individual species targets were not achieved, while other species were in surplus of their target. Where suitable and approved by the USACE, these surplus plants were used to replace the missed targets. See Table A-3 in Appendix A, for final plant inventories for HAs 34 and 37.

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## 5. RESTORATION ACTIVITIES

The objective of restoration activities is to return the impacted area to a natural landscape that conforms to the adjacent habitat communities in accordance with each SSRP. Restoration activities completed in 2016 included passive restoration at HAs 19, 26, 27A, 28, 29, 34, and 37 and active restoration at HAs 34 and 37.

### 5.1 Passive Restoration

Table 5-1 summarizes 2016 passive restoration activities. Generally, passive restoration activities occur annually between October and February, partially within two different calendar years. This report focuses only on the 2016 calendar year and reports restoration activities in that timeframe. In early 2016, Burleson performed passive restoration at HAs 26, 34, and 37. In late 2016, Burleson performed passive restoration at HAs 19, 27A, 28, 29, 34, 36, and 37. Appendix B provides detailed seed quantities, lists of the species applied, and locations of seed application for each restoration site. The following sections provide a description of passive restoration activities at each HA.

**Table 5-1.** 2016 Summary of Passive Restoration Activities per HA

HA	Passive Restoration Activities
19	Broadcast 4.0 acres worth <sup>1</sup> of SSRP seed mix enhanced with production seed mix
26	Broadcast 5.24 acres worth <sup>1</sup> of SSRP seed mix and broadcast of Monterey spineflower ( <i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>2</sup> ) seed
27A	Broadcast 0.15 acre with erosion control seed mix and 0.2 acre with production seed mix
28	Broadcast 0.1 acre with erosion control seed mix
29	Broadcast 0.4 acre with production seed mix
34	Broadcast 1.0 acre worth <sup>1</sup> of SSRP seed mix, 0.25 acre of erosion control seed mix, and 1.43 acres with production seed mix
36	Broadcast 0.45 acre with production seed mix
37	Broadcast 2.4 acres worth <sup>1</sup> of SSRP seed mix, 0.29 acre of erosion control seed mix, and 3.3 acres with production seed mix

<sup>1</sup>Acres worth of seed = amount of seed prescribed to restore 1 acre of area in accordance with the SSRP

<sup>2</sup>HMP species

#### 5.1.1 HA 19 Passive Restoration Activities

In November 2016, Burleson selectively applied 4.0 acres worth of HA 19 SSRP seed mix, enhanced with a production seed mix, throughout HA 19 (see Figure B-1, Appendix B; Table B-1, Appendix B). Areas that had good natural recruitment did not receive seed. However, areas that were barren and had little to no vegetation, received seed. Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw according to the recommendations of the SSRP.

#### 5.1.2 HA 26 Passive Restoration Activities

In January 2016, Burleson selectively applied 5.24 acres worth of HA 26 SSRP seed mix over 6.68 acres at HA 26 (see Figure B-2, Appendix B; Table B-2, Appendix B). This site has not been cleared to depth and an unexploded ordnance (UXO) escort was utilized to support seeding. Areas with good natural recruitment or considerable erosion did not receive seed. However, areas that were barren, stable, and had little to no natural recruitment, received seed. Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw.

Additionally, Burleson applied 0.85 lb (381 grams) of Monterey spineflower seed to nine plots totaling 0.46 acre at HA 26 (see Figure B-2, Appendix B; Table B-3, Appendix B).

### **5.1.3 HA 27A Passive Restoration Activities**

In November 2016, Burleson applied an erosion control seed mix to 0.15 acre during erosion control repairs at the site (see Figure B-3 Appendix B; Table B-4). Additionally, in December of 2016, Burleson applied a production seed mix over 0.2 acre to support erosion control repairs and general revegetation at the site (see Figure B-3, Appendix B; Table B-5). Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw. In areas where mulch was used as a component of erosion control, the mulch was seeded and lightly raked but was not covered with straw.

### **5.1.4 HA 28 Passive Restoration Activities**

In October 2016, Burleson applied an erosion control seed mix to 0.1 acre during minor erosion control repairs at the site (see Figure B-4, Appendix B; Table B-6). Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw.

### **5.1.5 HA 29 Passive Restoration Activities**

In October 2016, Burleson selectively applied a production seed mix to 0.4 acre (see Figure B-5, Appendix B; Table B-7, Appendix B). Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw. This was an additional seeding effort (compared to the SSRP prescription) at HA 29 to help areas that have been slow to respond to previous restoration efforts.

### **5.1.6 HA 34 Passive Restoration Activities**

In January 2016, Burleson applied 1.0 acre worth of HA 34 SSRP seed mix over 1.1 acres following active restoration activities (see Figure B-6, Appendix B; Table B-8, Appendix B). Seed was selectively broadcast around the installed plants, raked into the ground to establish good seed-soil contact, and covered with fresh straw according to the SSRP recommendations.

In November 2016, Burleson applied an erosion control seed mix to 0.25 acre to support erosion control repairs at the site (see Figure B-6, Appendix B; Table B-9, Appendix B). Additionally, in December 2016, Burleson applied a production seed mix to eight areas totaling 1.43 acres (see Figure B-6, Appendix B; Table B-10, Appendix B). Mulch, fabric and mulch, and bare ground are all substrates that were seeded at HA 34. In areas where mulch or fabric and mulch were present, the mulch was seeded and lightly raked but was not covered with straw. For bare ground, both seed mixes were raked into the ground to establish good seed-soil contact, and covered with fresh straw.

### **5.1.7 HA 36 Passive Restoration Activities**

In December of 2016, Burleson selectively applied a production seed mix over the entire 0.45 acre site (see Figure B-8, Appendix B; Table B-12, Appendix B). Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw. This was an additional seeding effort (compared to the SSRP prescription) at HA 36 to help areas that have been slow to respond to previous restoration efforts.

### **5.1.8 HA 37 Passive Restoration Activities**

In February and March 2016, Burleson applied 2.4 acres worth of HA 37 SSRP seed mix over three areas at HA 37 totaling 3.0 acres (see Figure B-9, Appendix B; Table B-13, Appendix B). One area has not been cleared to depth and a UXO escort was utilized to support seeding in this area. Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw.

In October 2016, three areas received an erosion control seed mix to support erosion control repairs performed by Burleson (see Figure B-9; Appendix B; Table B-14, Appendix B).

In December of 2016, Burleson selectively applied a production seed mix to seven areas adding up to 3.3 acres (see Figure B-9, Appendix B; Table B-15, Appendix B). Seed was raked into the ground to establish good seed-soil contact and covered with fresh straw. This was an additional seeding effort (compared to the SSRP prescription) to assist those areas that have been slow to respond to previous restoration efforts or areas where erosion control repairs were implemented.

## 5.2 Active Restoration

Table 5-2 summarizes 2016 active restoration activities at each site. Burleson installed a total of 5,198 plants at HAs 34 and 37 in early 2016. Tables B-11 and B-16 in Appendix B provide detailed information on species and quantities planted at HAs 34 and 37. The following sections provide a description of active restoration activities at HAs 34 and 37.

**Table 5-2.** 2016 Summary of Active Restoration Activities by HA

HA	Active Restoration Activities
34	Installed 1,783 plants (1.1 acres of active restoration)
37	Installed 3,415 plants (to complete active restoration at nine different areas)

### 5.2.1 HA 34 Active Restoration Activities

In January 2016, Burleson installed 1,783 plants over 1.1 acres on the top third of HA 34 (see Figure B-7, Appendix B; Table B-11, Appendix B). This was the first planting effort to occur at HA 34.

### 5.2.2 HA 37 Active Restoration Activities

In February and March 2016, Burleson installed 3,415 plants in nine different planting areas at HA 37 (see Figure B-10, Appendix B; Tables B-16 and B-17, Appendix B). This planting effort completed SSRP planting targets for all nine planting areas with the exception of one area. That area is on the west side of HA 37 and received successful planting and seeding efforts in previous years. Therefore, only the SSRP target numbers for shrub species were installed. The early successional plants grown for that area were approved by Base Realignment and Closure (BRAC) Division and USACE to be installed in other areas at HA 37 that had been less successful.

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## 6. MONITORING

Burleson conducted photo point documentation, HMP annual density surveys, species richness surveys, vegetative cover, and plant survivorship monitoring surveys at relevant HAs in 2016. Monitoring activities are guided by the HRP and Vegetation Sampling Protocol (Shaw, 2009; Burleson, 2009). Table 6-1 provides a breakdown of monitoring activities conducted in 2016. The following sections provide detailed descriptions of monitoring activities. Expanded 2016 monitoring results are presented in Section 8 on a site-by-site basis.

**Table 6-1. 2016 Summary of Monitoring Activities by HA**

HA	Photo Point	HMP Annual Density	Species Richness	Vegetative Cover	Plant Survivorship
18	•	•	•	•	
19	•	•	•	•	•
22	•	•	•	•	
23	•	•	•	•	
26	•	•	•	•	
27	•		•	•	
27A	•		•	•	
28	•	•	•	•	•
29	•		•	•	•
33	•	•	•	•	
34	•		•	•	•
36	•		•	•	
37	•	•	•	•	•
38	•	•	•	•	•
39/40	•	•	•	•	
43	•	•	•	•	
44	•		•	•	
48	•		•	•	
Austin Rd. Stockpile	•		•	•	

### 6.1.1 Photo Points and Photo Documentation

Multiple permanent photo points have been established at each restoration site that has received any restoration activity to document restoration progress. Photos are taken annually from every photo point and more frequently at select photo points. Additionally, photo documentation of restoration activities occurs throughout the year. See Appendix C for a photo log of activities during 2016 and Appendix D for select photo point comparisons for all sites.

### 6.1.2 HMP Annual Density Surveys at Restoration Plots

Density surveys for HMP annuals Monterey spineflower, sand gilia (*Gilia tenuiflora* ssp. *Arenaria*) and seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis*) are performed at restoration sites in years 1, 2, 3, 4, 5, and 8 during peak bloom for each species according to the HRP guidelines (Shaw, 2009). HMP annual density is obtained by counting every individual within a restoration plot and calculating the number of plants per 100 square feet. Density classes were derived from the HRP and are presented below.

Density Class	Plants Counted per 100 Square Feet
Not Present	0
Low	1-50
Medium	51-100
High	101-500
Very High	>500

Discrete patches of HMP annuals within the restoration site but outside of the HMP annual restoration plots are captured and mapped during meandering transect surveys. See Section 8 for survey results at each site.

### 6.1.3 Plant Survivorship Monitoring

Annual plant survivorship surveys are completed for a minimum of three years after plants have been installed. A random sample of at least 10% of each shrub species are permanently tagged and monitored annually. Survivorship monitoring events occur in the fall at the end of the dry season when plant mortality rates are highest. During monitoring visits, all tagged plants are counted as alive or dead to calculate survivorship percentages. All plants being monitored are evergreens and should have live leaves year-round. Plants that exhibit live leaves are recorded as alive. If plants have no leaves or if leaves appear dead, then the plants are recorded as dead. Plant survivorship classifications are presented below. See Section 8 for detailed plant survivorship results at each site.

Plant Survivorship	Percent Alive
High	80-100%
Moderate	50-79%
Low	≤49%

### 6.1.4 Vegetation Cover

Vegetative cover is monitored in years 1, 2, 3, 4, 5, 8, and 13 following restoration. In the first few years of monitoring, sites are visually assessed for cover. In 2016, cover of shrubs, annuals, perennials, grass, thatch, and bare ground were measured using transect surveys, as described in the 2009 protocol (Burlison, 2009). At a rate of one transect per acre, 50-meter transects are placed randomly in portions of the site where similar restoration activities took place. When applicable, transects are stratified by



year, and consideration given to topography and features of the area (for example avoidance of roads or berms if no restoration activities occurred there). Quadrat sampling along transects are completed when annual herbaceous cover under the transect line is 10% or greater.

For plots that are less than 0.1 acre, random quadrat sampling (not along a transect line) was completed. Quadrat sizes are one-quarter meter square, with an approximate density of 1 quadrat per 0.02 acre. Percent cover for HMP shrubs and invasive species, along with native species richness, was assessed from the transect data for each restoration site. Quadrats were used for their efficiency in quick assessment. They were not used for calculating criteria metrics.

#### **6.1.5 Species Richness**

Species richness surveys were completed at all of the restoration sites in 2016. Species richness is assessed by utilizing the available data at each restoration site, which may include either meandering transects, 50-meter line-intercept transects, or both. Meandering transects are conducted throughout the restoration site in years 1, 2, 3, 4, 5, 8, and 13 to determine if there is additional plant recruitment. Discrete patches of HMP annuals are mapped using GPS. These patches are assigned a density class or an actual population number if it is easy to do so. If the HMP annual occupied area is larger than 1 acre in size, density may be obtained by sub-sampling the population with circle plot surveys as described in the 2009 protocol (Burlison, 2009). Circle plot data is analyzed in ArcMap using the interpolation tool to develop HMP annual density models.

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## 7. EROSION CONTROL

Before the onset of the wet season, Burleson installed erosion control measures for minor stormwater related damage at HAs 27A, 28, 34, and 37. Photographs C-31 through C-39 in Appendix C show erosion control field activities.

At HA 27A, the following work was performed in 2016:

- Repaired approximately 200 linear feet of rill erosion ranging from 6-24 inches deep
- Installed 600 linear feet of straw rolls
- Broadcast erosion control seed mix on 0.15 acre
- Broadcast and crimped straw mulch on 0.15 acre
- Installed 2,000 square feet of coir fabric
- Spread 8 cubic yards of mulch on 0.1 acre

At HA 28, the following work was performed in 2016:

- Repaired approximately 60 linear feet of rill erosion ranging from 6-12 inches deep
- Installed 250 linear feet of straw rolls
- Broadcast erosion control seed mix on 0.10 acre
- Broadcast and crimped straw mulch on 0.10 acre

At HA 34, the following work was performed in 2016:

- Repaired approximately 100 linear feet of rill erosion ranging from 6-12 inches deep
- Installed 675 linear feet of straw rolls
- Broadcast erosion control seed mix on 0.25 acre
- Broadcast straw mulch on 0.25 acre

At HA 37, the following work was performed in 2016:

- Repaired approximately 160 linear feet of rill erosion ranging from 6-18 inches deep
- Installed 775 linear feet of straw rolls
- Broadcast erosion control seed mix on 0.25 acre
- Broadcast straw mulch on 0.25 acre
- Installed 4,000 square feet of coir fabric

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## 8. RESTORATION SUMMARY AND MONITORING RESULTS BY HA

The progress of restoration for each HA was evaluated against success criteria from each SSRP. In order to understand the progress of restoration, as well as to discuss the future efforts for each HA, it was important to compare the current status of each HA to its specific success criteria. Section 8 is an overview of the restoration effort through 2016, monitoring results, comparison to the SSRP baseline transects, and discussion of recommendations for each HA.

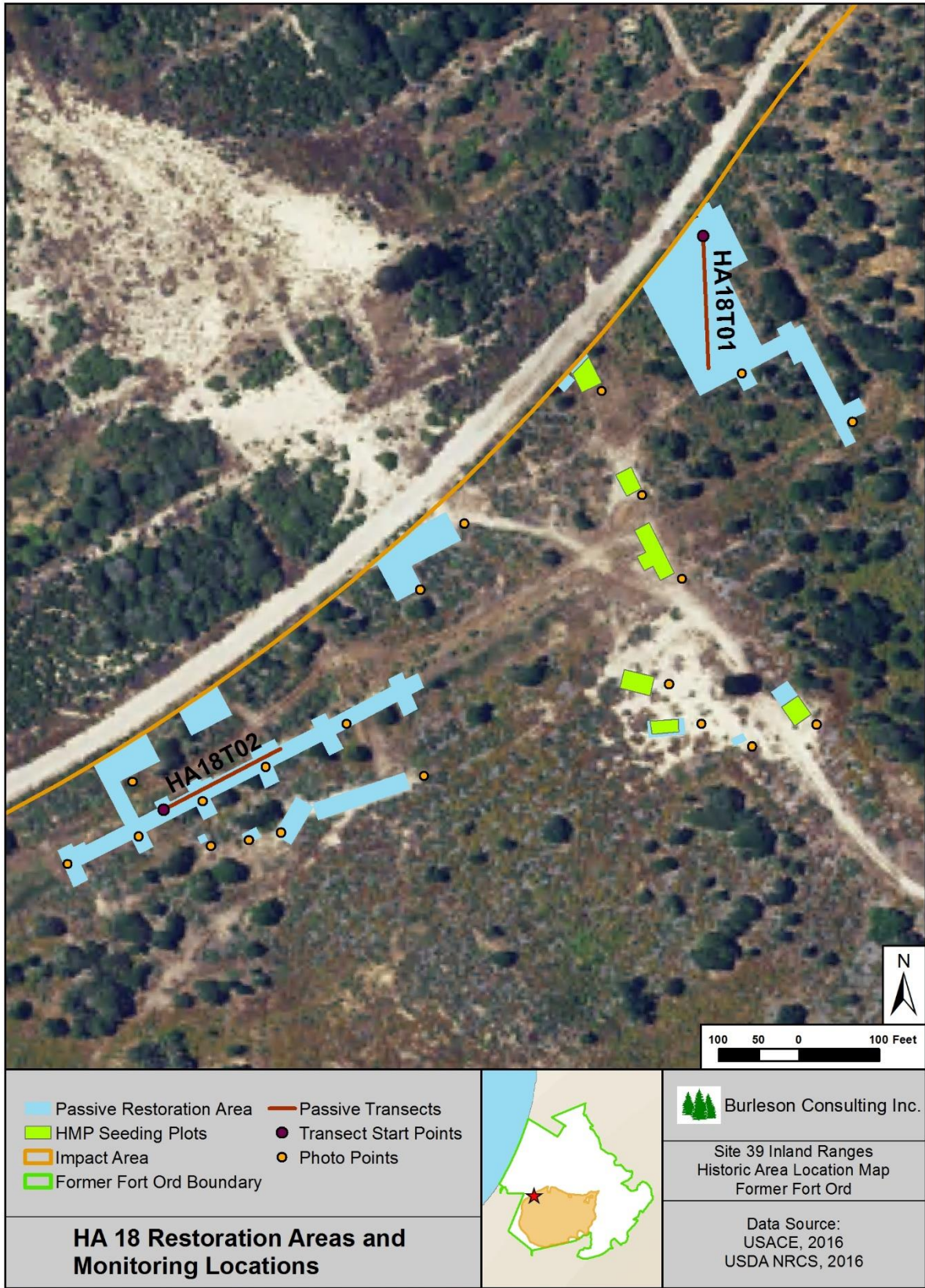
### 8.1 HA 18

HA 18 was used by the U.S Department of the Army (Army) as a long-distance small-arms firing range. The range consisted of seven target lanes about 165 feet apart. Soil remediation was completed in 2010 and resulted in 2,750 cubic yards of lead-contaminated soil being excavated from 1.4 acres (Shaw, 2008). HA 18 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 18 is relatively flat with a northwest and west aspect. The adjacent lands are high quality habitat areas which contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 18 is located on the northwestern portion of Site 39, occurring within the sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 18 consisted of hand broadcast of a non-irrigated seed mix and annual weed management. HA 18 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 18 occurred in 2012 and monitoring began in 2012. The HA has been monitored for four years by photo documentation, four years for HMP annual density in plots, one year for HMP annual density across the HA, one year of species richness, and one year for vegetative cover. Figure 8-1 shows the passive restoration area, photo documentation locations, and transect monitoring locations. Success criteria for HA 18 are summarized in Table 8-1.



**Figure 8-1.** HA 18 Restoration Areas and Monitoring Locations Map

**Table 8-1.** Success Criteria and Acceptable Limits for Restoration of HA 18

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			shaggy-bark manzanita
			California sage brush
			coyote brush
			Monterey ceanothus <sup>2</sup>
			dwarf ceanothus
			mock heather
			Eastwood's golden fleece <sup>2</sup>
			golden yarrow
			peak rush rose
			deerweed
			sticky monkey flower
			coast live oak
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.

**Table 8-1.** Success Criteria and Acceptable Limits for Restoration of HA 18

Objective 3 <sup>1</sup>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 2
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Monterey ceanothus percent cover, as an average of transect data, must be equal to or greater than 4
			Sandmat manzanita percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable
			Eastwood gold fleece percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		



### 8.1.1 Restoration Activities

Burleson has performed passive restoration at HA 18 for two years with two different applications of seed. No active restoration activities were prescribed at HA 18. Seed was broadcast in January and December of 2012, representing two seeding seasons. The total amount of seed broadcast on the site is 51.192 lb compared to the 50.220 lb prescribed in the SSRP. Table 8-2 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Six plots were chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-2.** Summary of Passive Restoration Activities from 2012-2016 for HA 18

Species	Pounds of Seed Broadcast			
	SSRP Target	2012 (Jan)	2012 (Dec)	Total by Species
ACGL	2.800	1.000	1.440	2.440
ADFA	1.400	0.500	0.770	1.270
ARPU <sup>1</sup>	1.400	1.100	1.000	2.100
ARTO	2.800	1.000	1.450	2.450
ARCA	1.400	0.500	0.733	1.233
BAPI	0.200	0.500	0.110	0.610
CERI <sup>1</sup>	1.400	0.500	0.780	1.280
CHPUP <sup>1</sup>	0.020	0.400	0.047	0.447
CRSC	1.400	0.500	0.770	1.270
DIAU	0.100	0.300	0.390	0.690
ELGL	12.600	0.000	12.650	12.650
ERER	0.400	0.200	0.230	0.430
ERFA <sup>1</sup>	0.100	0.072	0.070	0.142
ERCO	0.400	0.200	0.240	0.440
<i>Hordeum</i> sp.	12.600	0.000	12.700	12.700
HOCU	2.800	1.000	1.160	2.160
SAME	1.400	0.600	0.820	1.420
STCE	7.000	0.300	7.160	7.460
<b>TOTAL</b>	<b>50.220</b>	<b>8.672</b>	<b>42.520</b>	<b>51.192</b>

<sup>1</sup>HMP species

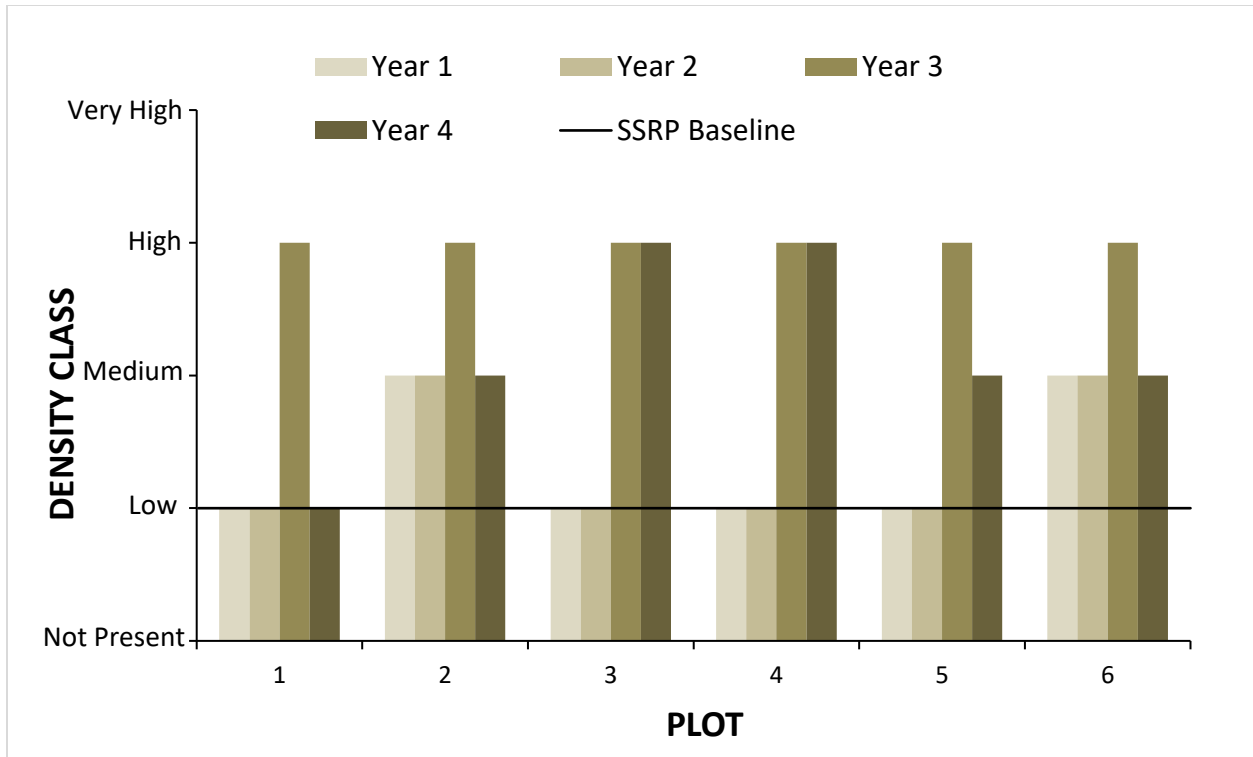
### 8.1.2 Monitoring Results

#### 8.1.2.1 HMP Annual Density

Six Monterey spineflower plots were surveyed for year 4 density at HA 18 in 2016. The plots are numbered 1-6 on Figure 8-2 and are primarily located in the eastern part of the site. Monterey spineflower density was low at plot 1. Plots 2, 5, and 6 had a medium density and plots 3 and 4 had a high density. Figure 8-3 represents all the Monterey spineflower restoration plot densities for HA 18.



Figure 8-2. HA 18 Year 4 Monterey Spineflower Plot Density Map



**Figure 8-3.** HA 18 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Year 1, 2, 3, and 4 at Restoration Plots 1-6

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. Twenty-two discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 8-4). The densities ranged from low to very high. The total acreage of Monterey spineflower patches with a density at or above the SSRP baseline was 0.11 acre.





Figure 8-4. HA 18 Monterey Spineflower Meandering Transect Density Map

## 8.1.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

## 8.1.2.3 Species Richness

A total of 67 species were observed at HA 18. Of those, 32 were native shrubs or perennials, 17 were native annual herbaceous species, and 19 were non-native species (see Table 8-3).

**Table 8-3.** Species observed at HA 18, 2016

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon parviflorus</i>	hill lotus	ACPA
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Agoseris</i> sp.		AG
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Artemisia californica</i>	California sagebrush	ARCA
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Avena fatua</i>	wild oat	AVFA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus diandrus</i>	riggut brome	BRDI
<i>Bromus hordeaceus</i>	softchess	BRHO
<i>Bromus madritensis</i>	foxtail brome	BRMA
<i>Calandrinia breweri</i>	Brewers redmaids	CABR
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Carex</i> sp.		CA
<i>Carpobrotus edulis</i>	ice plant	CAED
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Castilleja exserta</i>	owl's clover	CAEX
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe diffusa</i>	diffuse chorizanth	CHDI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crassula connata</i>	pygmy weed	CRCO
<i>Crocanthemum scoparium</i>	peak rush rose	CRSC
<i>Dichelostemma capitatum</i>	blue dicks	DICA
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Eriastrum virgatum</i>	virgate gilia	ERVI
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Eschscholzia californica</i>	California poppy	ESCA
<i>Festuca myuros</i>	rat tail fescue	FEMY
<i>Galium californicum</i>	California bedstraw	GACA

**Table 8-3.** Species observed at HA 18, 2016

Scientific Name	Common Name	Code
<i>Gallium nuttallii</i>	climbing bedstraw	GANU
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Logfia gallica</i>	narrowleaf cottonrose	LOGA
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR
<i>Lupinus concinnus</i>	bajada lupine	LUCO
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Madia gracilis</i>	grassy tarweed	MAGR
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Nuttallanthus texanus</i>	toad flax	NUTE
<i>Petrorhagia dubia</i>	hairy pink	PEDU
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Plantago erecta</i>	California plantain	PLER
<i>Pseudognaphalium californicum</i>	lady's tobacco	PSCA
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA
<i>Stachys bullata</i>	wood mint	STBU
<i>Stipa cernua</i>	nodding needle grass	STCE
<i>Stipa pulchra</i>	purple needle grass	STPU
<i>Toxicodendron diversilobum</i>	poison oak	TODI

<sup>1</sup>HMP species

#### 8.1.2.4 Vegetative Cover Transects and Quadrats

Burleson completed two 50-meter line-intercept transects at HA 18. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 33.46%. Table 8-4 presents the vegetation cover summary and Table 8-5 presents vegetation cover by species.

**Table 8-4.** Line-intercept Transect Survey Summary for HA 18

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA18T01	34.84	33.06	1.06	0.72	26.42	53.50
HA18T02	33.86	33.86	0.00	0.00	4.52	63.14
<b>AVERAGE</b>	<b>34.35</b>	<b>33.46</b>	<b>0.53</b>	<b>0.36</b>	<b>15.47</b>	<b>58.32</b>

**Table 8-5.** Line-intercept Transect Survey Results for HA 18 by Species

Transect	ACGL (%)	ARTO (%)	BAPI (%)	CARA (%)	CAED (%)	CRSC (%)	DIAU (%)	ELGL (%)	ERFA <sup>1</sup> (%)	ERCO (%)	HOCU (%)	LUAR (%)	RUAC (%)	TODI (%)	TH (%)	BG (%)
HA18T01	14.46	3.42	0.78	0.66	0.38	1.04	0.54	0.20	0.24	0.54	0.20	0.68	0.34	11.36	26.42	53.50
HA18T02	27.04	3.38	0.00	0.00	0.00	2.88	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00	4.52	63.14
<b>AVERAGE</b>	<b>20.75</b>	<b>3.40</b>	<b>0.39</b>	<b>0.33</b>	<b>0.19</b>	<b>1.96</b>	<b>0.27</b>	<b>0.10</b>	<b>0.12</b>	<b>0.55</b>	<b>0.10</b>	<b>0.34</b>	<b>0.17</b>	<b>5.68</b>	<b>15.47</b>	<b>58.32</b>

<sup>1</sup>HMP species

### 8.1.3 Discussion

#### 8.1.3.1 HMP Annual Density

Monterey spineflower density is within the acceptable limits for HMP annual density at HA 18. The SSRP baseline density class for Monterey spineflower was low. The Monterey spineflower restoration plot results show that by year 4, for all plots, densities met or exceeded the success criterion under objective 3. In addition, Monterey spineflower was present outside of the restoration plots. Discrete patches, with densities that either met or exceeded the success criteria, covered 0.11 acre of HA 18.

#### 8.1.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.1.3.3 Species Richness

Shaggy-barked manzanita, California sagebrush, coyote brush, Monterey ceanothus, dwarf ceanothus, mock heather, Eastwood's goldenbush, golden yarrow, peak rush rose, deerweed, sticky monkey flower, coast live oak, and black sage were all present. Chamise was not present. HA 18 included 32 shrub and perennial native species; however, it did not meet success criterion for objective 1 because chamise was not present.

#### 8.1.3.4 Vegetation Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 18 native shrub, perennial, and annual species presented in Table 2 of the HA 18 SSRP (Burlison, 2013). Currently the HA includes 27.64% vegetative cover from those species; therefore, this success criterion was not met.

Objective 2 considers the percent cover of non-native target weeds. The transect surveys contained iceplant; however, the vegetative cover for non-native species was 0.19% which is less than the 5% acceptable limit. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 2. Cover class 2 is from 1-5% of absolute cover. The HMP shrub species at HA 18 are providing an absolute cover of 0.12%. HA 18 has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 18, this means a vegetative cover average of at least 4% cover for Monterey ceanothus, and sandmat manzanita and Eastwood's goldenbush must be present. The average vegetative cover for Monterey ceanothus was 0.00%, for sandmat manzanita 0.00%, and for Eastwood's goldenbush 0.12%. Only one of the three species, Eastwood's goldenbush, met the criterion. Therefore, the success criterion was not met. In addition, HMP annuals were evaluated for vegetative cover. The acceptable limit for Monterey



spineflower is at least 1% cover from the transect surveys. The average vegetative cover for Monterey spineflower was 0.00%. Therefore, the success criterion was not met.

#### 8.1.3.5 Recommendations

HA 18 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth, and improvement of the HA. Overall, HA 18 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort. Aside from time, it is recommended that chamise be planted to meet the species richness success criterion.

Additionally, it is recommended that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy, which is already captured in objective 3 success criteria number 3.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-6 summarizes the current status of HA 18 including which success criteria have been met as well as recommendation to move towards meeting all success criteria.

**Table 8-6.** Status and Recommendations for Achieving Success Criteria at HA 18

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant chamise
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

## 8.2 HA 19

HA 19 was used by the Army as a small arm firing range. Soil remediation was completed in 2010 and resulted in the excavation of 23,000 cubic yards of lead-contaminated soil from approximately 14 acres (Shaw, 2008). HA 19 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 19 is relatively flat with a western aspect. The adjacent lands are high quality habitat areas which contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 19 is located on the western portion of Site 39, occurring within the sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. The vegetative habitat at



HA 19 prior to remediation was predominantly very high quality maritime chaparral. The HA 19 SSRP includes a detailed list of the typical vegetation identified at the HA.

According to the SSRP, the restoration procedure for HA 19 included both passive and active restoration. The main focus of restoration was to broadcast non-irrigated seed mix. However, for the active restoration efforts, container-grown plants were installed. Areas within HA 19 which were less than 1.0 acre, or larger than 1.0 acre but less than 100 feet wide, were restored passively using broadcast seed only. Areas larger than 1.0 acre and greater than 100 feet across received active restoration in addition to the passive restoration efforts.

Restoration activities at HA 19 began in 2012 and were completed in 2016. Monitoring at HA 19 began in 2013. It has been monitored for four years by photo documentation, three years for HMP annual density in plots, one year for HMP annual density across the HA, one year for species richness, one year for vegetative cover, and four years for plant survivorship. Figure 8-5 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. The success criteria for HA 19 are summarized in the Table 8-7.

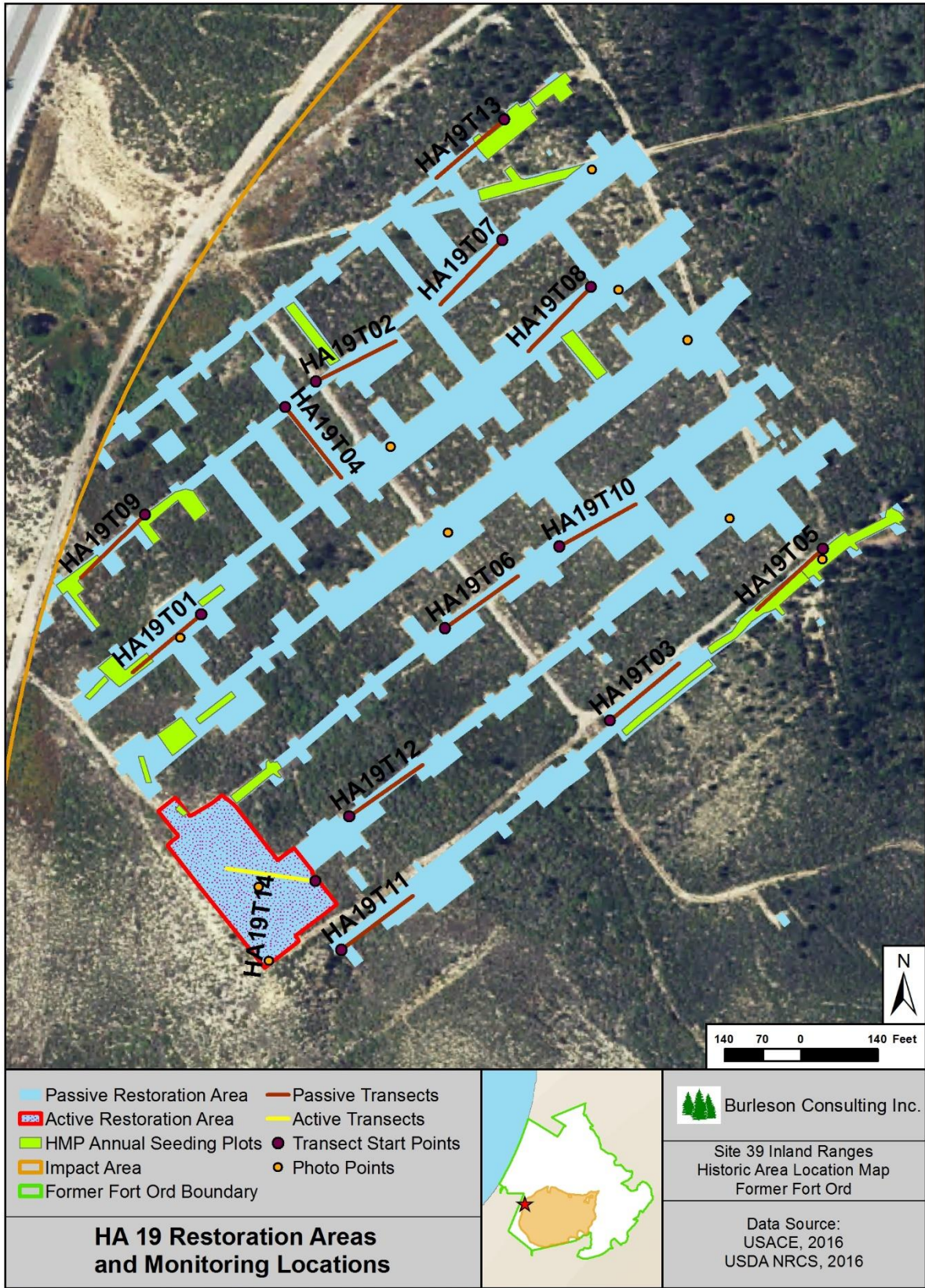


Figure 8-5. HA 19 Restoration Areas and Monitoring Locations Map

**Table 8-7. Success Criteria and Acceptable Limits for Restoration of HA 19**

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			Chamise
			sandmat manzanita <sup>2</sup>
			shaggy-barked manzanita
			California sagebrush
			coyote brush
			Monterey ceanothus <sup>2</sup>
			mock heather
			Eastwood’s goldenbush <sup>2</sup>
			golden yarrow
			pitcher sage
			deerweed
			sticky monkey flower
			coast live oak
black sage			
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40% for native species listed as part of the plant palette in Table 2.
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.

**Table 8-7. Success Criteria and Acceptable Limits for Restoration of HA 19**

Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 16.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
			Eastwood's goldenbush percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup> .
			Sand gilia percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup> .
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

### 8.2.1 Restoration Activities

Burleson has performed passive restoration at HA 19 for three years with four different applications of seed. Seed was broadcast twice in 2013, once in 2015, and once in 2016. The total amount of seed broadcast on the site was 393.9 lb compared to 517 lb prescribed in the SSRP. Table 8-8 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species sand gilia and Monterey spineflower. Nine plots were chosen in the HA based on having suitable habitat for the HMP annuals and adjacent extant populations.

**Table 8-8.** Summary of Passive Restoration Activities from 2013-2016 for HA 19

Species	Pounds of Seed Broadcast					Total by Species
	SSRP Target	2013 (Jan)	2013 (Nov)	2015	2016	
ACMI	14.00	3.50	5.00	0.00	8.00	16.50
ACGL	28.00	7.00	10.00	0.00	16.00	33.00
ADFA	14.00	3.50	0.00	0.00	4.00	7.50
ARPU <sup>1</sup>	14.00	3.90	5.00	0.00	0.00	8.90
ARTO	28.00	7.00	0.00	0.00	0.00	7.00
ARCA	14.00	3.50	5.00	0.00	4.00	12.50
BAPI	2.10	0.53	1.00	0.00	4.00	5.53
CEDE	-	-	-	-	4.00	4.00
CERI <sup>1</sup>	14.00	3.70	5.00	0.00	4.00	12.70
CHPUP <sup>1</sup>	0.20	0.22	0.00	0.00	0.00	0.22
CRSC	14.00	3.50	5.00	0.00	4.00	12.50
DIAU	1.40	2.10	3.00	0.00	0.40	5.50
ELGL	126.00	31.70	45.00	0.00	36.00	112.70
ERER	3.50	0.88	0.50	0.00	0.00	1.38
ERFA <sup>1</sup>	1.40	0.37	1.50	0.00	0.40	2.27
ERCO	4.20	1.10	1.50	0.00	5.20	7.80
GITEA <sup>1</sup>	0.20	0.00	0.00	0.20	0.00	0.20
<i>Hordeum</i> sp.	126.00	31.70	45.00	0.00	0.00	76.70
HOCU	28.00	7.00	10.00	0.00	16.00	33.00
LUAR	-	-	-	-	3.00	3.00
LUNA	-	-	-	-	1.00	1.00
SAME	14.00	3.50	5.00	0.00	4.00	12.50
STCE	70.00	17.50	0.00	0.00	0.00	17.50
<b>TOTAL</b>	<b>517.00</b>	<b>132.20</b>	<b>147.50</b>	<b>0.20</b>	<b>114.00</b>	<b>393.90</b>

<sup>1</sup>HMP species



Active restoration was completed in 2014. Plants were installed in 2013 and 2014. The total number of plants installed at HA 19 was 2,930 compared to 2,462 prescribed in the SSRP. Table 8-9 shows the number of plants

**Table 8-9.** Summary of Active Restoration from 2013-2016 for HA19

Species	Number of Individual Plants			
	SSRP Target	2013	2014	Total by Species
ACMI	75	117	0	117
ACGL	250	250	0	250
ADFA	100	37	63	100
ARPU <sup>1</sup>	80	255	0	255
ARTO	150	24	126	150
ARCA	52	68	0	68
BAPI	150	150	0	150
CERI <sup>1</sup>	50	66	53	119
CRSC	250	250	5	255
DIAU	250	262	0	262
ELGL	55	138	0	138
ERER	50	33	25	58
ERFA <sup>1</sup>	50	97	0	97
ERCO	200	186	14	200
HOCU	250	9	241	250
LUAL	0	0	9	9
SAME	250	227	25	252
STCE	200	200	0	200
<b>TOTAL</b>	<b>2,462</b>	<b>2,369</b>	<b>561</b>	<b>2,930</b>

<sup>1</sup>HMP species

## 8.2.2 Monitoring Results

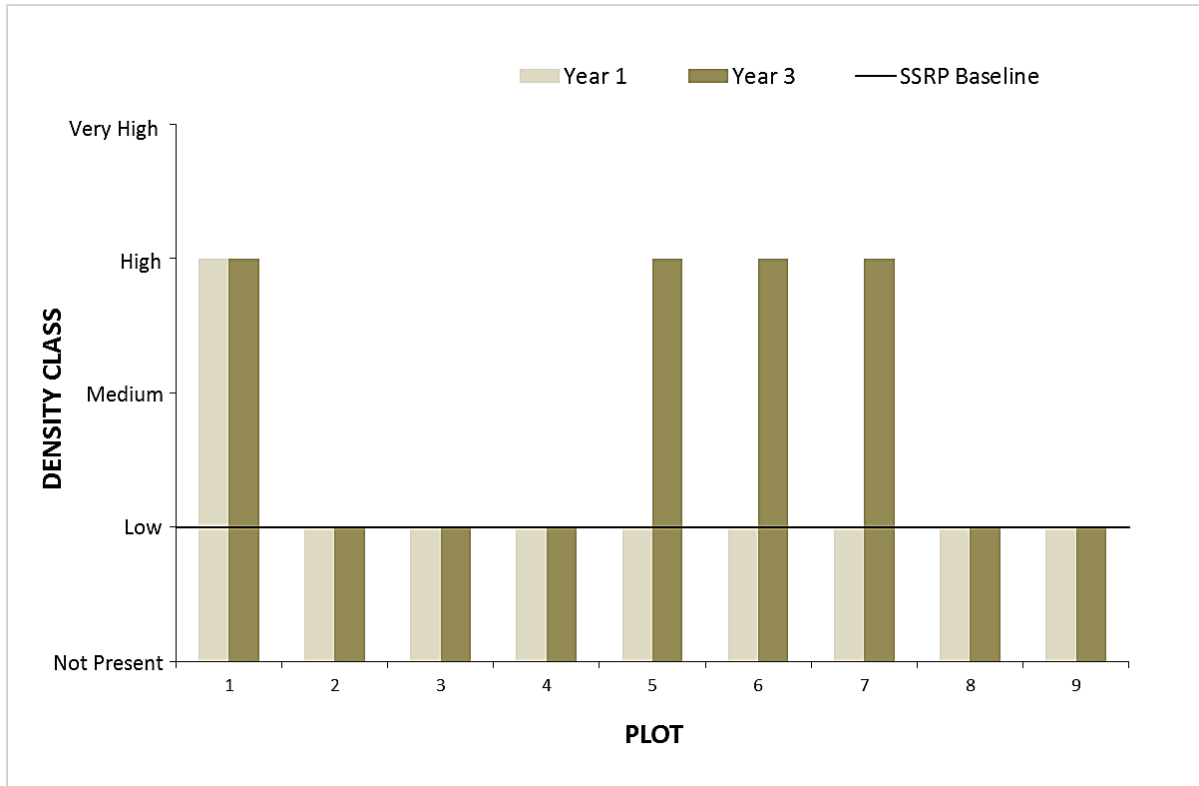
### 8.2.2.1 HMP Annual Density

Monterey spineflower and sand gilia restoration plots were monitored for density. Monitoring at HA 19 was completed for year 3 for Monterey spineflower and year 2 for sand gilia in 2016.

Nine Monterey spineflower plots were surveyed for year 3 density at HA 19 in 2016. The plots are numbered 1-9 on Figure 8-6 and located throughout HA 19. Monterey spineflower density was low at plots 2, 3, 4, 8, and 9 and high at plots 1, 5, 6, and 7. Figure 8-7 represents all the Monterey spineflower restoration plot densities for HA 19.



Figure 8-6. HA 19 Year 3 Monterey Spineflower Plot Density



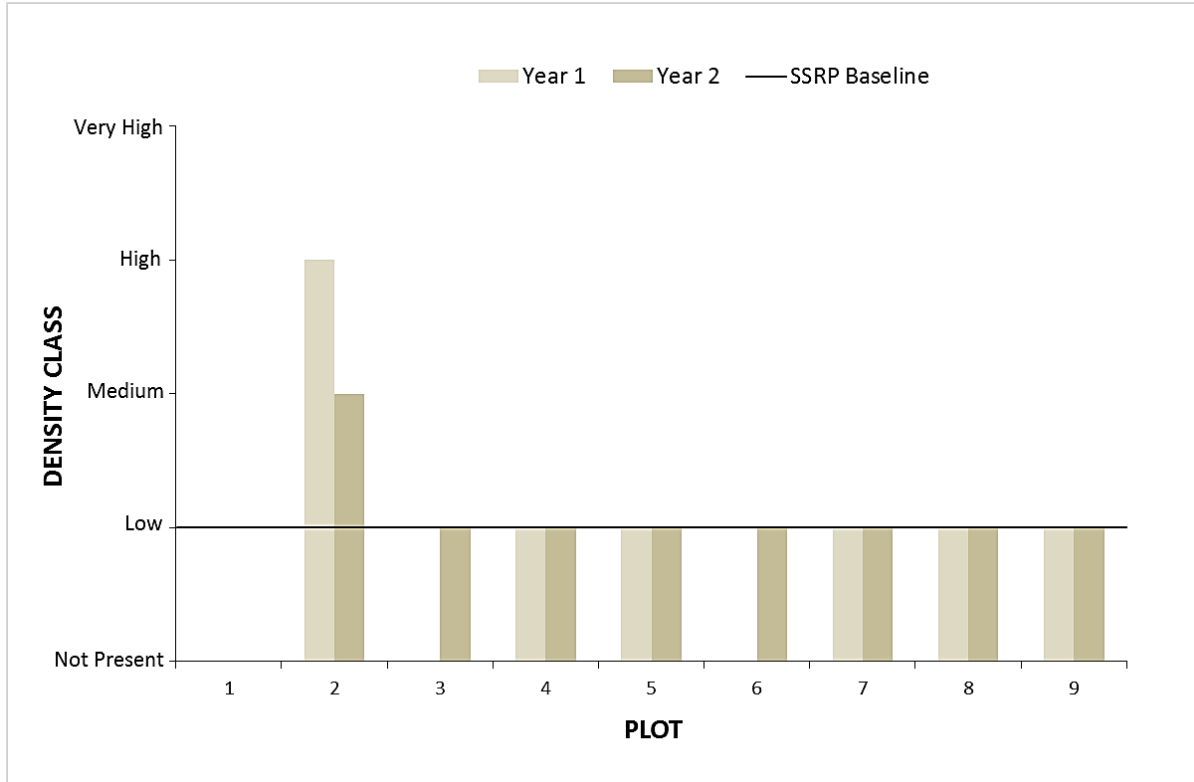
**Figure 8-7.** HA 19 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Years 1 and 3 at Restoration Plots 1-9, Year 2 Data Was Not Collected

Nine sand gilia plots were surveyed for year 2 density at HA 19 in 2016. The plots are numbered 1-9 on Figure 8-8 and are primarily located on the southwestern part of the site. Sand gilia was absent at plot 1. Sand gilia densities were low at plots 3, 4, 5, 6, 7, 8, and 9 and medium at plot 2. Figure 8-9 represents all the sand gilia restoration plot densities for HA 19.





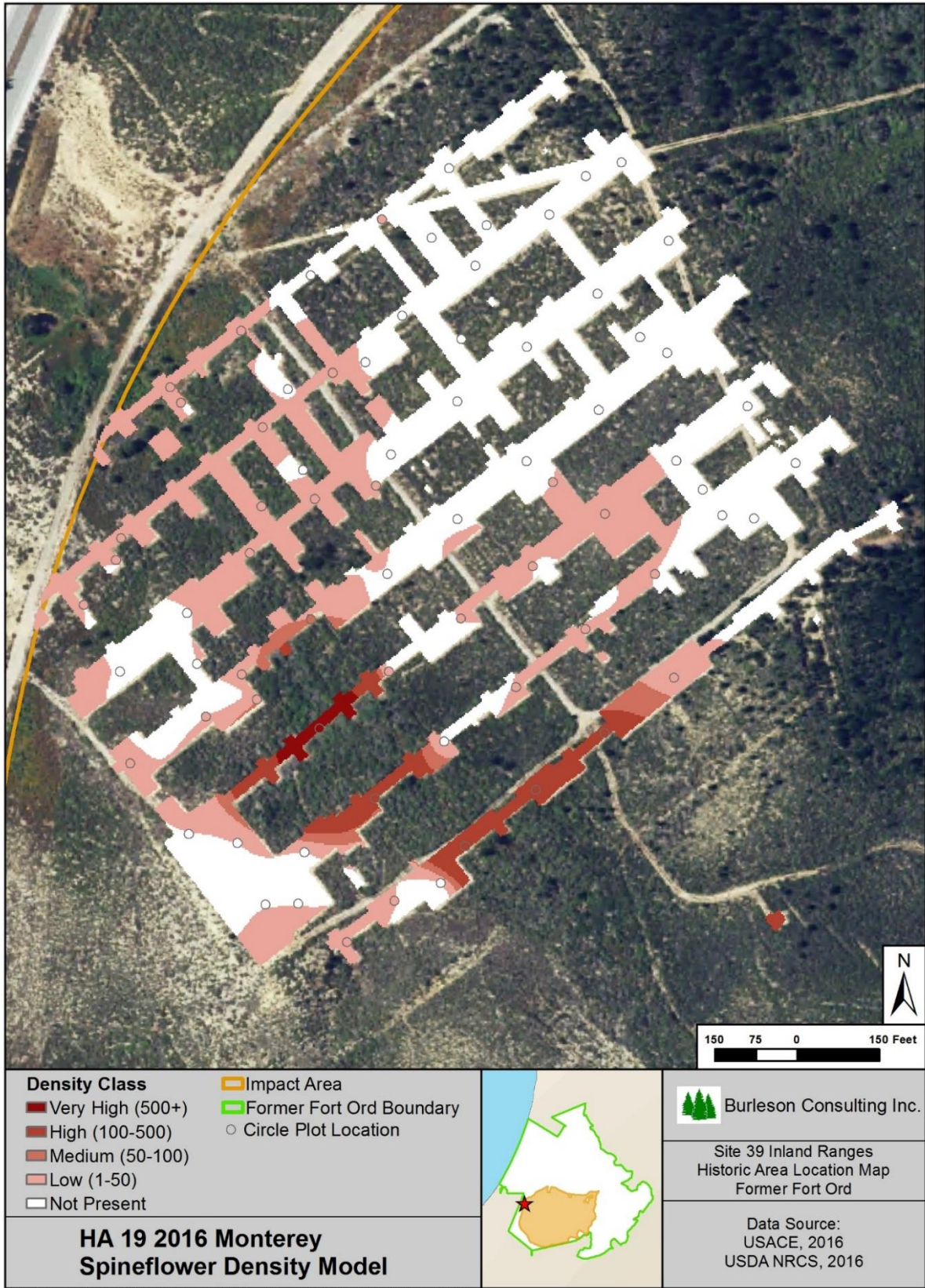
Figure 8-8. HA 19 Year 2 Sand Gilia Plot Density Map



**Figure 8-9.** HA 19 Comparison of Sand Gilia Density Classes to the SSRP Baseline Density Class for Years 1 and 2 at Restoration Plots 1-9

HMP annual density monitoring includes mapping discrete patches of HMP annuals within the restoration site but outside of the HMP annual restoration plots. This survey was completed for sand gilia and Monterey spineflower. A total of four individual sand gilia plants were found outside of the restoration plots. However, the Monterey spineflower population was very dense and patches were indistinguishable throughout HA 19. Therefore, Burleson biologists used the circle plot method to evaluate density across the site. The circle plot data was used in ArcMap to create a Monterey spineflower plant density interpolation model. Figure 8-10 presents results of the circle plot data and density interpolation model for Monterey spineflower.





**Figure 8-10.** HA 19 2016 Monterey Spineflower Density Model Map

### 8.2.2.2 Plant Survivorship

Plant survivorship monitoring was completed at HA 19 for plants installed in 2013 and 2014. A total of nine shrub species and 207 individual plants were monitored for survivorship. By year three monitoring, 60% of the 2013 plants were alive and 20% of the 2014 plants were alive. Survivorship monitoring is complete for both plantings. Tables 8-10 and 8-11 present results by species.

**Table 8-10.** Plant Survivorship Monitoring Summary and Results for 2013 Planting at HA 19

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2013)	Year Two (2014)	Year Three (2015)
			Alive (%)	Alive (%)	Alive (%)
ADFA	37	32	47	63	63
ARCA	68	20	10	15	35
ARPU <sup>1</sup>	255	30	60	77	80
ARTO	24	10	30	80	70
BAPI	150	20	35	50	65
CERI <sup>1</sup>	66	30	23	20	27
ERER	33	20	75	70	70
ERFA <sup>1</sup>	97	20	70	90	95
SAME	227	20	55	45	35
<b>TOTAL</b>	<b>957</b>	<b>202</b>	<b>45*</b>	<b>57*</b>	<b>60*</b>

\*average

<sup>1</sup>HMP species

**Table 8-11.** Plant Survivorship Monitoring Summary and Results for 2014 Planting at HA 19

Species	Planted	Monitored	Year One (2014)	Year Two (2015)	Year Three (2016)
			Alive (%)	Alive (%)	Alive (%)
ADFA	63	5	40	20	20
<b>TOTAL</b>	<b>63</b>	<b>5</b>	<b>40*</b>	<b>20*</b>	<b>20*</b>

\*average

### 8.2.2.3 Species Richness

A total of 60 species were observed at HA 19. Of those, 40 were native shrubs or perennials, 10 were native annual herbaceous species and 10 were non-native species (see Table 8-12).

**Table 8-12. Species Observed at HA 19, 2016**

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Anaphalis margaritacea</i>	pearly everlasting	ANMA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Artemisia californica</i>	California sagebrush	ARCA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus madritensis</i>	red brome	BRMA
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Carex</i> sp.		CA
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Camissoniopsis cheiranthifolia</i>	beach evening-primrose	CHCH
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Clinopodium douglasii</i>	yerba buena	CLDO
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crassula connata</i>	pygmy-weed	CRCO
<i>Cryptantha</i> sp.		CR
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Deinandra corymbosa</i>	coastal tarweed	DECO
<i>Elymus glaucus</i>	blue wild-rye	ELGL
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's goldenbush	ERFA
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY
<i>Frangula californica</i>	California coffeeberry	FRCA
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> <sup>1</sup>	sand gilia	GITEA
<i>Crocianthemum scoparium</i>	peak peak rush-rose	HESC
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's-ear	HYGL
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR
<i>Madia sativa</i>	coast tarweed	MASA
<i>Navarretia atractyloides</i>	holly-leaf navarretia	NAAT
<i>Pinus radiata</i>	Monterey pine	PIRA
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Poaceae</i>		

**Table 8-12.** Species Observed at HA 19, 2016

Scientific Name	Common Name	Code
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE
<i>Pseudognaphalium californicum</i>	lady's tobacco	PSCA
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Schismus barbatus</i>	common Mediterranean grass	SCBA
<i>Sonchus</i> sp.		SO
<i>Stipa pulchra</i>	purple needle grass	STPU
<i>Stylocline gnaphaloides</i>	everlasting neststraw	STGN
<i>Toxicodendron diversilobum</i>	poison oak	TODI
<i>Trifolium</i> sp.	clover	TR

<sup>1</sup> HMP species

#### 8.2.2.4 Vegetative Cover Transects and Quadrats

Burleson completed 14 50-meter line-intercept transects at HA 19. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 33.66%. Table 8-13 presents a summary of vegetation cover and Table 8-14 presents vegetation cover by species.

**Table 8-13.** Line-intercept Transect Survey Summary for HA 19

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA19T01	20.46	20.46	0.00	0.00	3.80	78.10
HA19T02	40.00	40.00	0.00	0.00	12.60	53.30
HA19T03	41.66	41.34	0.32	0.00	12.48	49.94
HA19T04	17.62	17.62	0.00	0.00	12.90	72.38
HA19T05	18.42	18.20	0.22	0.00	7.42	76.42
HA19T06	79.28	79.28	0.00	0.00	3.46	49.56
HA19T07	38.84	38.84	0.00	0.00	9.22	59.12
HA19T08	32.90	32.90	0.00	0.00	6.92	62.44
HA19T09	52.56	52.56	0.00	0.00	9.70	43.80
HA19T10	20.80	20.80	0.00	0.00	9.42	72.82
HA19T11	30.82	30.54	0.28	0.00	7.58	67.56
HA19T12	27.10	23.50	3.60	0.00	12.18	66.76
HA19T13	31.02	31.02	0.00	0.00	0.00	70.12
HA19T14	24.14	24.14	0.00	0.00	0.00	76.14
<b>AVERAGE</b>	<b>33.97</b>	<b>33.66</b>	<b>0.32</b>	<b>0.00</b>	<b>7.69</b>	<b>64.18</b>



**Table 8-14.** Line-intercept Transect Survey Results for HA 19 by Species

Transect	ACMI (%)	ACGL (%)	ARCA (%)	ARPU <sup>1</sup> (%)	ARTO (%)	BAPI (%)	CEDE (%)	CHPUP <sup>1</sup> (%)	COFI (%)	CRSC (%)	DIAU (%)	ELGL (%)	ERFA <sup>1</sup> (%)	ERCO (%)	HOCU (%)	LOPA (%)	LUAL (%)	LUAR (%)	SAME (%)	TODI (%)	TH (%)	BG (%)
HA19T01	0.00	5.60	0.00	4.44	1.16	0.00	0.00	0.00	0.00	2.96	1.86	0.00	0.00	0.42	0.26	0.00	0.00	0.00	0.00	3.76	3.80	78.10
HA19T02	1.12	11.84	0.66	0.68	0.30	1.12	0.00	0.00	0.00	14.98	0.00	0.00	0.00	1.10	0.00	0.00	0.00	0.00	7.24	0.96	12.60	53.30
HA19T03	0.00	5.68	0.00	3.72	1.84	0.00	0.74	0.32	1.40	25.02	0.00	0.00	0.00	1.50	1.44	0.00	0.00	0.00	0.00	0.00	12.48	49.94
HA19T04	0.00	2.64	0.00	7.34	1.70	0.20	2.40	0.00	0.00	2.14	0.00	0.00	0.00	1.00	0.20	0.00	0.00	0.00	0.00	0.00	12.90	72.38
HA19T05	0.00	3.80	0.00	1.18	0.00	0.00	0.00	0.22	0.74	11.06	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.30	0.52	0.00	7.42	76.42
HA19T06	0.00	16.00	0.00	6.42	4.36	0.00	6.36	0.00	0.00	46.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.46	49.56
HA19T07	0.00	7.56	0.00	6.54	0.00	0.00	0.00	0.00	5.12	16.44	0.00	0.00	0.00	2.88	0.30	0.00	0.00	0.00	0.00	0.00	9.22	59.12
HA19T08	0.44	5.86	0.00	5.18	0.48	0.00	2.16	0.00	0.00	17.76	0.00	0.00	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	6.92	62.44
HA19T09	0.00	16.78	0.00	12.96	0.00	0.00	0.00	0.00	0.22	21.30	0.00	0.00	0.00	0.32	0.00	0.60	0.00	0.38	0.00	0.00	9.70	43.80
HA19T10	0.22	2.60	0.62	1.08	0.86	0.00	3.30	0.00	0.00	8.70	0.00	0.48	0.00	1.82	0.80	0.00	0.00	0.00	0.32	0.00	9.42	72.82
HA19T11	0.00	4.68	0.00	1.68	3.56	0.00	0.00	0.28	0.00	8.86	0.00	0.00	0.00	0.30	0.00	0.00	1.18	0.00	10.28	0.00	7.58	67.56
HA19T12	0.00	16.66	0.00	5.58	0.00	0.00	0.00	3.60	0.00	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.18	66.76
HA19T13	0.00	11.26	0.00	0.00	0.42	0.00	0.00	0.00	0.00	8.18	0.00	0.00	1.42	9.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.12
HA19T14	0.00	3.14	0.00	9.00	0.22	0.00	0.00	0.00	0.00	6.38	0.00	0.00	0.00	0.00	0.00	0.00	5.40	0.00	0.00	0.00	0.00	76.14
<b>AVERAGE</b>	<b>0.13</b>	<b>8.15</b>	<b>0.09</b>	<b>4.70</b>	<b>1.06</b>	<b>0.09</b>	<b>1.07</b>	<b>0.32</b>	<b>0.53</b>	<b>13.66</b>	<b>0.13</b>	<b>0.03</b>	<b>0.10</b>	<b>1.48</b>	<b>0.21</b>	<b>0.04</b>	<b>0.47</b>	<b>0.05</b>	<b>1.31</b>	<b>0.34</b>	<b>7.69</b>	<b>64.18</b>

<sup>1</sup>HMP species

### 8.2.3 Discussion

#### 8.2.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limits for HMP annual density at HA 19. The SSRP baseline density class for Monterey spineflower was low. All of the Monterey spineflower restoration plots have met the success criterion. It should be noted that Monterey spineflower was not monitored in year 2 due to conflicting instructions between the SSRP and the Protocol for Conducting Vegetation Monitoring. A clarification was made that the HMP annual plots should be monitored for density according to the SSRP. However, this clarification did not occur until after the peak bloom for Monterey spineflower. In addition, the Monterey spineflower population outside of the restoration plots has responded very well. The circle plot data results indicated areas of Monterey spineflower densities ranging from not present to very high. The density model that interpolates the circle plot data indicates that more than 10% of the overall area of HA 19 is being utilized by Monterey spineflower (see Figure 8-10). The circle plot density average across the HA is 30.25 Monterey spineflower/100 ft<sup>2</sup> which falls in the density class of low. Overall, the HA is meeting the success criterion across the site for Monterey spineflower density.

Sand gilia density is within the acceptable limits for the HMP annual density criteria at HA 19. The SSRP baseline density class for sand gilia was low. The sand gilia restoration plot results show that by Year 2, for all plots except plot 1, densities met or exceeded the success criterion. The sand gilia population outside of the restoration plots was only four individuals. Recruitment beyond the restoration plots, whether natural or related to the restoration efforts, has not significantly occurred for sand gilia at HA 19.

#### 8.2.3.2 Plant Survivorship

Plant survivorship results indicate that 60% of plants installed in 2013 were still alive after three years of monitoring. However, for plants installed in 2014, only 20% were alive. The 2014 planting was an additional effort to meet the planting target for chamise. The percentage of total monitored chamise plantings still alive by 2016 was 58% (combining both planting events).

Plant survivorship increased from 46% in year 1, to 54% in year 2, and to 58% in year 3. The increase in survivorship was attributed to some plants being recorded as dead in year 1 but then recorded as alive in years 2 and 3 because they showed new growth.

The three plant species that had low survivorship (California sagebrush, Monterey ceanothus, and black sage) appear to be more sensitive to high winds than the other species. It should be noted that Monterey ceanothus had low survivorship at multiple sites. Wind erosion was evident with signs of wind scour and deposition of sand, making it difficult for plants to get established at HA 19. If future plantings occur, it is recommended that wind breaks be installed to protect the plants from high winds and wind erosion.

#### 8.2.3.3 Species Richness

Chamise, sandmat manzanita, shaggy-barked manzanita, California sagebrush, Monterey ceanothus, mock heather, Eastwood's goldenbush, golden yarrow, deerweed, sticky monkey flower, coast live oak, and black sage were all present. Pitcher sage was not present. HA 19 included 40 shrub and perennial native species present; however, it did not meet the success criterion for objective 1 because pitcher sage was not present.



#### 8.2.3.4 Vegetation Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes twenty shrub and perennial species presented in Table 2 of the HA 19 SSRP (Burleson, 2013). Currently, these species comprise 31.46% cover of the HA. This success criterion is on an excellent trajectory but is not yet met.

Objective 2 considers the percent cover of non-native target weeds. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 3. Cover class 3 is from 6-25% of absolute cover. The HMP shrub species at HA 19 are providing an absolute cover of 4.8%; therefore, the HA has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 19 this means a vegetative cover average of at least 16% cover for sandmat manzanita and presence of Monterey ceanothus and Eastwood's golden bush. The average vegetative cover for sandmat manzanita was 4.7%, for Monterey ceanothus 0.00%, and for Eastwood's golden bush 0.10%. Only one of the three species, Eastwood's golden bush, met the acceptable limit. In addition, HMP annuals were evaluated for vegetative cover. Monterey spineflower and sand gilia are required to provide at least 1% cover from the transect surveys. Monterey spineflower is likely meeting the success criteria for cover as evident by the population density, however, the result of the transect data average was 0.32%. Sand gilia did not provide any cover, according to the transect data. The HMP annual vegetative cover success criterion is currently not met.

#### 8.2.3.5 Recommendations

HA 19 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate progress, growth, and improvement of the HA. Overall, HA 19 requires more time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort. Burleson recommends that pitcher sage be planted to meet the species richness success criterion. Pitcher sage was not previously included in the plant palette, but was listed as a required species in the SSRP. Also, the amount of seed broadcast has not yet reached the prescribed amount in the HA 19 SSRP. An additional 123 lbs of seed is required in the passive restoration area to reach this target; however, we recommend additional monitoring before more seed is broadcast.

We also recommend that objective 3, success criterion 4 be reconsidered. This success criterion requires greater than or equal to 1% transect cover for Monterey spineflower and sand gilia. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy; this is already captured in objective 3.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-15 summarizes the current status of HA 19 including which success criteria have been met as well as our recommendation to move towards meeting success criteria.

**Table 8-15.** Status and Recommendations for Achieving the Success Criteria at HA 19

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Broadcast or plant pitcher sage
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

### 8.3 HA 22

HA 22 was used by the Army as a long-distance small-arms firing range with targets and no berm. Soil remediation was completed in 2010, and resulted in 100 cubic yards of lead-contaminated soil being excavated from 0.05 acre (Shaw, 2008). HA 22 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 22 is relatively flat with a northwest and west aspect. The adjacent lands are not developed and contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 22 is located on the western portion Site 39, occurring within sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive restoration was prescribed at HA 22, and consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 22 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 22 occurred in 2011 and 2012. Monitoring at HA 22 began in 2012. It has been monitored for four years by photo documentation, four years for HMP annual density in plots, one year for HMP annual density across the HA, and one year for vegetative cover. Figure 8-11 shows the historic area footprint, passive restoration area and quadrat monitoring locations. Success criteria for HA 22 are summarized in Table 8-16.

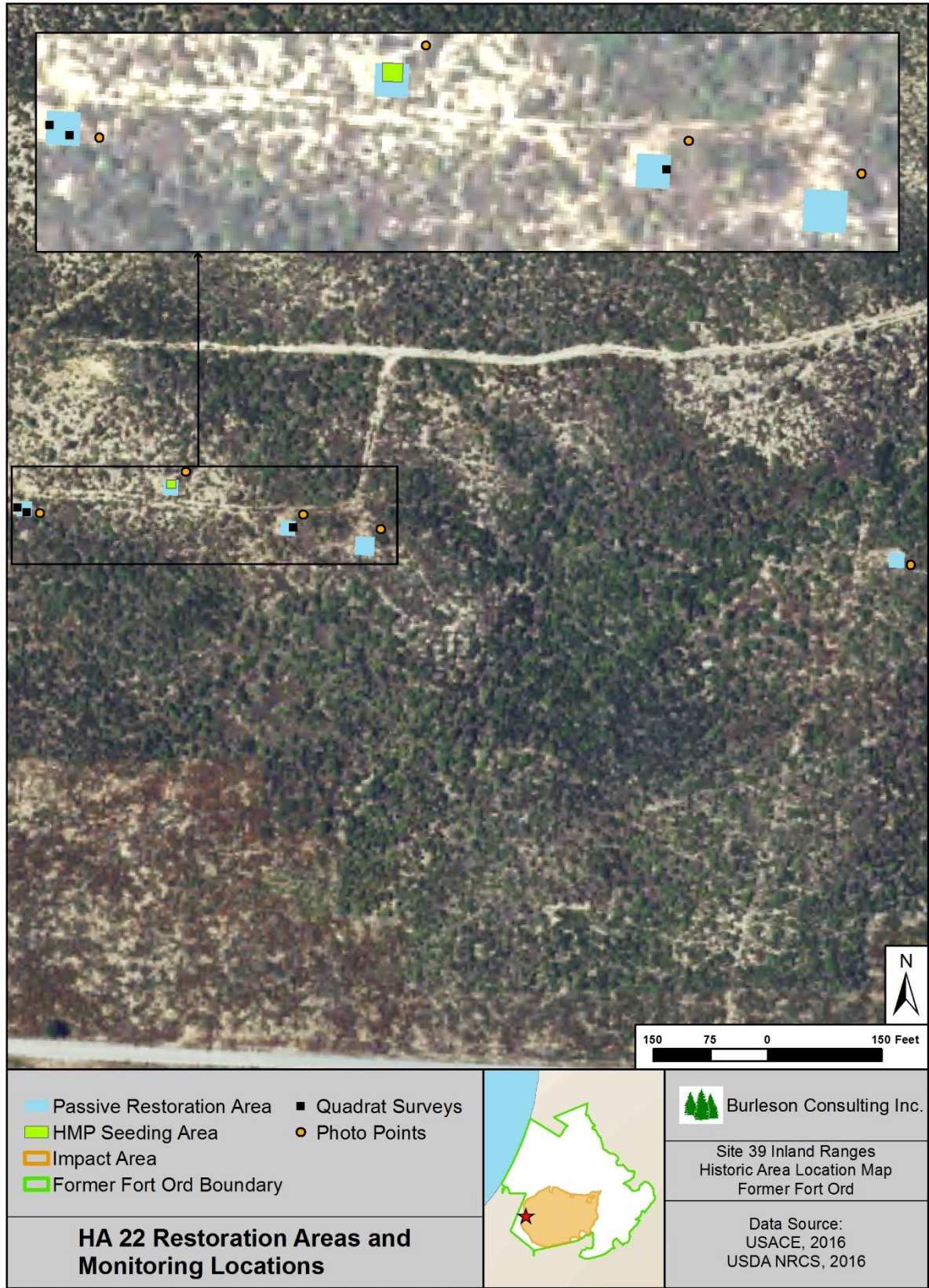


Figure 8-11. HA 22 Restoration Areas and Monitoring Locations Map

**Table 8-16.** Success Criteria and Acceptable Limits for Restoration of HA 22

Objective 1 <sup>1</sup>			
No.	Success	Decision Rule	Acceptable Limits
1	Restoration demonstrates	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			shaggy-bark manzanita
			sandmat manzanita <sup>2</sup>
			Coyote brush
			Monterey ceanothus <sup>2</sup>
			dwarf ceanothus
			Monterey spineflower <sup>2</sup>
			mock heather
			Eastwood’s golden fleece <sup>2</sup>
			golden yarrow
			peak rush rose
			deerweed
			sticky monkey flower
			black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.

**Table 8-16.** Success Criteria and Acceptable Limits for Restoration of HA 22

Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 20.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 4.
			Eastwood's golden fleece percent cover, as an average of transect data, must be equal or greater than 1.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.3.1 Restoration Activities**

Burleson has performed passive restoration at HA 22 for two years with seed broadcast in 2011 and 2012. The total amount of seed broadcast on the site is 1.219 lb compared to the 1.243 lb prescribed in the SSRP. No active restoration activities have been completed for HA 22. Table 8-17 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed



passive restoration for the HMP annual species Monterey spineflower. The plot was chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-17.** Summary of Passive Restoration Activities from 2011-2016 for HA 22

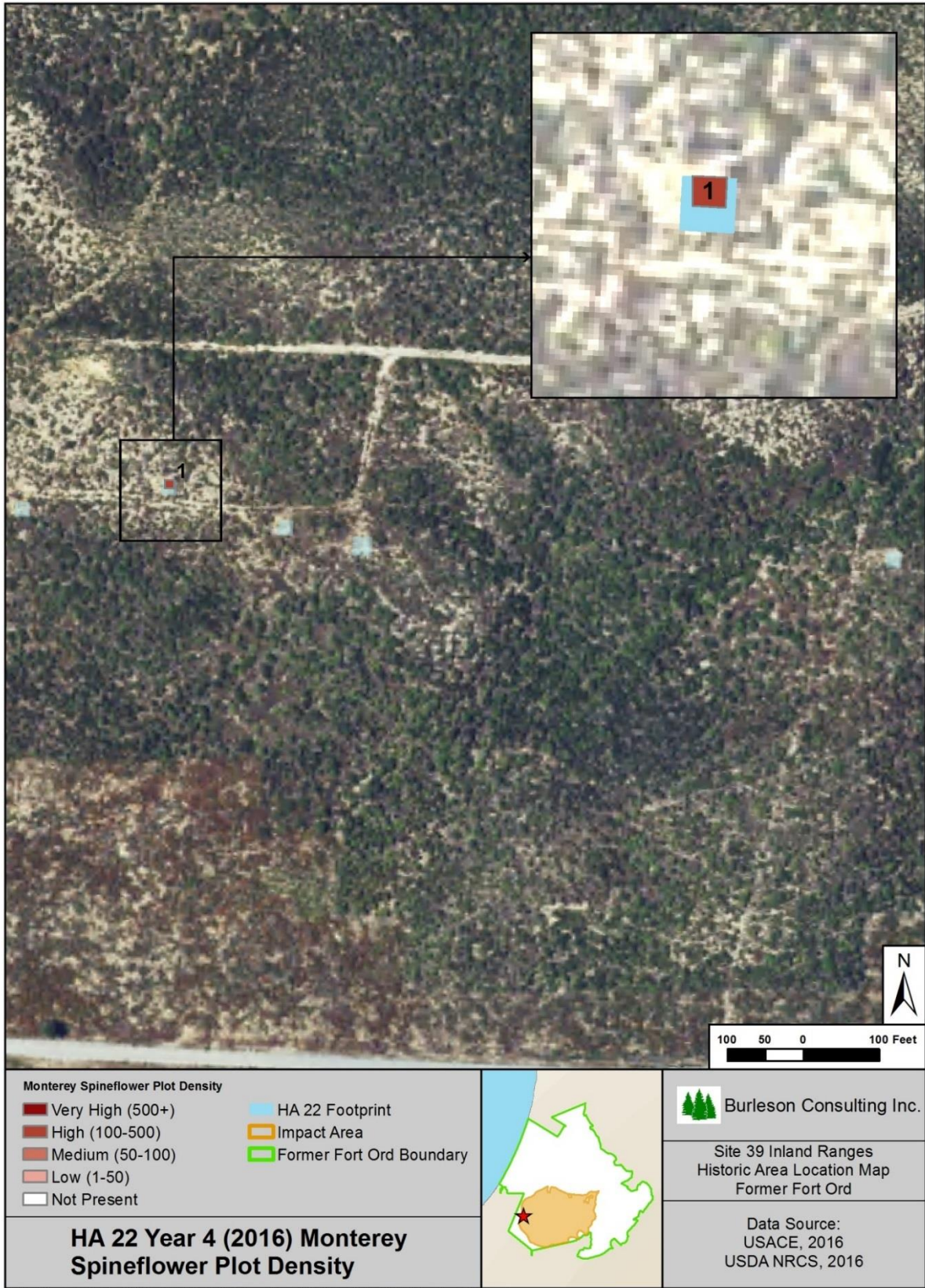
Species	Pounds of Seed Broadcast			
	SSRP Target	2011	2012	Total by Species
ACGL	0.100	0.051	0.059	0.110
ACMI	0.050	0.026	0.032	0.058
ADFA	0.050	0.028	0.032	0.060
ARPU <sup>1</sup>	0.050	0.027	0.04	0.067
ARTO	0.100	0.052	0.062	0.114
BAPI	0.008	0.000	0.006	0.006
CERI <sup>1</sup>	0.050	0.028	0.028	0.056
CHPUP <sup>1</sup>	0.001	0.011	0.005	0.016
CRCA	0.050	0.026	0.032	0.058
CRSC	0.050	0.028	0.029	0.057
DIAU	0.005	0.016	0.025	0.041
ERCO	0.015	0.011	0.012	0.023
ERER	0.013	0.009	0.014	0.023
ERFA <sup>1</sup>	0.001	0.000	0.002	0.002
HOCU	0.100	0.051	0.058	0.109
<i>Hordeum sp.</i>	0.450	0.000	0.239	0.239
SAME	0.050	0.037	0.032	0.069
STCE	0.100	0.051	0.06	0.111
<b>TOTAL</b>	<b>1.243</b>	<b>0.452</b>	<b>0.767</b>	<b>1.219</b>

<sup>1</sup>HMP species

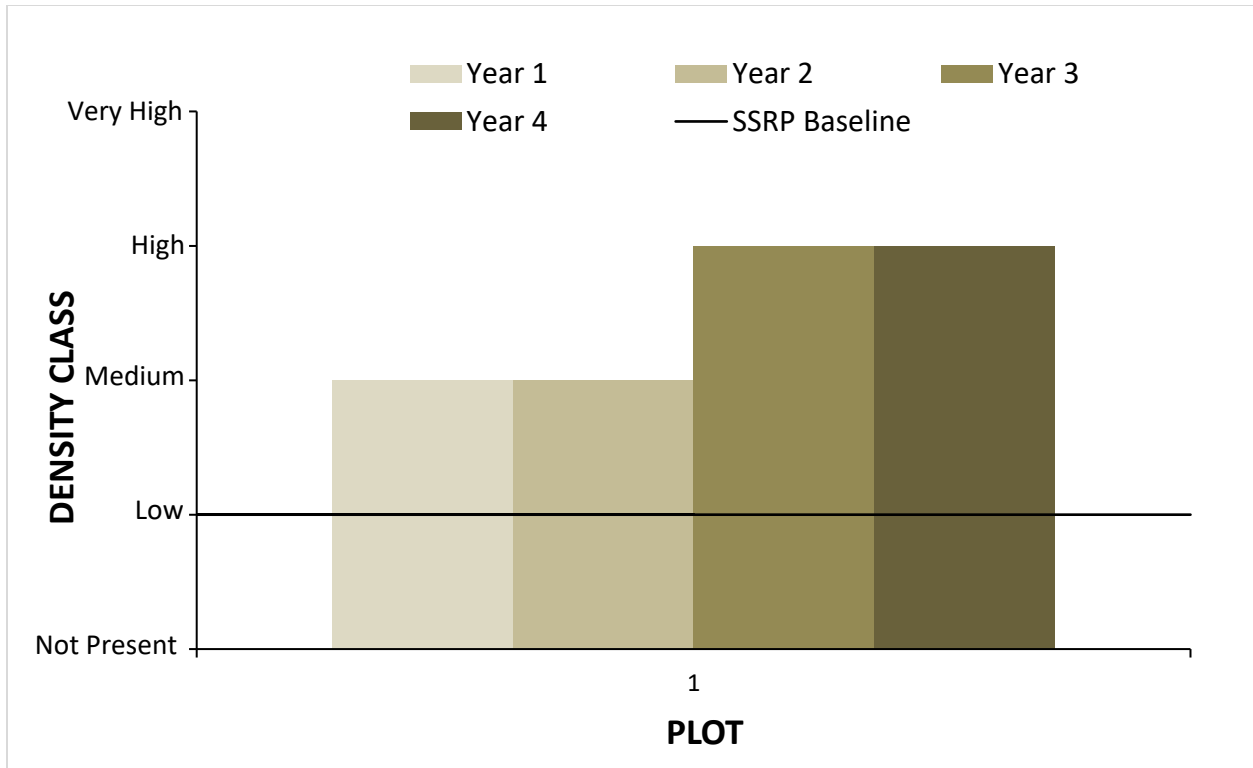
### 8.3.2 Monitoring Results

#### 8.3.2.1 HMP Annual Density

The Monterey spineflower plot was surveyed for year 4 density at HA 22 in 2016. The plot is numbered 1 on Figure 8-12 and is located in the central part of the site. Monterey spineflower density was high at plot 1. Figure 8-13 represents Monterey spineflower restoration plot densities for HA 22.



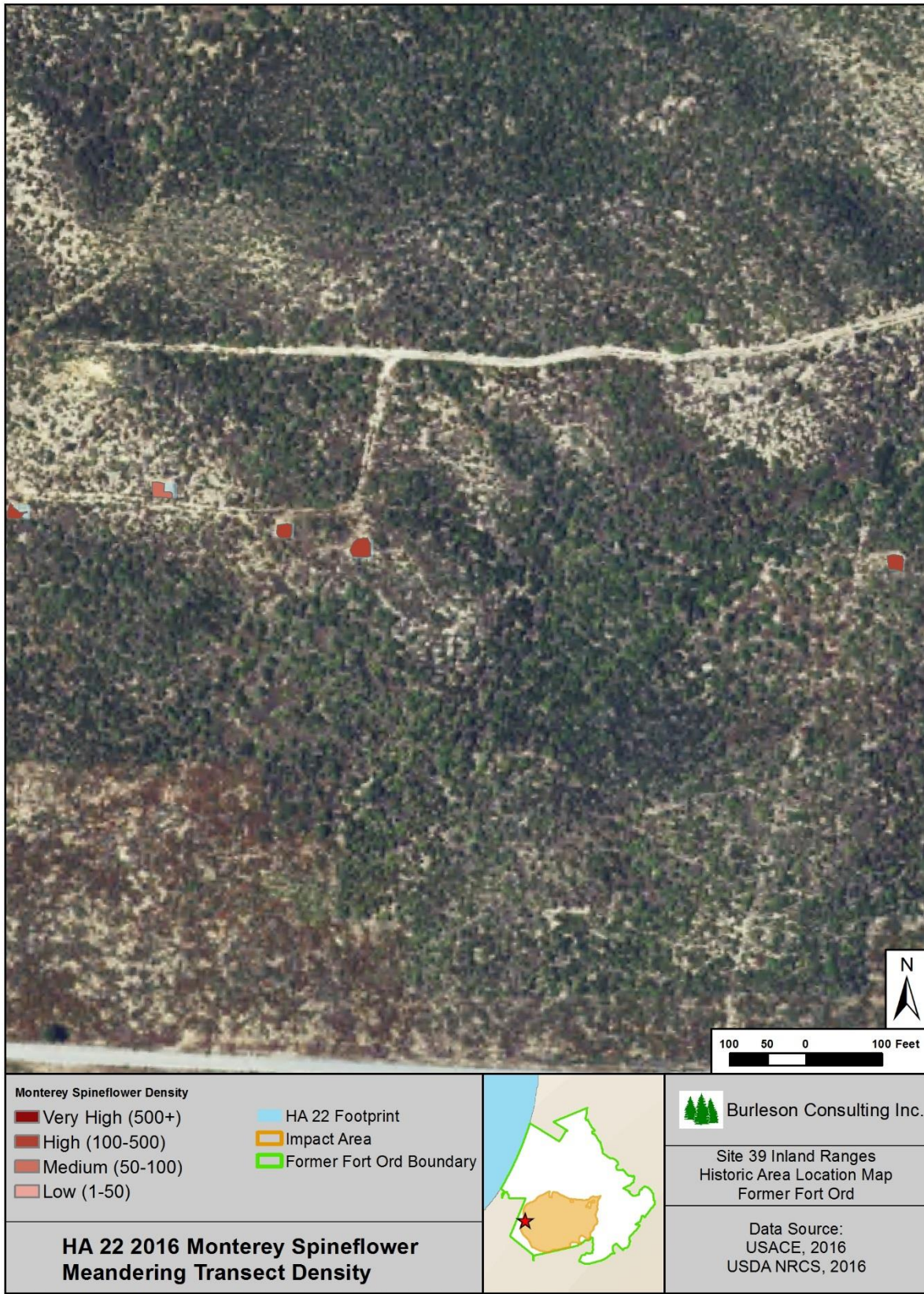
**Figure 8-12.** HA 22 Year 4 Monterey Spineflower Plot Density Map



**Figure 8-13.** HA 22 Monterey Spineflower Plot Densities, Year 1 through Year 4

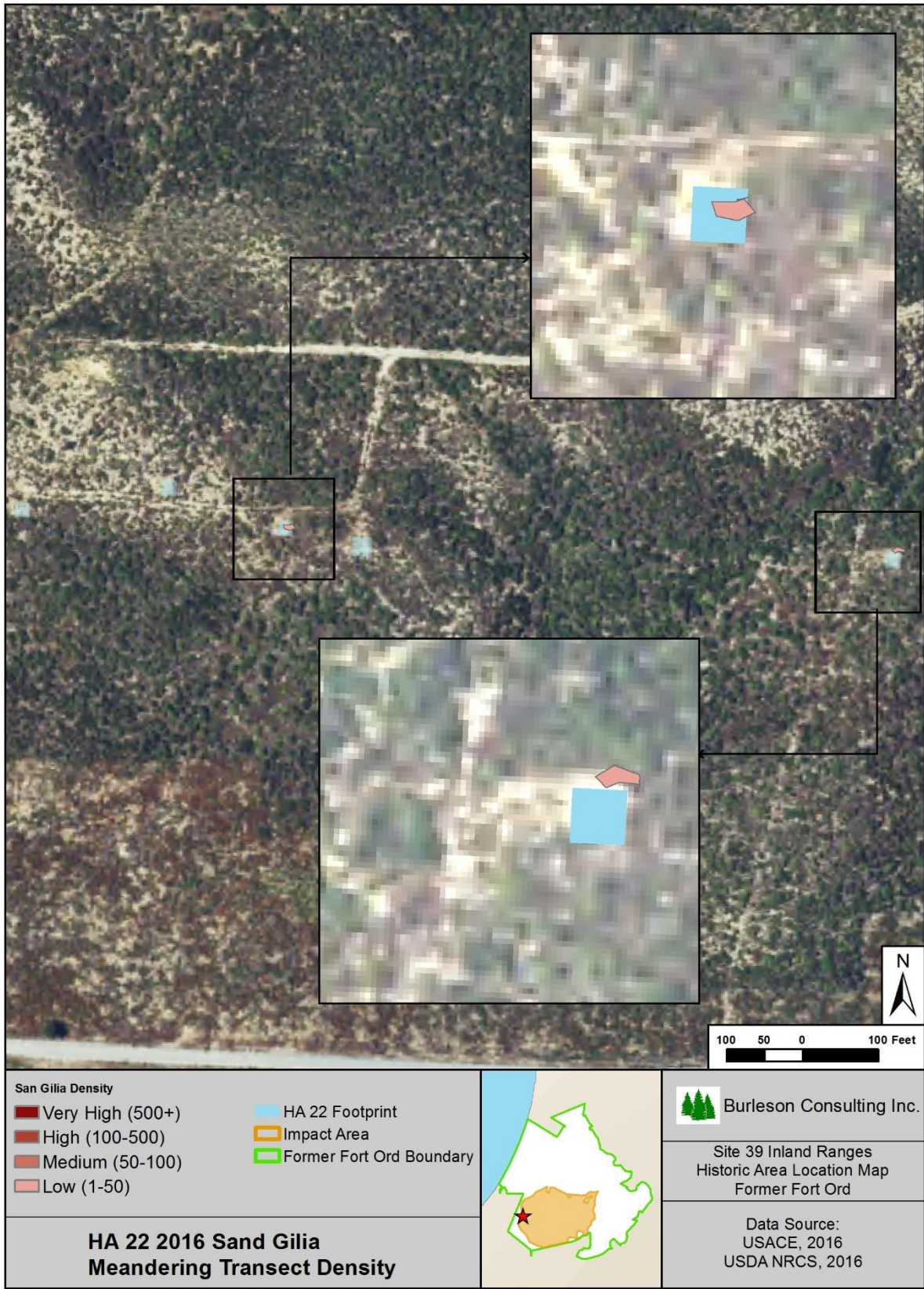
HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. Five discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 8-14). The densities ranged from medium to high. The total acreage of Monterey spineflower patches with a density at or above the SSRP baseline was 0.04 acre. Two discrete patches of sand gilia were mapped and individuals counted within each patch (see Figure 8-15). The densities were low. The total acreage of sand gilia patches with a density at or above the SSRP baseline was 0.004 acre.





**Figure 8-14.** HA 22 Monterey Spineflower Meandering Transect Density Map





**Figure 8-15.** HA 22 Sand Gilia Meandering Transect Density Map

### 8.3.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.3.2.3 Species Richness

Nine species were observed at HA 22 as shown on Table 8-18. Of those, four were native shrubs or perennials, four were native annual herbaceous species, and one was a non-native species.

**Table 8-18. Species Observed at HA 22, 2016**

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Croton californica</i>	croton	CRCA
<i>Crocانthemum scoparium</i>	peak rush rose	CRSC
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> <sup>1</sup>	sand gilia	GITEA
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Navarretia hamata</i>	hooked navarretia	NAHA

<sup>1</sup>HMP species

### 8.3.2.4 Vegetative Cover Transects and Quadrats

Burleson completed three quadrats at HA 22. The quadrat survey results indicate that the mean vegetative cover by native shrubs and perennials was 5.3%. Table 8-19 presents the vegetation cover summary and Table 8-20 presents the vegetation cover by species.

**Table 8-19. Quadrat Survey Summary for HA 22**

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA22Q01	6.0	5.0	1.0	0.0	0.0	94.0
HA22Q02	81.0	0.0	0.0	0.0	81.0	19.0
HA22Q03	14.0	11.0	0.0	0.0	3.0	86.0
<b>AVERAGE</b>	<b>33.7</b>	<b>5.3</b>	<b>0.3</b>	<b>0.0</b>	<b>28.0</b>	<b>66.3</b>

**Table 8-20. Quadrat Survey Results for HA 22 by Species**

Quadrat	ACGL (%)	CRSC (%)	MAGR (%)	TH (%)	BG (%)
HA22Q01	0.0	5.0	1.0	0.0	94.0
HA22Q02	0.0	0.0	0.0	81.0	19.0
HA22Q03	11.0	0.0	0.0	3.0	86.0
<b>AVERAGE</b>	<b>3.7</b>	<b>1.7</b>	<b>0.3</b>	<b>28.0</b>	<b>66.3</b>

### 8.3.3 Discussion

#### 8.3.3.1 HMP Annual Density

Monterey spineflower density is within the acceptable limits for HMP annual density at HA 22. The SSRP baseline density class for Monterey spineflower was low. The Monterey spineflower restoration plot results show that by year 4 the density exceeded the success criterion under objective 3. In addition, Monterey spineflower was present outside of the restoration plots. Discrete patches, with densities that either met or exceeded the success criterion, covered 0.004 acre of HA 22.

#### 8.3.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.3.3.3 Species Richness

Chamise, peak rush rose, and deerweed were all present. However, sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, dwarf ceanothus, mock heather, Eastwood's goldenbush, golden yarrow, sticky monkey flower, and black sage were not present. HA 22 does not meet the success criterion for objective 1.

#### 8.3.3.4 Vegetative Cover Transects and Quadrats

Quadrats were completed to provide a preliminary idea of vegetative cover with a limited amount of effort; however, multiple objectives outlined in the SSRP specifically require transect data. Quadrat data will not be compared to the success criteria.

#### 8.3.3.5 Recommendations

HA 22 is generally responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth, and improvement of the HA. Despite this progress, the species richness criterion has not been met. Burleson recommends installing three of each species: sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, dwarf ceanothus, mock heather, Eastwood's goldenbush, golden yarrow, sticky monkey flower, and black sage. Other success criteria cannot be assessed at this time since transect data were not collected.

The site will continue to be monitored by photo documentation, HMP annual density surveys, and species richness meandering transects. It is recommended to collect line-intercept transects in the future at this site to effectively evaluate success criteria.

Table 8-21 summarizes the current status of HA 22 including which success criteria have been met as well as our recommendation to move towards meeting all success criteria.

**Table 8-21.** Status and Recommendations for Achieving the Success Criteria at HA 22

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, dwarf ceanothus, mock heather, Eastwood's goldenbush, golden yarrow, sticky monkey flower and black sage
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	Cannot assess	Install transects

#### 8.4 HA 23

HA 23 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010, and resulted in 450 cubic yards of lead-contaminated soil being excavated from 0.3 acre (Shaw, 2008). HA 23 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 23 is relatively flat with a west aspect. The adjacent lands are not developed and contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 23 is located on the western portion of Site 39, occurring within sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 23 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 23 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 23 was completed in 2012 and monitoring began in 2013. The HA has been monitored for four years by photo documentation, three years for HMP annual density in plots, one year for HMP annual density across the HA, and one year for vegetative cover. Figure 8-16 shows the HA footprint, passive restoration area, and quadrat monitoring locations. Success criteria for HA 23 are summarized in Table 8-22.



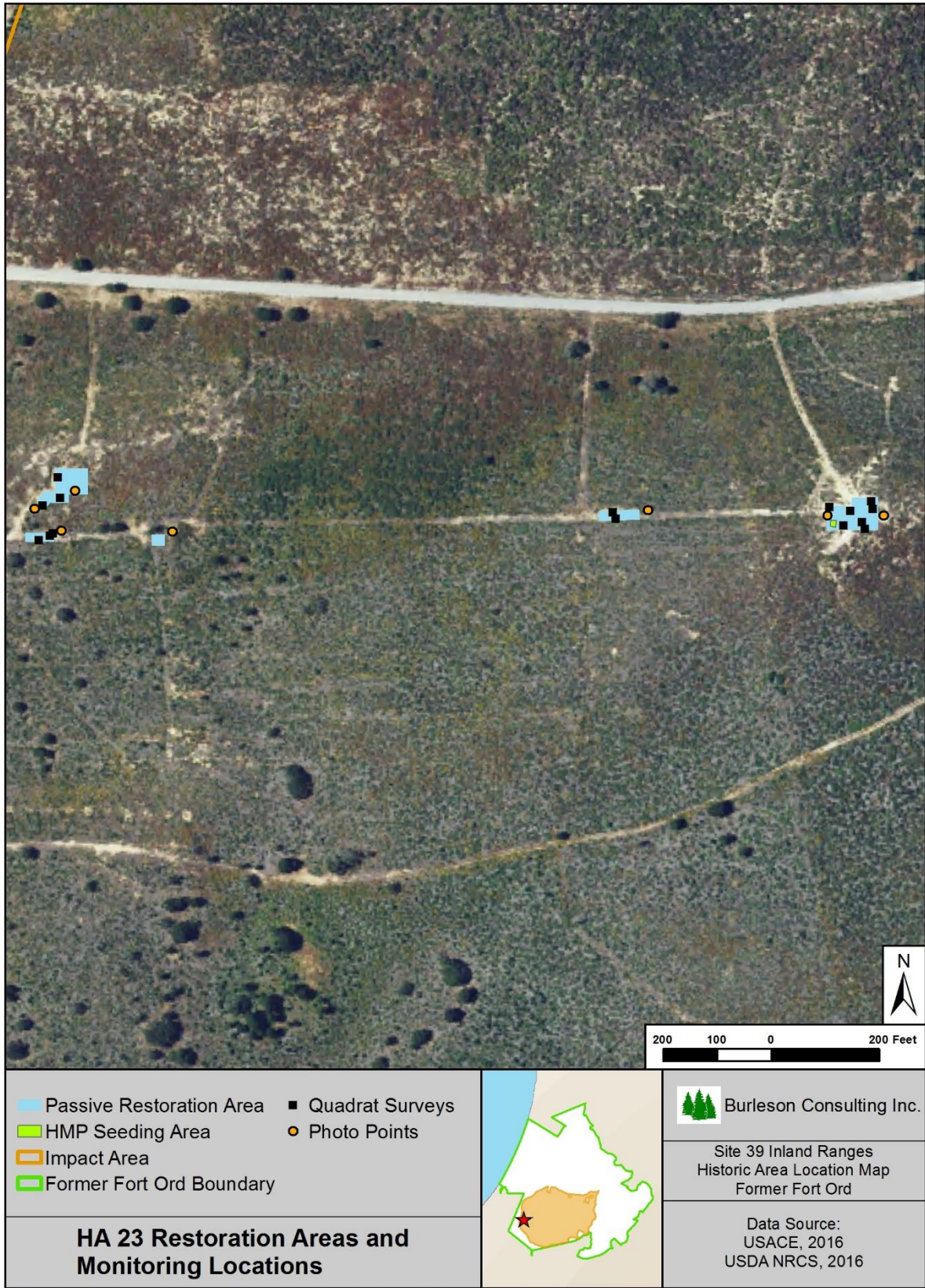


Figure 8-16. HA 23 Restoration Areas and Monitoring Locations Map



**Table 8-22. Success Criteria and Acceptable Limits for Restoration of HA 23**

Objective 1 <sup>1</sup>			
No.	Success Element	Decision Rule	Acceptable Limits
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			shaggy-bark manzanita
			sandmat manzanita <sup>2</sup>
			coyote brush
			Monterey ceanothus <sup>2</sup>
			dwarf ceanothus
			Monterey spineflower <sup>2</sup>
			mock heather
			Eastwood's golden fleece <sup>2</sup>
			golden yarrow
			peak rush rose
			deerweed
			sticky monkey flower
			black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.

**Table 8-22. Success Criteria and Acceptable Limits for Restoration of HA 23**

Objective 3 <sup>1</sup>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 20.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 4.
			Eastwood's golden fleece percent cover, as an average of transect data, must be equal or greater than 1.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.4.1 Restoration Activities**

Burleson performed passive restoration at HA 23 for two years with seed broadcast in 2011 and 2012. The total amount of seed broadcast on the site was 5.953 lb compared to 5.7845 lb prescribed in the SSRP. Table 8-23 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species Monterey spineflower. One plot was chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-23.** Summary of Passive Restoration Activities from 2011-2016 for HA 23

Species	Pounds of Seed Broadcast			
	SSRP Target	2011	2012	Total by Species
ARTO	0.600	0.300	0.326	0.626
BAPI	0.050	0.000	0.028	0.028
CERI <sup>1</sup>	0.300	0.088	0.248	0.336
CHPUP <sup>1</sup>	0.005	0.022	0.003	0.025
CRCA	0.080	0.200	0.158	0.358
CRSC	0.300	0.200	0.168	0.368
DIAU	0.030	0.088	0.105	0.193
ERCO	0.090	0.490	0.058	0.548
ERER	0.080	0.420	0.044	0.464
ERFA <sup>1</sup>	0.050	0.028	0.026	0.054
HOCU	0.600	0.300	0.306	0.606
<i>Hordeum</i> sp.	2.700	0.000	1.370	1.370
SAME	0.300	0.200	0.162	0.362
STCE	0.600	0.300	0.315	0.615
<b>TOTAL</b>	<b>5.785</b>	<b>2.636</b>	<b>3.317</b>	<b>5.953</b>

<sup>1</sup>HMP species

## 8.4.2 Monitoring Results

### 8.4.2.1 HMP Annual Density

The Monterey spineflower plot was surveyed for year 4 density at HA 23 in 2016. The plot is numbered 1 on Figure 8-17 and is located in the eastern polygon on the site. Monterey spineflower density was medium. Figure 8-18 represents Monterey spineflower restoration plot densities for HA 23. Monterey spineflower was not monitored in year 1 due to UXO activity and associated restrictions for accessibility.

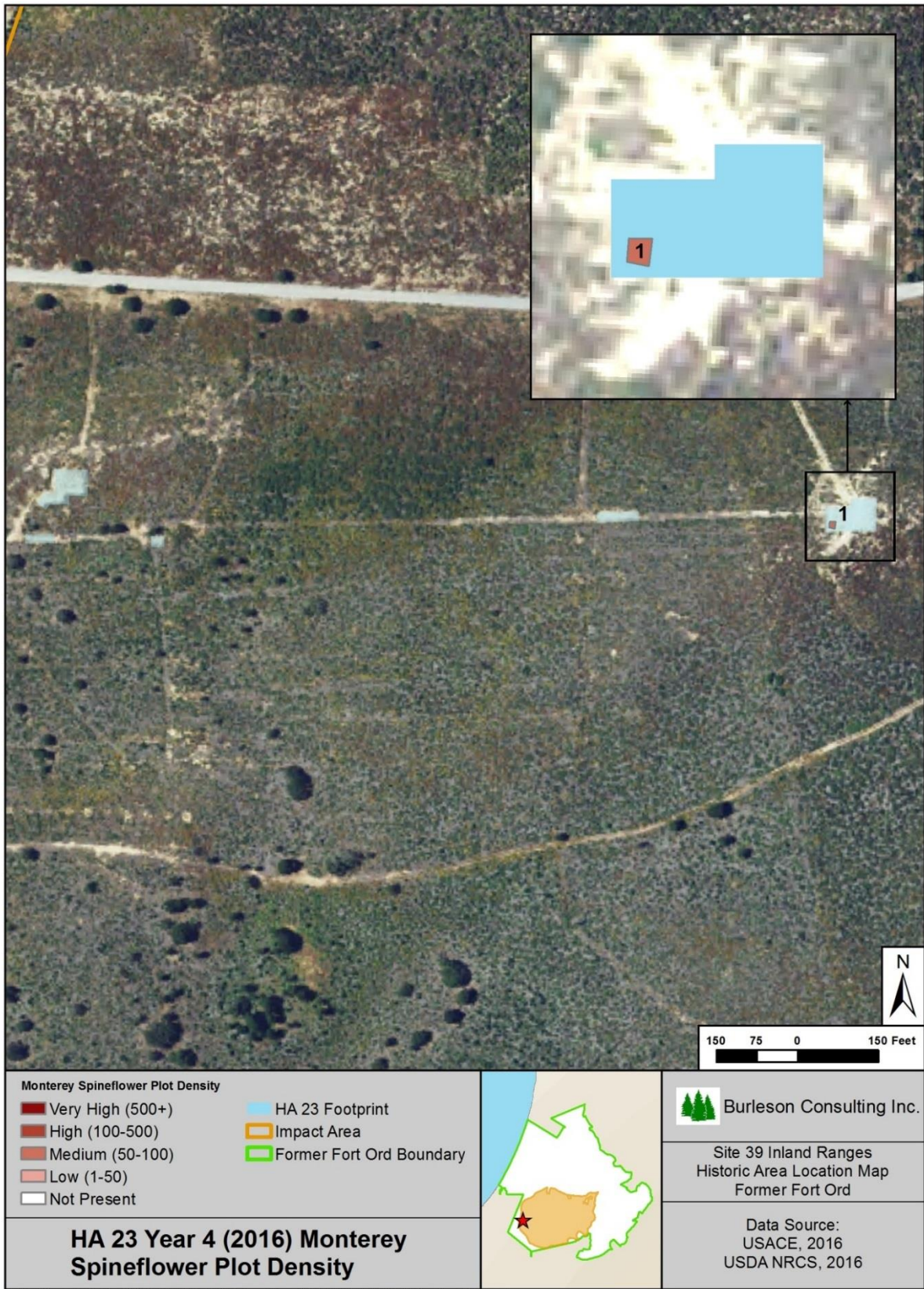
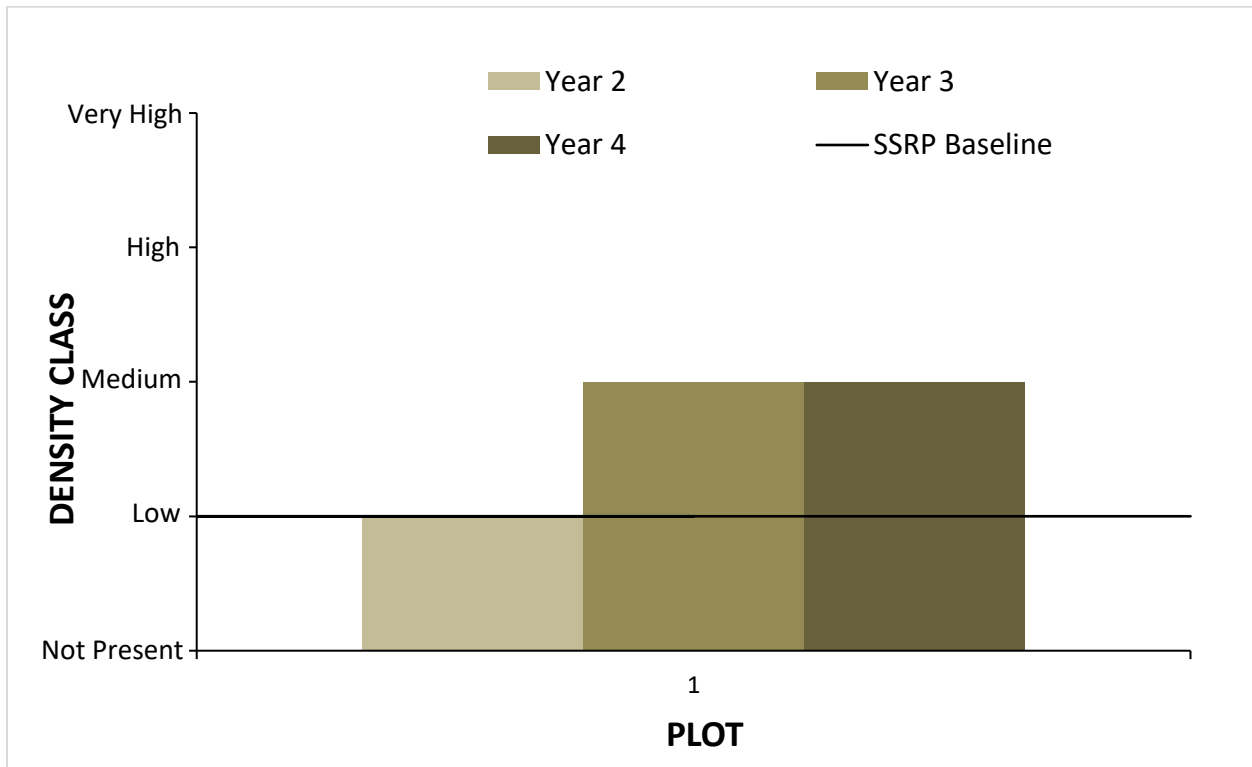


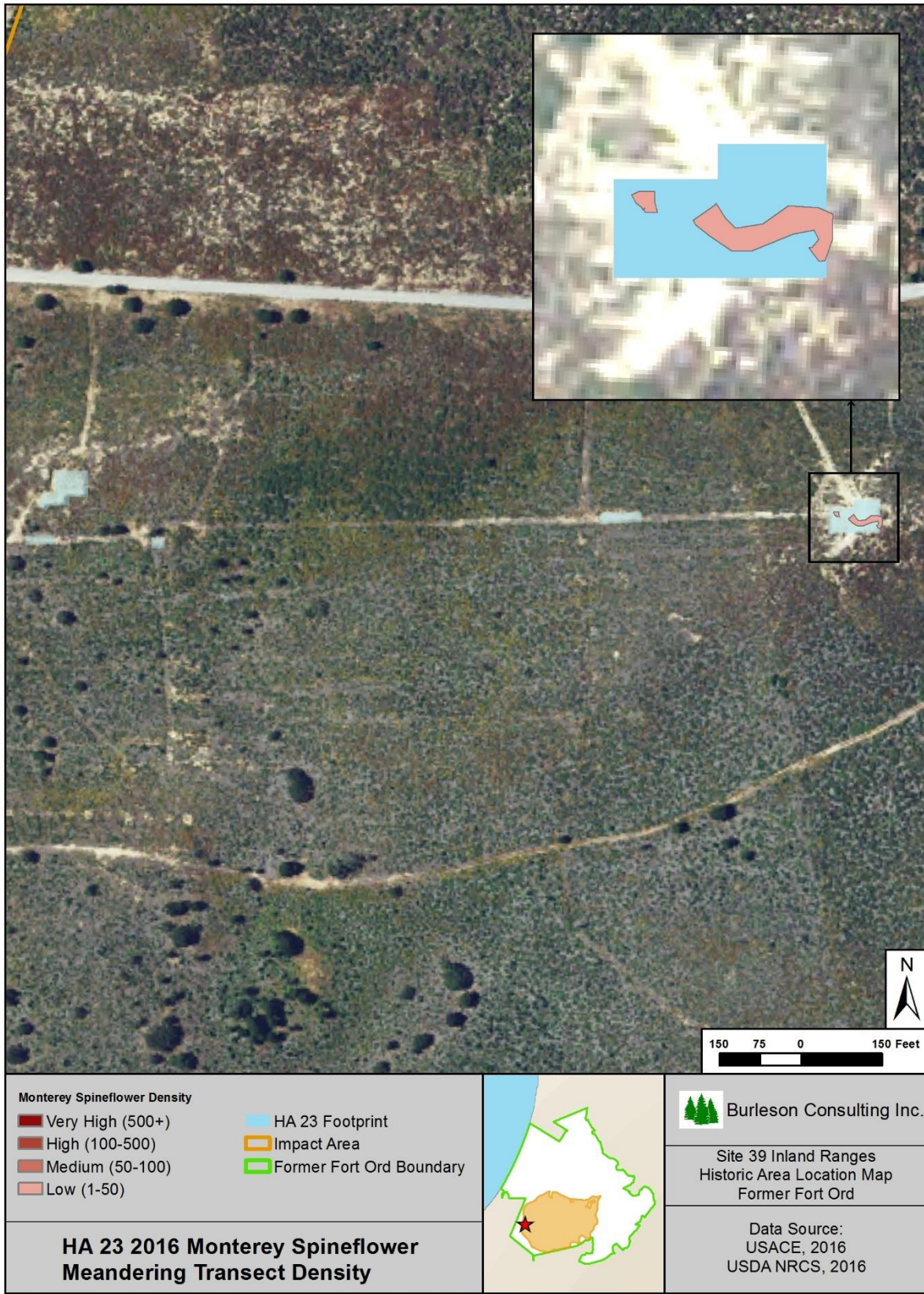
Figure 8-17. HA 23 Year 4 Monterey Spineflower Plot Density Map



**Figure 8-18.** HA 23 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plot 1. Data Were Not Collected in Year 1 Due to UXO.

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. Two discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 8-19). The densities were low. The total acreage of Monterey spineflower patches with a density at or above the SSRP baseline was 0.02 acre. One discrete patch of sand gilia was mapped and individuals counted within the patch (see Figure 8-20). The density was low. The total acreage of sand gilia patches was 0.02 acre. Four discrete patches of seaside bird’s beak were mapped and individuals counted within each patch (see Figure 8-21). The densities were low. The total acreage of seaside bird’s beak patches was 0.03 acre.





**Figure 8-19.** HA 23 Monterey Spineflower Meandering Transect Density Map



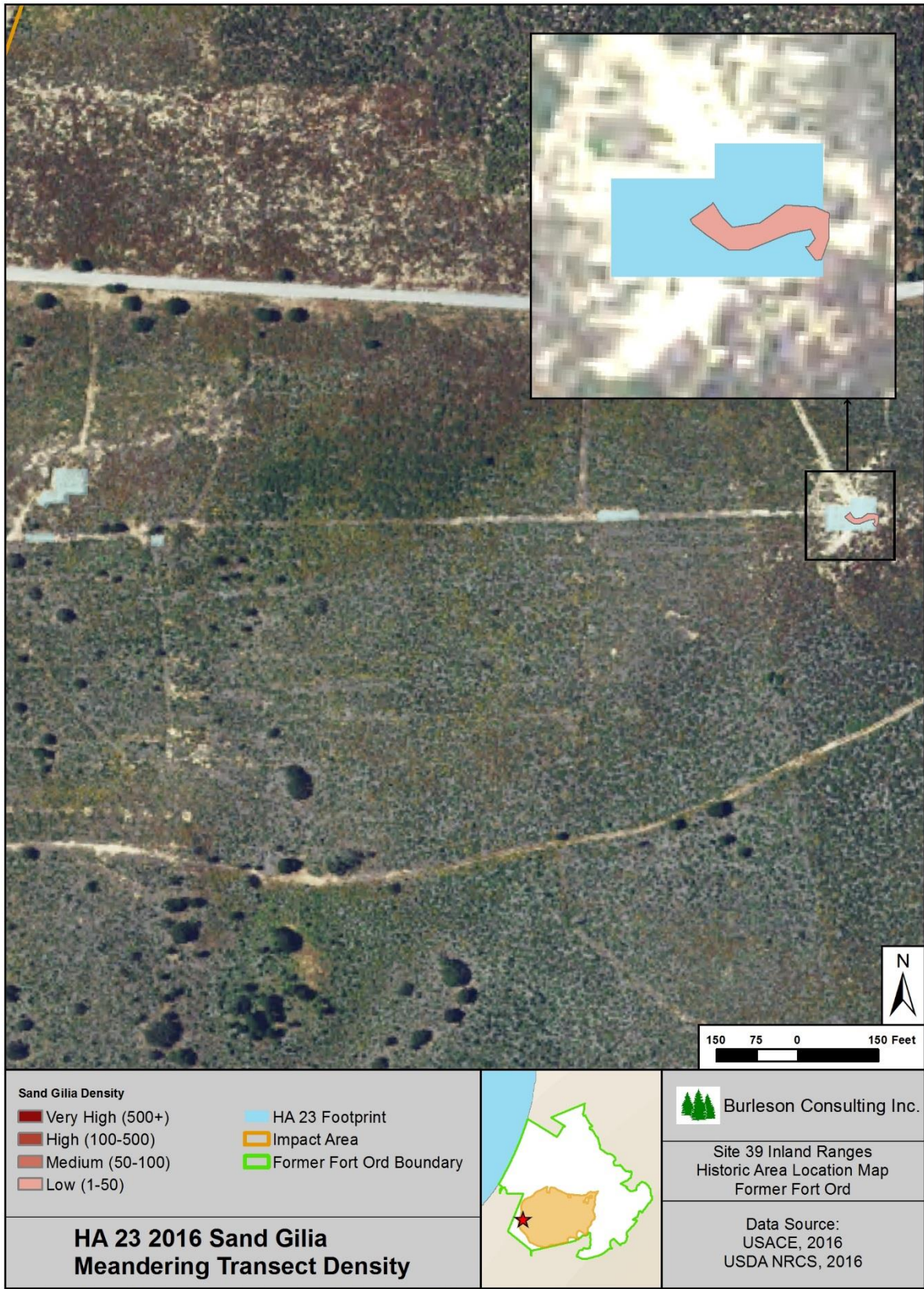
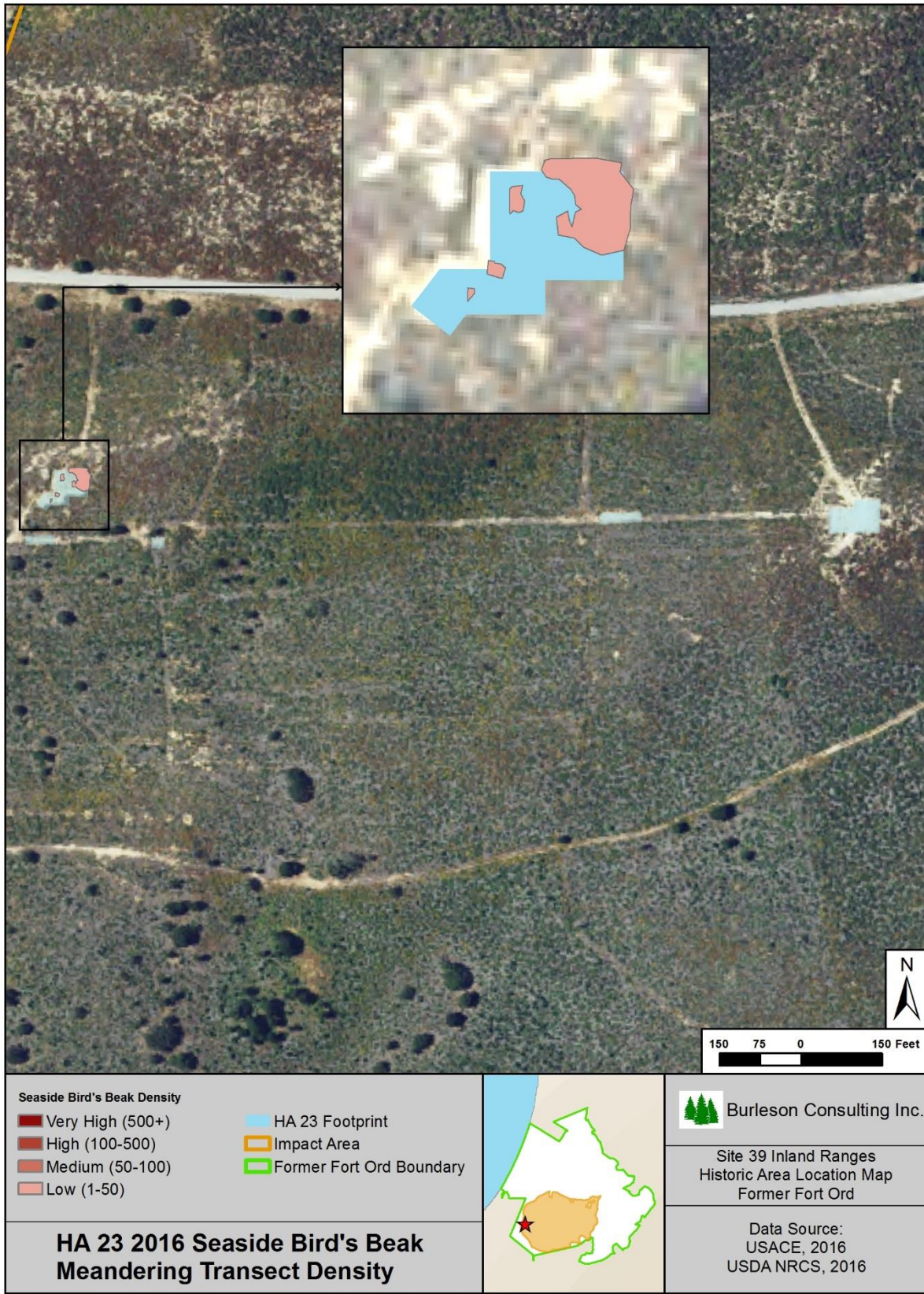


Figure 8-20. HA 23 Sand Gilia Meandering Transect Density Map





**Figure 8-21.** HA 23 Seaside Bird's Beak Meandering Transect Density Map

#### 8.4.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.4.2.3 Species Richness

A total of 22 species were observed at HA 23. Of those, 13 were native shrubs or perennials, seven were native annual herbaceous species, and two were non-native species (see Table 8-24).

**Table 8-24.** Species observed on HA 23, 2016

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Chorizanthe diffusa</i>	diffuse chorizanth	CHDI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> <sup>1</sup>	seaside bird's beak	CORIL
<i>Crocanthemum scoparium</i>	peak rush rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Eriastrum virgatum</i>	virgate gilia	ERVI
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Pseudognaphalium</i> sp.		PS
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA
<i>Toxicodendron diversilobum</i>	poison oak	TODI

<sup>1</sup>HMP species

#### 8.4.2.4 Vegetative Cover Transects and Quadrats

Burleson completed 15 quadrats at HA 23. The quadrat survey results indicate that the mean vegetative cover by native shrubs and perennials was 22%. Table 8-25 presents the vegetation cover summary and Table 8-26 presents the vegetation cover by species.

**Table 8-25.** Quadrat Survey Summary for HA 23

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA23Q01	25	21	4	0	4	71
HA23Q02	18	13	5	0	1	81
HA23Q03	18	18	0	0	0	82
HA23Q04	3	3	0	0	0	97
HA23Q05	10	10	0	0	5	85
HA23Q06	58	50	8	0	14	28
HA23Q07	60	60	0	0	0	40
HA23Q08	24	24	0	0	1	74
HA23Q09	36	25	11	0	2	62
HA23Q10	7	0	7	0	0	93
HA23Q11	0	0	0	0	12	88
HA23Q12	24	24	0	0	3	73
HA23Q13	6	2	4	0	1	93
HA23Q14	27	27	0	0	0	73
HA23Q15	52	52	0	0	0	48
<b>AVERAGE</b>	<b>25</b>	<b>22</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>73</b>

**Table 8-26.** Quadrat Survey Results for HA 23 by Species

Transect	ACGL (%)	ADFA (%)	ARPU <sup>1</sup> (%)	CORIL <sup>1</sup> (%)	CRSC (%)	DIAU (%)	ERFA <sup>1</sup> (%)	ERCO (%)	HOCU (%)	MAGR (%)	TODI (%)	TH (%)	BG (%)
HA23Q01	0.0	0.0	0.0	0.0	21.0	0.0	0.0	0.0	0.0	4.0	0.0	4.0	71.0
HA23Q02	0.0	0.0	0.0	0.0	10.0	0.0	0.0	3.0	0.0	0.0	0.0	1.0	81.0
HA23Q03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	82.0
HA23Q04	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.0
HA23Q05	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	85.0
HA23Q06	0.0	0.0	40.0	0.0	10.0	0.0	0.0	0.0	0.0	8.0	0.0	14.0	28.0
HA23Q07	5.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	40.0
HA23Q08	0.0	0.0	13.0	0.0	5.0	1.0	2.0	0.0	3.0	0.0	0.0	1.0	74.0
HA23Q09	12.0	0.0	0.0	10.0	0.0	0.0	0.0	1.0	0.0	3.0	10.0	2.0	62.0
HA23Q10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0	93.0
HA23Q11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	88.0
HA23Q12	0.0	6.0	0.0	0.0	5.0	0.0	0.0	13.0	0.0	0.0	0.0	3.0	73.0
HA23Q13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	4.0	0.0	1.0	93.0
HA23Q14	10.0	0.0	16.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	73.0
HA23Q15	0.0	0.0	0.0	0.0	51.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	48.0
<b>AVERAGE</b>	<b>2.5</b>	<b>0.4</b>	<b>4.6</b>	<b>0.7</b>	<b>10.3</b>	<b>0.1</b>	<b>0.1</b>	<b>2.5</b>	<b>0.6</b>	<b>1.7</b>	<b>0.7</b>	<b>2.9</b>	<b>72.5</b>

<sup>1</sup>HMP species

### 8.4.3 Discussion

#### 8.4.3.1 HMP Annual Density

Monterey spineflower density is within the acceptable limits for HMP annual density at HA 23. The SSRP baseline density class for Monterey spineflower was low. The Monterey spineflower restoration plot results show that by year 4, the density within the plot had exceeded the success criterion under objective 3. In addition, Monterey spineflower was present outside of the restoration plot. Discrete patches, with density that either met or exceeded the success criteria, covered 0.02 acre of HA 23. Although not part of the success criteria, Sand gilia and seaside bird's beak were both present at HA 23. Both species had discrete patches of low density.

#### 8.4.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.4.3.3 Species Richness

Chamise, sandmat manzanita, shaggy-barked manzanita, Monterey spineflower, mock heather, Eastwood's golden bush, peak rush rose, deerweed, sticky monkey flower, and black sage were all present. Coyote brush, Monterey ceanothus, dwarf ceanothus, and golden yarrow were not present. HA 23 has not met the success criterion for objective 1.

#### 8.4.3.4 Vegetative Cover Transects and Quadrats

Quadrats were completed to provide a preliminary idea of vegetative cover with a limited amount of effort; however, multiple objectives outlined in the SSRP specifically require transect data. Quadrat data will not be compared to the success criteria.

#### 8.4.3.5 Recommendations

HA 23 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth and improvement of the HA. Overall, HA 23 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may require additional effort. Burleson recommends that coyote brush, Monterey ceanothus, dwarf ceanothus, and golden yarrow be planted to meet the species richness success criterion. We also recommend that transects be installed to capture vegetation cover to compare to the success criteria.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-27 summarizes the current status of HA 23 including which success criteria have been met as well as our recommendation to move towards meeting all success criteria.



**Table 8-27.** Status and Recommendations for Achieving the Success Criteria at HA 23

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant coyote brush, Monterey ceanothus, dwarf ceanothus, and golden yarrow
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	Cannot assess	Install transects

## 8.5 HA 26

HA 26 was used by the Army as an intermittent machine gun range and dry fire movement course and later as a squad automatic weapon range. An estimated total of 22,400 cubic yards of soil was excavated over approximately 14 acres. Much of the site was dominated by invasive species. The excavation removed many areas of invasive species and may aid in the revegetation effort for this range (Mactec, 2008). HA 26 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 26 is relatively flat with a northeast aspect and contains low to medium quality habitat.

HA 26 is located on the western portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive and active restoration activities were prescribed for HA 26. The prescription for passive restoration at HA 26 consisted of hand broadcast non-irrigated seed and annual weed management activities. The prescription for active restoration at HA 26 included transplanting native or greenhouse-grown individuals. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration and monitoring at HA 26 began in 2016. The HA has been monitored for four years by photo documentation, one year for HMP annual density in plots, one year for HMP annual density across the HA, and one year for species richness. Figure 8-22 shows the HA footprint, passive restoration area, and future active restoration area. Success criteria for HA 26 are summarized in Table 8-28.



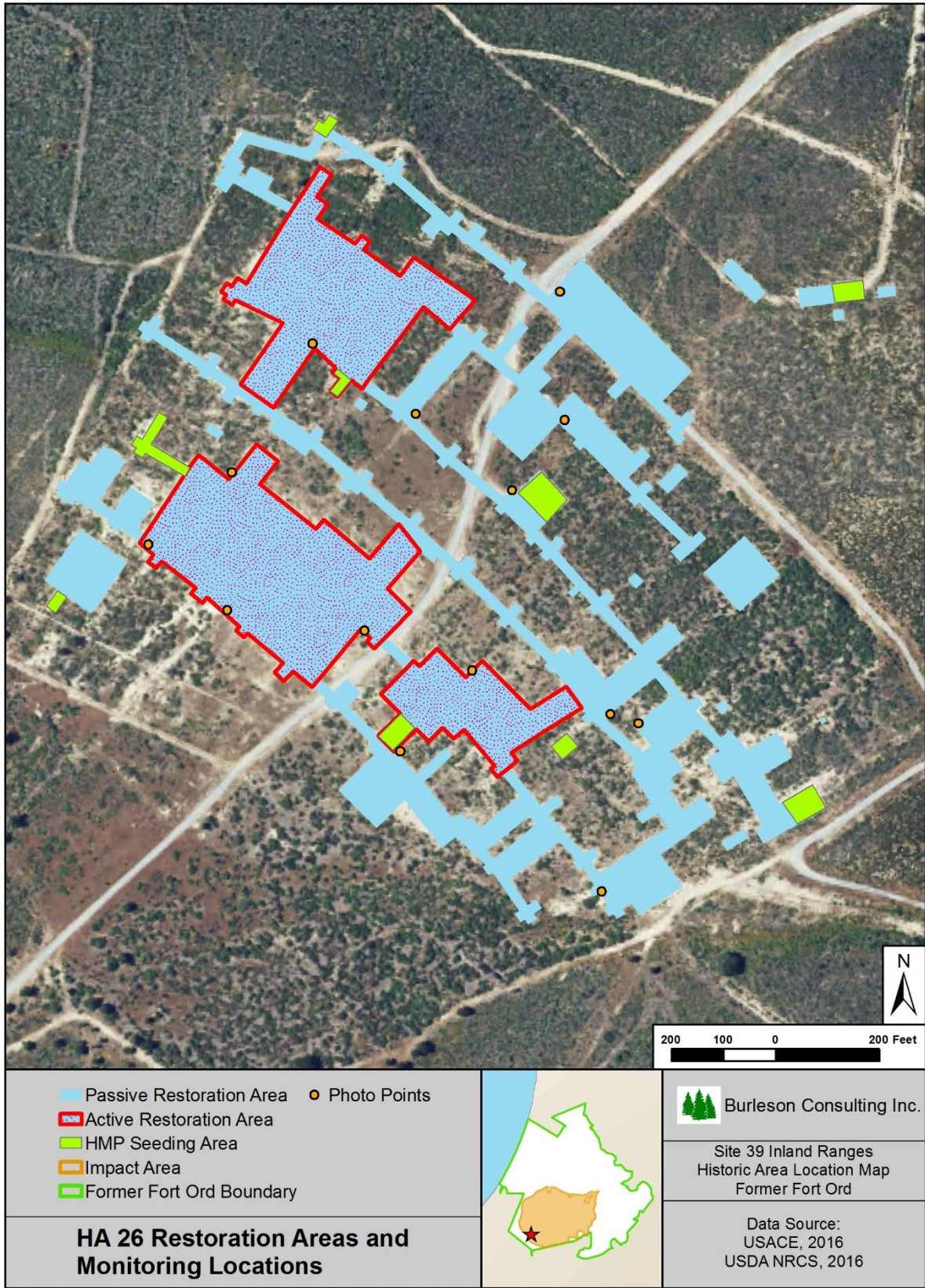


Figure 8-22. HA 26 Restoration Areas and Monitoring Locations Map

**Table 8-28.** Success Criteria and Acceptable Limits for Restoration of HA 26

Objective 1 <sup>1</sup>			
No.	Success Element	Decision Rule	Acceptable Limits
1	Restoration demonstrates native species	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			sandmat manzanita <sup>2</sup>
			shaggy-bark manzanita
			Monterey ceanothus <sup>2</sup>
			Eastwood's golden fleece <sup>2</sup>
			sticky monkey flower
			black sage
2	Percent cover of native species	Percent cover equals 20 percent for native species <sup>3</sup>	For the restoration area, percent cover monitoring data must meet or exceed 20 percent for native species listed as part of the plant palette in Table 2 <sup>3</sup>
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did indicate presence of non-native target weed species <i>Cortaderia jubata</i> (pampas grass). No more than 5 percent non-native target weeds may be present at this restoration site.
Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2.

**Table 8-28. Success Criteria and Acceptable Limits for Restoration of HA 26**

			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable
			Eastwood's gold fleece percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>4</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> 20 percent cover of native species is the revised success criteria due to the degraded conditions of the site prior to remediation - low quality habitat. However, the same restoration methods will be used and results will likely be similar to all restored areas.		
	<sup>4</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.5.1 Restoration Activities**

Burleson performed passive restoration at HA 26 in 2016 with a single application of seed over 6.68 acres. The total amount of seed broadcast on the site was 114.08 lb compared to the 303.10 lb prescribed in the SSRP. No active restoration activities have been conducted at HA 26.

Table 8-29 summarizes the amount of seed applied in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Nine plots were chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-29.** Summary of Passive Restoration Activities in 2016 for HA 26

Species	Pounds of Seed Broadcast		
	SSRP Target	2016	Total by Species
ACGL	28.00	10.48	10.48
ACMI	14.00	5.24	5.24
BAPI	2.10	1.05	1.05
CERI <sup>1</sup>	14.00	5.24	5.24
CHPUP <sup>1</sup>	2.10	0.85	0.85
CRSC	10.50	4.20	4.20
DIAU	7.00	2.62	2.62
ELGL	42.00	15.72	15.72
ERCO	14.00	5.24	5.24
ERFA <sup>1</sup>	1.40	0.52	0.52
HOCU	28.00	10.48	10.48
<i>Hordeum</i> sp.	126.00	47.20	47.20
SAME	14.00	5.24	5.24
<b>TOTAL</b>	<b>303.10</b>	<b>114.08</b>	<b>114.08</b>

<sup>1</sup>HMP species

## 8.5.2 Monitoring Results

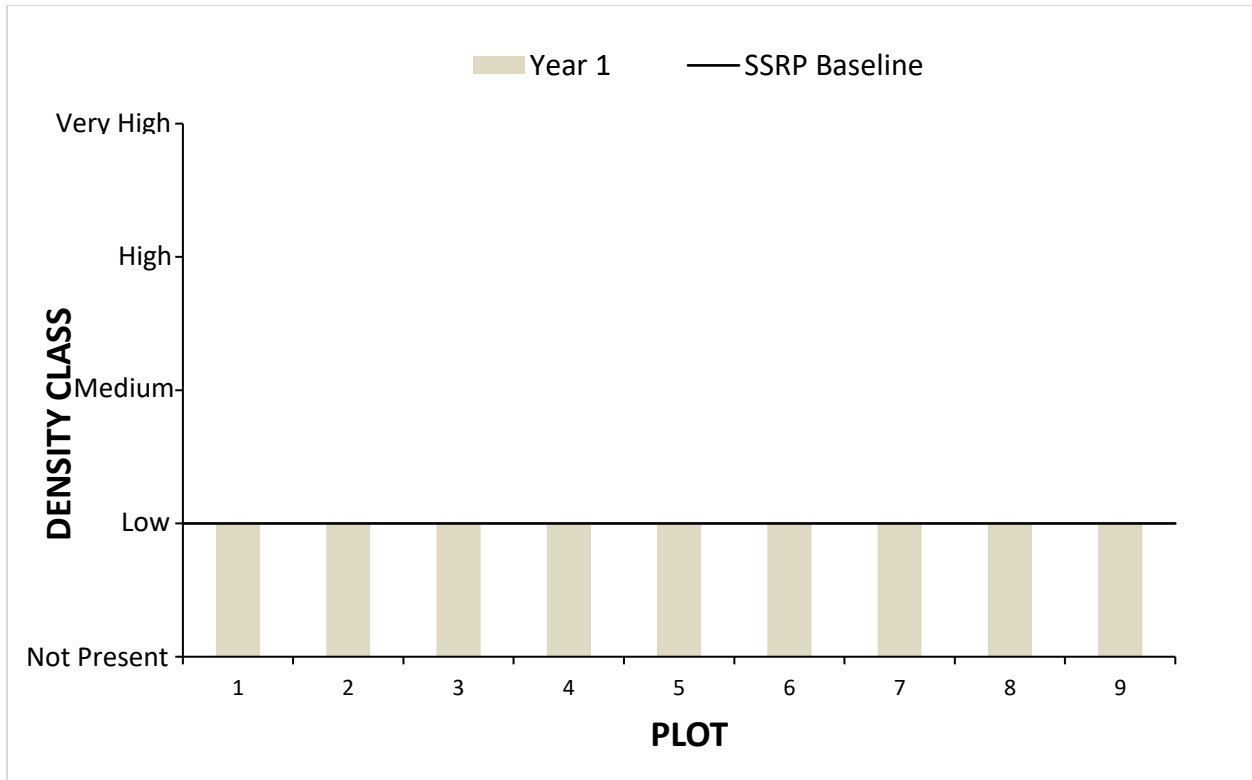
### 8.5.2.1 HMP Annual Density

Nine Monterey spineflower plots were surveyed for year 1 density at HA 26 in 2016. The plots are numbered 1-9 on Figure 8-23 and are located throughout the site. All nine plots had a low density. Figure 8-24 summarizes all the Monterey spineflower restoration plot densities for HA 26.





Figure 8-23. HA 26 Year 1 Monterey Spineflower Plot Density Map



**Figure 8-24.** HA 26 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Year 1, Plots 1-9

HMP annual density monitoring included mapping discrete patches of HMP forbs within the restoration site but outside of the HMP annual restoration plots. This survey was completed for Monterey spineflower. Monterey spineflower was not observed outside of the restoration plots at HA 26.

8.5.2.2 Plant Survivorship

No active restoration has been completed, therefore, no survivorship data were collected.

8.5.2.3 Species Richness

A total of 61 species were observed at HA 26. Of those, 28 were native shrubs or perennials, 15 were native annual herbaceous species, and 18 were non-native species. Table 8-30 shows the species present in HA 26.



**Table 8-30. Species observed on HA 26, 2016**

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Agoseris</i> sp.		AG
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Aphanes occidentalis</i>	western lady's mantle	
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Briza maxima</i>	rattlesnake weed	BRMA
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMA
<i>Briza minor</i>	little quaking grass	BRMI
<i>Brassica nigra</i>	black mustard	BRNI
<i>Carex</i> sp.		CA
<i>Calochortus albus</i>	white globe lily	CAAL
<i>Camissoniopsis cheiranthifolia</i>	beach evening primrose	CACH
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Castilleja exserta</i> ssp. <i>exserta</i>	escobita	CAEX
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Ceanothus thrysfloris</i> var. <i>griseus</i>	Carmel ceanothus	CETH
<i>Chorizanthe diffusa</i>	diffuse chorizanthe	CHDI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Chlorogalum pomeridianum</i>	soap plant	CHPO
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crassula connata</i>	pygmy weed	CRCO
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Dichelostemma capitatum</i>	blue dicks	DICA
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Garrya elliptica</i>	coast silk tassel	GAEL
<i>Githopsis specularoides</i>	common bluecup	GISP
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Hypochaeris radicata</i>	hairy cat's ear	HYRA
<i>Lepetchinia calycina</i>	pitcher sage	LECA
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Logfia gallica</i>	narrowleaf cottonrose	LOGA
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA
<i>Lupinus concinnus</i>	bajada lupine	LUCO
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR

**Table 8-30. Species observed on HA 26, 2016**

Scientific Name	Common Name	Code
<i>Madia gracilis</i>	slender tarweed	MAGR
<i>Petrorhagia prolifera</i>	pink grass	PEPR
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Plantago erecta</i>	California plantain	PLER
<i>Plantago erecta</i>	California plantain	PLER
<i>Polygala californica</i>	California milkwort	POCA
<i>Pseudognaphalium</i> sp.		PS
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA
<i>Stylocline gnaphaloides</i>	everlasting nest straw	STGN
<i>Toxicodendron diversilobum</i>	poison oak	TODI
<i>Trifolium hirtum</i>	rose clover	TRHI
<i>Vicia</i> sp.	vetch	VI

<sup>1</sup>HMP species

#### 8.5.2.4 Vegetative Cover Transects and Quadrats

Vegetation cover surveys have not been completed at HA 26.

### 8.5.3 Discussion

#### 8.5.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limits for HMP annual density at HA 26. The SSRP baseline density class for Monterey spineflower was low. All of the Monterey spineflower restoration plots have met the success criterion. Monterey spineflower was not observed outside restoration plots; however, seeding and monitoring both occurred in 2016 and it is likely that the site needs more time for Monterey spineflower to spread outside of the seeded restoration plots.

#### 8.5.3.2 Plant Survivorship

No active restoration occurred, therefore, no survivorship data were collected.

#### 8.5.3.3 Species Richness

Chamise, sandmat manzanita, shaggy-barked manzanita, Monterey ceanothus, Eastwood's goldenbush, sticky monkey flower, and black sage were all present. HA 26 has met the success criterion for objective 1.

#### 8.5.3.4 Vegetative Cover Transects and Quadrats

Vegetation cover surveys have not been completed at HA 26.

#### 8.5.3.5 Recommendations

HA 26 has not received the full prescription of passive or active restoration. Transects should be installed to monitor vegetative cover when it is appropriate to do so. There are no further recommendations at this time. Reference photo points were taken in May 2016 and December 2016 and will be compared to future years when restoration is complete and the site starts to respond (see Appendix D).

The site will continue to be monitored by photo documentation, HMP annual density surveys, and species richness meandering transects.

Table 8-31 summarizes the current status of HA 26 including which success criteria have been met as well as our recommendation to move towards meeting success criteria.

**Table 8-31.** Status and Recommendations for Achieving the Success Criteria at HA 26

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects when appropriate
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	Cannot assess	Install transects when appropriate

## 8.6 HA 27

HA 27 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010, and resulted in 100 cubic yards of lead-contaminated soil being excavated from 0.06 acre (Shaw, 2008). HA 27 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 27 sits on exposed bedrock with surface water runoff in its western portion. The adjacent lands are not developed and contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 27 is located on the southern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 27 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 27 is relatively flat. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 27 occurred in 2011 and 2012 and monitoring began in 2013. HA 27 has been monitored for four years by photo documentation and one year for vegetative cover. Figure 8-25 shows the HA footprint, passive restoration area, and quadrat monitoring locations. Success criteria for HA 27 are summarized in Table 8-32.

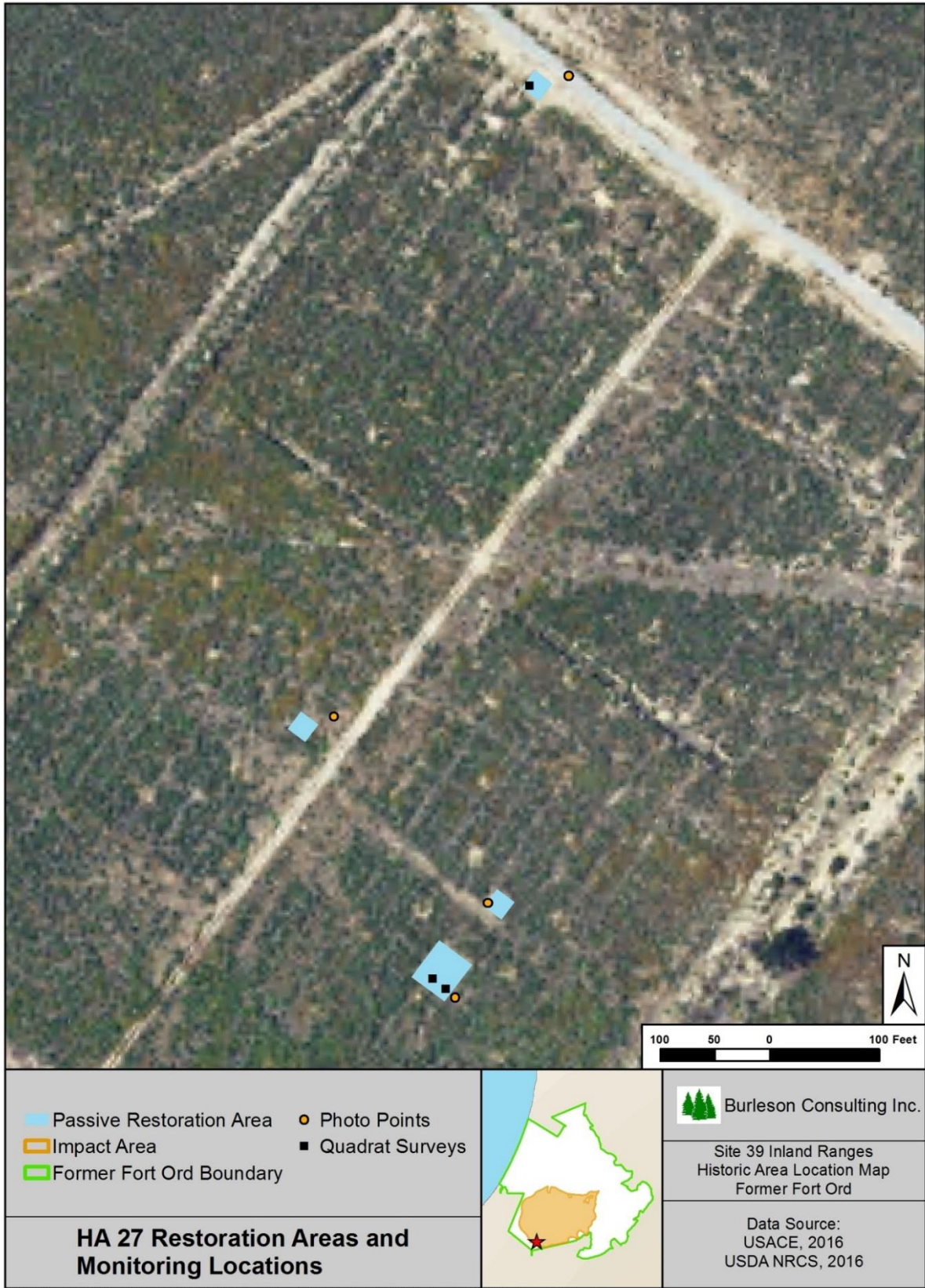


Figure 8-25. HA 27 Restoration Areas and Monitoring Locations Map



**Table 8-32. Success Criteria and Acceptable Limits for Restoration of HA 27**

Objective 1 <sup>1</sup>			
No.	Success Element	Decision Rule	Acceptable Limits
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			Toro manzanita <sup>2</sup>
			shaggy-bark manzanita
			sandmat manzanita <sup>2</sup>
			coyote brush
			Monterey ceanothus <sup>2</sup>
			golden yarrow
			peak rush rose
			wedge-leaved Horkelia
			deerweed
			sticky monkey flower
			black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species jubata grass at 50 percent cover. Therefore, the non-native target weed may be present at less than or equal to 5 percent.
Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 25.



**Table 8-32. Success Criteria and Acceptable Limits for Restoration of HA 27**

			Toro manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Baseline data indicated no HMP annual species. Therefore, no HMP annuals need to be present at this restoration site <sup>3</sup> .
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.6.1 Restoration Activities**

Burleson performed passive restoration at HA 27 for two years in 2011 and 2012. The total amount of seed broadcast on the site was 1.046 lb compared to the 1.270 lb prescribed in the SSRP. No active restoration activities have been conducted at HA 27. Table 8-33 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

**Table 8-33.** Summary of Passive Restoration Activities from 2011-2016 for HA 27

Species	Pounds of Seed Broadcast			
	SSRP Target	2011	2012	Total by Species
ACGL	0.120	0.062	0.060	0.122
ARMO <sup>1</sup>	0.060	0.032	0.043	0.075
ARPU <sup>1</sup>	0.120	0.063	0.067	0.130
ARTO	0.120	0.062	0.067	0.129
BAPI	0.010	0.000	0.005	0.005
CERI <sup>1</sup>	0.060	0.000	0.063	0.063
CRSC	0.060	0.033	0.033	0.066
HOCU	0.120	0.062	0.060	0.122
<i>Hordeum sp.</i>	0.540	0.000	0.268	0.268
SAME	0.060	0.035	0.031	0.066
<b>TOTAL</b>	<b>1.270</b>	<b>0.349</b>	<b>0.697</b>	<b>1.046</b>

<sup>1</sup>HMP species

## 8.6.2 Monitoring Results

### 8.6.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27. Therefore, no HMP annuals need to be present at this restoration site.

### 8.6.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.6.2.3 Species Richness

A total of 25 species were observed at HA 27. Of those, 16 were native shrubs or perennials, four were native annual herbaceous species and five were non-native species. Table 8-34 presents species observed at HA 27.

**Table 8-34.** Species observed on HA 27, 2016

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Avena</i> sp.	wild oat	AV
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Carex</i> sp.		CA
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe diffusa</i>	diffuse chorizanth	CHDI
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Festuca octoflora</i>	sixweeks grass	FEOC
<i>Filago</i> sp.		FI
<i>Gnaphalium</i> sp.		GN
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Lepechinia calycina</i>	pitcher sage	LECA
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHA
<i>Pinus radiata</i>	Monterey Pine	PIRA
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU
<i>Salvia mellifera</i>	black sage	SAME

<sup>1</sup> HMP species

#### 8.6.2.4 Vegetative Cover Transects and Quadrats

Burleson completed three quadrats at HA 27 with survey results indicating that the mean vegetative cover by native shrubs and perennials was 28.3%. Table 8-35 summarizes vegetation cover and Table 8-36 presents vegetation cover results by species.

**Table 8-35.** Quadrat Survey Summary for HA 27

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch	Bare Ground
HA27Q01	1.0	0.0	0.0	1.0	28.0	71.0
HA27Q02	97.0	52.0	40.0	5.0	2.0	1.0
HA27Q03	38.0	33.0	2.0	3.0	6.0	56.0
<b>AVERAGE</b>	45.3	28.3	14.0	3.0	12.0	42.7

**Table 8-36. Quadrat Survey Results for HA 27 by Species**

Transect	ARPU <sup>1</sup> (%)	ARTO (%)	CERI <sup>1</sup> (%)	ERBO (%)	HOCU (%)	HYGL (%)	MAGR (%)	NAHA (%)	PSLU (%)	TH (%)	BG (%)
HA27Q01	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	28.0	71.0
HA27Q02	47.0	5.0	0.0	0.0	0.0	5.0	40.0	0.0	0.0	2.0	1.0
HA27Q03	0.0	30.0	3.0	0.0	1.0	2.0	0.0	1.0	1.0	6.0	56.0
<b>AVERAGE</b>	<b>15.7</b>	<b>11.7</b>	<b>1.0</b>	<b>0.3</b>	<b>0.3</b>	<b>2.3</b>	<b>13.3</b>	<b>0.3</b>	<b>0.3</b>	<b>12.0</b>	<b>42.7</b>

<sup>1</sup>HMP species

### 8.6.3 Discussion

#### 8.6.3.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27. Therefore, no HMP annuals need to be present at this restoration site

#### 8.6.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.6.3.3 Species Richness

Sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, golden yarrow, peak rush rose, wedge-leaved horkelia, deerweed, and black sage were all present. Toro manzanita, golden yarrow, and sticky monkey flower were not present. HA 27 does not meet the success criterion for objective 1.

#### 8.6.3.4 Vegetative Cover Transects and Quadrats

Quadrats were completed to provide a preliminary idea of vegetative cover with a limited amount of effort; however, multiple objectives outlined in the SSRP specifically require transect data. Quadrat data will not be compared to the success criteria.

#### 8.6.3.5 Recommendations

HA 27 is generally responding well to the restoration efforts. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the positive change in the HA, where increased cover can be observed. Overall, HA 27 needs time to further respond to the restoration effort. Additionally, Burleson recommends installing 10 Toro manzanitas, three golden yarrow, and three sticky monkey flower plants.

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-37 summarizes the current status of HA 27 including which success criteria have been met as well as recommendation to move towards meeting success criteria.

**Table 8-37.** Status and Recommendations for Achieving the Success Criteria at HA 27

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant Toro manzanita, golden yarrow and sticky monkey flower
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects
Objective 3 – No. 4	HMP annual density	NA	NA
Objective 3 – No. 4	HMP annual cover	NA	NA

## 8.7 HA 27A

HA 27A was used by the Army as a small-arms firing range. Soil remediation was completed in 2010, and resulted in 1,100 cubic yards of lead-contaminated soil being excavated from 0.6 acre (Shaw, 2008).

HA 27A rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 27A is relatively flat with a west aspect. The adjacent lands are not developed and contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 27A is located on the southern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 27A consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 27A is relatively flat and has little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 27A occurred in 2011, 2012, twice in 2016, and monitoring began in 2013. HA 27A has been monitored for four years by photo documentation and one year for species richness and vegetative cover. Figure 8-26 shows the HA footprint, passive restoration area, and transect location. Success criteria for HA 27A are summarized in Table 8-38.





Figure 8-26. HA 27A Restoration Areas and Monitoring Location Map

**Table 8-38.** Success Criteria and Acceptable Limits for Restoration of HA 27A

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			Toro manzanita <sup>2</sup>
			shaggy-bark manzanita
			sandmat manzanita <sup>2</sup>
			coyote brush
			Monterey ceanothus <sup>2</sup>
			golden yarrow
			peak rush rose
			wedge-leaved Horkelia
			deerweed
			sticky monkey flower
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species jubata grass at 10 percent cover. Therefore, the non-native target weed may be present at less than or equal to 5 percent.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4

**Table 8-38.** Success Criteria and Acceptable Limits for Restoration of HA 27A

		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 25.
			Toro manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Baseline data indicated no HMP annual species. Therefore, no HMP annuals need to be present at this restoration site <sup>3</sup> .
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.7.1 Restoration Activities**

Burleson performed passive restoration at HA 27A with four applications of seed broadcast once in 2011, once in 2012, and twice in 2016. The total amount of seed broadcast on the site was 21.906 lb compared to 13.530 lb prescribed in the SSRP. No active restoration activities have occurred at HA 27A. Table 8-39 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

**Table 8-39.** Summary of Passive Restoration Activities from 2011-2016 for HA 27A

Species	Pounds of Seed Broadcast				Total by Species
	SSRP Target	2011	2012	2016	
ACGL	1.200	0.600	0.608	0.800	2.008
ACMI	-	-	-	0.400	0.400
ADFA	0.600	0.300	0.308	0.000	0.608
ARMO <sup>1</sup>	1.200	0.600	0.611	0.000	1.211
ARPU <sup>1</sup>	0.600	0.300	0.308	0.000	0.608
ARTO	1.200	0.600	0.612	0.000	1.212
BAPI	0.090	0.000	0.046	0.000	0.046
CERI <sup>1</sup>	0.600	0.000	0.314	0.000	0.314
CRSC	0.600	0.300	0.303	0.000	0.603
DIAU	0.060	0.200	0.183	0.000	0.383
ELGL	-	-	-	3.800	3.800
ERCO	0.180	0.093	0.093	0.000	0.186
HOCU	1.200	0.600	0.600	0.800	2.000
<i>Hordeum sp.</i>	5.400	0.000	5.421	2.000	7.421
SAME	0.600	0.300	0.306	0.000	0.606
STPU	-	-	-	0.500	0.500
<b>TOTAL</b>	<b>13.530</b>	<b>3.893</b>	<b>9.713</b>	<b>8.300</b>	<b>21.906</b>

## 8.7.2 Monitoring Results

### 8.7.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site.

### 8.7.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.7.2.3 Species Richness

A total of 41 species were observed at HA 27A. Of those, 22 were native shrubs or perennials, seven were native annual herbaceous species, and 12 were non-native species. Table 8-40 lists species present in HA 27A.

**Table 8-40.** Species observed on HA 27A, 2016

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Briza maxima</i>	rattlesnake weed	BRMA
<i>Carex</i> sp.		CA
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe diffusa</i>	diffuse chorizanthe	CHDI
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Croton californica</i>	croton	CRCA
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Dichelostemma capitatum</i>	blue dicks	DICA
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Eriastrum virgatum</i>	virgate gilia	ERVI
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Gnaphalium</i> sp.	gnaphalium	GN
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Juncus</i> sp.		JU
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Pinus radiata</i>	Monterey pine	PIRA
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salix</i> sp.	willow	SA
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA

<sup>1</sup> HMP species



#### 8.7.2.4 Vegetative Cover Transects and Quadrats

Burleson completed one 50-meter line-intercept transect at HA 27A. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 2.98%. Table 8-41 summarizes the vegetation cover and Table 8-42 presents vegetation cover by species.

**Table 8-41.** Line-intercept Transect Survey Summary for HA 27A

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA27AT01	3.66	2.98	0.00	0.68	2.80	93.54
<b>AVERAGE</b>	<b>3.66</b>	<b>2.98</b>	<b>0.00</b>	<b>0.68</b>	<b>2.80</b>	<b>93.54</b>

**Table 8-42.** Line-intercept Transect Survey Results for HA27A by Species

Transect	ACGL (%)	BAPI (%)	CRSC (%)	HYGL (%)	TH (%)	BG (%)
HA27AT01	0.80	0.38	1.80	0.68	2.80	93.54
<b>AVERAGE</b>	<b>0.80</b>	<b>0.38</b>	<b>1.80</b>	<b>0.68</b>	<b>2.80</b>	<b>93.54</b>

### 8.7.3 Discussion

#### 8.7.3.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site.

#### 8.7.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.7.3.3 Species Richness

Chamise, Toro manzanita, sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, golden yarrow, peak rush rose, wedge-leaved horkelia, deerweed, sticky monkey flower, and black sage were all present. HA 27A has met the success criterion for objective 1.

#### 8.7.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes thirteen shrub and perennial species presented in Table 2 of the HA 27A SSRP (Burleson, 2013). Currently the HA includes 2.98% vegetative cover; therefore, the success criterion is not met.

Objective 2 considers the percent cover of non-native target weeds. The transect surveys did not encounter any target weeds. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 4. Cover class 4 is from 26-50% of absolute cover. The HMP shrub species at HA 27A are providing an absolute cover of 0.00%, the HA has not yet met this success criterion; however, most of the species were present at HA 27A. The second success criterion is no net loss of HMP shrubs. For HA 27A this means a vegetative cover average of at least 25% cover for sandmat manzanita, 2% or greater for Toro manzanita, and 1% or greater for Monterey ceanothus. The average vegetative cover for sandmat manzanita was 0.00%, for Toro manzanita 0.00%, and for Monterey ceanothus 0.00%. None of the species met the success criterion, but they were present on site.

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site and the success criterion is not applicable.

#### 8.7.3.5 Recommendations

HA 27A has only begun to respond to restoration efforts. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate some progress, but the site still has little cover. Overall, HA 27A needs time to respond to the restoration effort and continued monitoring. We recommend to install an additional transect for HA 27A because the current transect is located in a very disturbed area that does not represent the overall conditions of the site. We recommend to install a second 50-meter transect randomly in the northern polygon of the site, which is more representative of the site.

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-43 summarizes the current status of HA 27A including which success criteria have been met as well as our recommendation to move towards meeting success criteria.

**Table 8-43.** Status and Recommendations for Achieving the Success Criteria at HA 27A

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Install additional transect
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Install additional transect
Objective 3 – No. 4	HMP shrub cover by species	No	Install additional transect
Objective 3 – No. 4	HMP annual density	NA	NA
Objective 3 – No. 4	HMP annual cover	NA	NA

## 8.8 HA 28

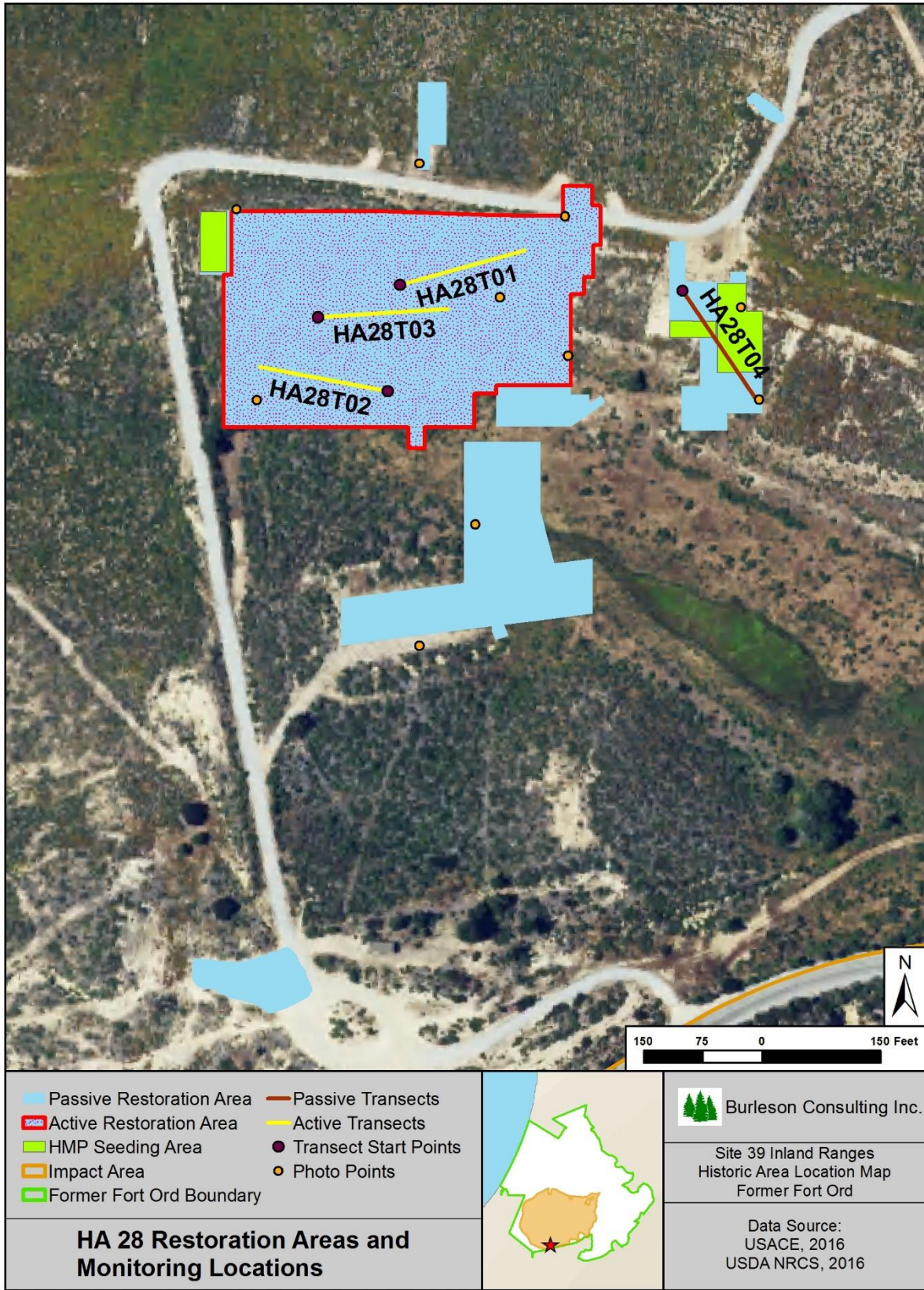
HA 28 was used by the Army as a range for automatic rifles. Soil was excavated over 4.3 acres. A pond partially extends into HA 28 and California tiger salamander (CTS) have been documented within this feature. This vernal pool is comprised by Ponds 30A, 30B, and 30C. These ponds provide habitat for CTS and other aquatic species. Pond 30B was created during remediation; however, it is still contained within the historic inundation area and is hydrologically connected to the other ponds (Burlison, 2017). HA 28 rests within unprotected maritime chaparral with mean annual temperatures ranging between

56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 28 is relatively flat and is surrounded by medium to very high quality habitat.

HA 28 is located on the southern portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive and active restoration activities were prescribed for HA 28. The prescription for passive restoration at HA 28 consisted of hand broadcast non-irrigated seed and annual weed management activities. The prescription for active restoration at HA 28 included transplanting native or greenhouse-grown individuals. HA 28 is moderately sloped and flat with some potential for erosion.

Restoration activities and monitoring at HA 28 began in 2013. The HA has been monitored for four years by photo documentation, two years for HMP annual density in plots, one year for HMP annual density across the HA, one year for vegetative cover, and two years for plant survivorship. Figure 8-27 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. Success criteria for HA 28 are summarized in Table 8-44.



**Figure 8-27.** HA 28 Restoration Areas and Monitoring Locations Map



**Table 8-44.** Success Criteria and Acceptable Limits for Restoration of HA 28

Objective 1 <sup>1</sup>			
No.	Success Element	Decision Rule	Acceptable Limits
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			Toro manzanita <sup>2</sup>
			sandmat manzanita <sup>2</sup>
			shaggy-bark manzanita
			Monterey ceanothus <sup>2</sup>
			horkelia
			black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated presence of non-native target weed species <i>Cortaderia jubata</i> (pampas grass). No more than 5 percent non-native target weeds may be present at this restoration site.
Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 35.



**Table 8-44.** Success Criteria and Acceptable Limits for Restoration of HA 28

			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable
			Toro manzanita percent cover, as an average of transect data, must be present however, less than 2 percent is acceptable
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.8.1 Restoration Activities**

Burleson has performed passive restoration at HA 28 for four years in 2013, 2014, 2015, and 2016. The total amount of seed broadcast on the site was 263.268 lb compared to 115.800 lb prescribed in the SSRP. Table 8-45 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Three plots were chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-45.** Summary of Passive Restoration Activities from 2013-2016 for HA 28

Species	Pounds of Seed Broadcast					Total by Species
	SSRP Target	2013	2014	2015	2016	
ACGL	6.800	8.500	0.000	3.720	0.000	12.220
ACMI	3.400	4.400	0.000	3.140	0.000	7.540
BAPI	0.500	1.000	0.000	0.070	0.000	1.070
CER1 <sup>1</sup>	1.700	1.700	0.000	0.360	0.000	2.060
CHPUP <sup>1</sup>	0.100	0.000	0.028	0.000	0.000	0.028
CRSC	2.600	3.500	0.000	0.290	0.000	3.790
DIAU	0.500	3.600	0.000	0.180	0.000	3.780
ELGL	13.600	33.600	0.000	15.700	1.200	50.500
ERCO	4.300	5.300	0.000	0.360	0.000	5.660
ERER	-	3.100	0.000	0.000	0.000	3.100
ERFA	0.700	0.700	0.000	0.040	0.000	0.740
HOCU	6.800	8.800	0.000	0.720	0.000	9.520
<i>Hordeum</i> sp.	68.000	118.000	0.000	36.400	0.800	155.200
SAME	6.800	7.700	0.000	0.360	0.000	8.060
<b>TOTAL</b>	<b>115.800</b>	<b>199.900</b>	<b>0.028</b>	<b>61.340</b>	<b>2.000</b>	<b>263.268</b>

<sup>1</sup>HMP species

Active restoration was conducted in 2015. The total number of plants installed at HA 28 was 3,435 compared to 4,382 prescribed in the SSRP. Additional active restoration is planned for 2017. Table 8-46 summarizes the plants installed during active restoration.

**Table 8-46.** Summary of Active Restoration Activities from 2015-2016 for HA 28

Species	Number of Individual Plants		
	SSRP Target	2015 (Jan)	Total by Species
ACGL	237	237	237
ADFA	473	473	473
ARHO <sup>1</sup>	237	237	237
ARMO <sup>1</sup>	237	237	237
ARPU <sup>1</sup>	947	-	-
ARTO	592	592	592
BAPI	237	237	237
CERI <sup>1</sup>	237	375	375
CRSC	237	237	237
ERCO	237	175	175
ERFA <sup>1</sup>	237	161	161
HOCU	237	237	237
SAME	237	237	237
<b>TOTAL</b>	<b>4,382</b>	<b>3,435</b>	<b>3,435</b>

<sup>1</sup>HMP species

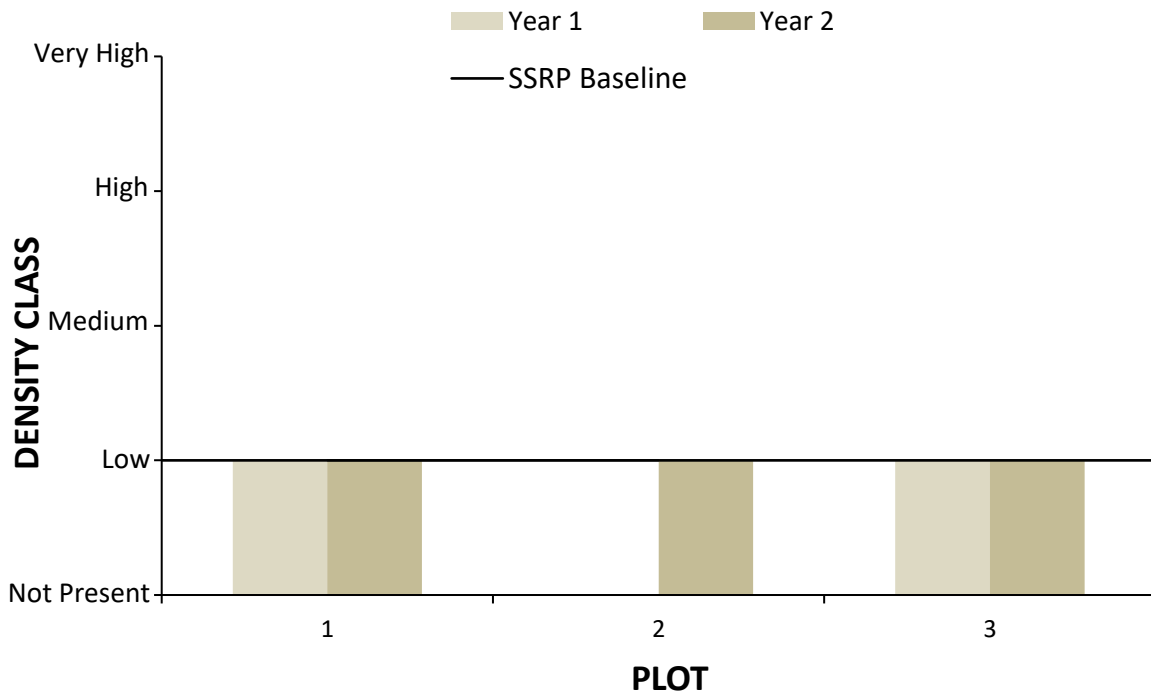
## 8.8.2 Monitoring Results

### 8.8.2.1 HMP Annual Density

Three Monterey spineflower plots were surveyed for year 2 density at HA 28 in 2016. The plots are numbered 1-3 on Figure 8-28 and are located throughout HA 28. Monterey spineflower was low density in all three plots. Figure 8-29 represents Monterey spineflower restoration plot densities for HA 28.



Figure 8-28. HA 28 Year 2 Monterey Spineflower Plot Density Map



**Figure 8-29.** HA 28 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Years 1 and 2, Plots 1-3

HMP annual density monitoring includes mapping discrete patches of HMP forbs within the restoration site but outside of the HMP annual restoration plots. This survey was completed for Monterey spineflower; they were not observed outside of the restoration plots at HA 28.

8.8.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 28. A total of eight shrub species and 243 individual plants were monitored for survivorship. By year two of monitoring, 77% of the 2015 plants were alive. Table 8-47 presents results by species.



**Table 8-47.** Plant Survivorship Monitoring Summary and Results for 2015 Planting at HA 28

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2015)	Year Two (2016)
			Alive (%)	Alive (%)
ADFA	473	47	100	96
ARHO <sup>1</sup>	237	24	88	88
ARMO <sup>1</sup>	237	24	83	83
ARTO	592	60	87	82
BAPI	237	24	71	46
CERI <sup>1</sup>	375	24	71	58
ERFA <sup>1</sup>	161	16	88	75
SAME	237	24	96	88
<b>TOTAL</b>	<b>2,549</b>	<b>243</b>	<b>85*</b>	<b>77*</b>

\* average

<sup>1</sup>HMP species

## 8.8.2.3 Species Richness

A total of 46 species were observed at HA 28. Of those, 26 were native shrubs or perennials, eight were native annual herbaceous species, and 12 were non-native species (see Table 8-48).

**Table 8-48.** Species observed on HA 28, 2016

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus madritensis</i>	foxtail brome	BRMA
<i>Calochortus albus</i>	white globe lily	CAAL
<i>Carex</i> sp.		CA
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI
<i>Crassula connata</i>	pygmy weed	CRCO
<i>Crocianthemum scoparium</i>	peak rush-rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Eriastrum virgatum</i>	virgate gilia	ERVI

**Table 8-48.** Species observed on HA 28, 2016

Scientific Name	Common Name	Code
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Genista monspessulana</i>	French broom	GEMO
<i>Heteromeles arbutifolia</i>	toyon	HEAR
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Lepechinia calycina</i>	pitcher sage	LECA
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA
<i>Lupinus bicolor</i>	annual lupine	LUBI
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Pseudognaphalium beneolens</i>	fragrant cudweed	PSBE
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA

<sup>1</sup>HMP species

#### 8.8.2.4 Vegetative Cover Transects and Quadrats

Burleson completed four 50-meter line-intercept transects at HA 28. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 24.08%. Table 8-49 summarizes vegetation cover and Table 8-50 presents the vegetation cover by species.

**Table 8-49.** Line-intercept Transect Survey Summary for HA 28

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA28T01	37.16	35.82	0.94	0.40	9.22	58.52
HA28T02	27.72	25.26	1.40	1.06	4.00	70.28
HA28T03	16.10	13.32	1.60	1.18	7.98	72.58
HA28T04	23.12	21.92	0.92	0.28	8.46	69.18
<b>AVERAGE</b>	<b>26.03</b>	<b>24.08</b>	<b>1.22</b>	<b>0.73</b>	<b>7.42</b>	<b>67.64</b>

**Table 8-50. Line-intercept Transect Survey Results for HA 28 by Species**

Transect	ACMI (%)	ACGL (%)	ACHE (%)	ARHO <sup>1</sup> (%)	ARMO <sup>1</sup> (%)	ARPU <sup>1</sup> (%)	ARTO (%)	CEDE (%)	CERI <sup>1</sup> (%)	CRSC (%)	DIAU (%)	ERCO (%)	HEGR (%)	HOCU (%)	HYGL (%)	PSRA (%)	SAME (%)	TH (%)	BG (%)
HA28T04	0.30	17.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.82	0.00	0.66	0.00	0.00	0.28	0.62	0.00	8.46	69.18
HA28T03	0.00	2.34	1.04	0.76	0.46	0.00	2.62	3.50	2.02	1.24	0.00	0.00	0.56	0.00	1.18	0.00	0.00	7.98	72.58
HA28T01	0.00	18.04	0.00	0.00	0.00	6.88	0.00	0.00	0.00	7.96	1.86	0.48	0.00	0.48	0.40	0.46	0.28	9.22	58.52
HA28T02	0.00	11.40	0.76	0.00	0.00	0.76	0.00	0.00	0.00	13.10	0.00	0.00	0.00	0.42	1.06	0.22	0.00	4.00	70.28
<b>AVERAGE</b>	<b>0.08</b>	<b>12.31</b>	<b>0.45</b>	<b>0.19</b>	<b>0.12</b>	<b>1.91</b>	<b>0.66</b>	<b>0.88</b>	<b>0.51</b>	<b>6.53</b>	<b>0.47</b>	<b>0.29</b>	<b>0.14</b>	<b>0.23</b>	<b>0.73</b>	<b>0.33</b>	<b>0.07</b>	<b>7.42</b>	<b>67.64</b>

<sup>1</sup>HMP species

### 8.8.3 Discussion

#### 8.8.3.1 HMP Annual Density

Monterey spineflower density is within the acceptable limits for HMP annual density at HA 28. The SSRP baseline density class for Monterey spineflower was low. The Monterey spineflower restoration plot results show that by year 2, for all plots, the density within the plots met or exceeded the success criterion under objective 3. Monterey spineflower was not present outside of the restoration plots. However, seeding was completed in 2015 and it is likely that the site needs more time for Monterey spineflower to spread outside of the seeded restoration plots.

#### 8.8.3.2 Plant Survivorship

Plant survivorship results show that 77% of the plants installed in 2015 are still alive after two years of monitoring. All species are doing well at HA 28.

#### 8.8.3.3 Species Richness

Chamise, Toro manzanita, sandmat manzanita, shaggy-bark manzanita, Monterey ceanothus, wedge-leaved horkelia, and black sage were all present. HA 28 met the success criterion for objective 1.

#### 8.8.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes eighteen shrub and perennial species presented in Table 2 of the HA 28 SSRP (Burlison, 2013). Currently the HA includes 23.37% vegetative cover; therefore, this criterion was not met.

Objective 2 considers the percent cover of non-native target weeds. Target weeds were not observed during the transect surveys. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 3. Cover class 3 is from 6-25% of absolute cover. The HMP shrub species at HA 28 are providing an absolute cover of 2.73% and the HA has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 28 this means a vegetative cover average of at least 35% cover for sandmat manzanita and presence of Monterey ceanothus and Toro manzanita. The average vegetative cover for sandmat manzanita was 1.91%, for Monterey ceanothus 0.51%, and for Toro manzanita 0.12%. Two of the three species, Monterey ceanothus and Toro manzanita, met the success criterion. In addition, HMP annuals were evaluated for vegetative cover. Monterey spineflower are required to provide at least 1% cover from the transect surveys. Monterey spineflower was not detected in the transect data. The HMP annual vegetative cover success criterion was not met.

#### 8.8.3.5 Recommendations

HA 28 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth and improvement of the HA. Overall, HA 28 still requires installation of 947 SSRP-prescribed sandmat manzanita, time to respond to the restoration effort, and continued monitoring.

We also recommend that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy, this is already captured in objective 3 success criteria number 3.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-51 summarizes the current status of HA 28 including which success criteria have been met and which have not as well as our recommendation to move towards meeting all of the success criteria at HA 28.

**Table 8-51. Status and Recommendations for Achieving the Success Criteria at HA 28**

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Install sandmat manzanita
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

## 8.9 HA 29

HA 29 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010, and resulted in 1,700 cubic yards of soil being excavated from 1.0 acre (Shaw, 2008). HA 29 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 29 varies in elevation with a west aspect. The adjacent lands are not developed and contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 29 is located on the southern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Both passive and active restoration areas were designated for HA 29. The main focus of restoration was to broadcast non-irrigated seed. However, for the active restoration efforts, container-grown plants, cuttings, and burls were to be planted. The potential for erosion at HA 29 exists along the slopes surrounding the excavated areas. Areas within HA 29 which are less than 1.0 acre, or are larger than 1.0 acre but less than 100 feet wide, were restored passively, using broadcast seed only. Areas larger than



1.0 acre and greater than 100 feet across received active restoration in addition to the passive restoration efforts.

Restoration at HA 29 began in 2012 and was completed in 2013. However, in 2016 additional seed was broadcast on the site. Monitoring at HA 29 began in 2013. It has been monitored for four years by photo documentation, one year for vegetative cover, and three years for plant survivorship. Figure 8-30 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. Success criteria for HA 29 are summarized in Table 8-52.



Figure 8-30. HA 29 Restoration Areas and Monitoring Locations Map

**Table 8-52. Success Criteria and Acceptable Limits for Restoration of HA 29**

Objective 1 <sup>1</sup>			
No.	Success Element	Decision Rule	Acceptable Limits
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			Hooker's manzanita <sup>2</sup>
			Toro manzanita <sup>2</sup>
			shaggy-bark manzanita
			sandmat manzanita <sup>2</sup>
			coyote brush
			Monterey ceanothus <sup>2</sup>
			Eastwood's Golden fleece <sup>2</sup>
			golden yarrow
			toyon
			peak rush rose
			wedge-leaved Horkelia
			deerweed
			sticky monkey flower
			black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated that jubata grass was present at 11%. Therefore, no more than 5% non-native target weeds may be present at this restoration site.

**Table 8-52. Success Criteria and Acceptable Limits for Restoration of HA 29**

Objective 3 <sup>1</sup>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 2
			Toro manzanita percent cover, as an average of transect data, must be equal or greater than 7
			Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 27
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1
			Eastwood gold fleece percent cover, as an average of transect data, must be equal or greater than 2
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Baseline data indicated no HMP annual species. Therefore, no HMP annuals need to be present at this restoration site <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

### 8.9.1 Restoration Activities

Burleson performed passive restoration at HA 29 for three years in February 2012, December 2012, and 2016. The total amount of seed broadcast on the site was 32.090 lb compared to the 24.650 lb prescribed in the SSRP. Table 8-53 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

**Table 8-53. Summary of Passive Restoration Activities for HA 29**

Species	Pounds of Seed Broadcast				Total by Species
	SSRP Target	2012 (Feb)	2012 (Dec)	2016	
ACGL	2.000	1.000	1.025	1.600	3.625
ACMI	-	-	-	0.800	0.800
ADFA	1.000	0.500	0.505	0.000	1.005
ARHO <sup>1</sup>	2.000	1.000	1.019	0.000	2.019
ARMO <sup>1</sup>	2.000	1.000	1.011	0.000	2.011
ARPU <sup>1</sup>	1.000	0.500	0.520	0.000	1.020
ARTO	2.000	1.000	1.010	0.000	2.010
BAPI	0.150	0.000	0.083	0.000	0.083
CERI <sup>1</sup>	1.000	0.000	1.035	0.000	1.035
CRSC	1.000	0.500	0.515	0.000	1.015
DIAU	0.100	0.300	0.316	0.000	0.616
ELGL	-	-	-	1.600	1.600
ERCO	0.300	0.200	0.160	0.000	0.360
ERFA <sup>1</sup>	0.100	0.058	0.059	0.000	0.117
HOCU	2.000	1.000	1.021	1.600	3.621
<i>Hordeum sp.</i>	9.000	0.000	9.030	0.000	9.030
SAME	1.000	0.600	0.523	0.000	1.123
STPU	-	-	-	1.000	1.000
<b>TOTAL</b>	<b>24.650</b>	<b>7.658</b>	<b>17.832</b>	<b>6.600</b>	<b>32.090</b>

<sup>1</sup>HMP species

Active restoration was completed in 2012 and 2013. The total number of plants installed at HA 29 was 1,636 compared to 1,374 prescribed in the SSRP. Table 8-54 summarizes the plants installed at HA 29.



**Table 8-54.** Summary of Active Restoration Activities for HA 29

Species	Number of Individual Plants			
	SSRP Target	2012	2013	Total by Species
ACGL	189	225	-	225
ADFA	101	-	120	120
ARHO <sup>1</sup>	4	-	5	5
ARMO <sup>1</sup>	13	-	15	15
ARPU <sup>1</sup>	17	-	20	20
ARTO	21	-	25	25
BAPI	76	91	-	91
CERI <sup>1</sup>	4	-	5	5
CRSC	189	225	-	225
DIAU	189	225	-	225
ERCO	189	225	-	225
ERFA <sup>1</sup>	4	-	5	5
HOCU	189	225	-	225
SAME	189	225	-	225
<b>TOTAL</b>	<b>1,374</b>	<b>1,441</b>	<b>195</b>	<b>1,636</b>

<sup>1</sup>HMP species

## 8.9.2 Monitoring Results

### 8.9.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 29. Therefore, no HMP annuals need to be present at this restoration site.

### 8.9.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 29. A total of nine shrub species and 160 individual plants were monitored for survivorship. By year three, 87% of the 2013 plants were alive. See Table 8-55 for results by species.

**Table 8-55.** Survivorship Monitoring Results for HA 29

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2013)	Year Two (2014)	Year Three (2015)
			Alive (%)	Alive (%)	Alive (%)
ADFA	120	45	67	89	91
ARHO <sup>1</sup>	5	5	100	100	100
ARMO <sup>1</sup>	15	15	100	100	87
ARPU <sup>1</sup>	20	20	95	95	85
ARTO	25	25	88	88	84
BAPI	91	20	85	70	75
CERI <sup>1</sup>	5	5	60	80	80
ERFA <sup>1</sup>	5	5	100	100	100
SAME	225	20	100	95	90
<b>TOTAL</b>	<b>511</b>	<b>160</b>	<b>88*</b>	<b>91*</b>	<b>87*</b>

\*average

<sup>1</sup>HMP species

### 8.9.2.3 Species Richness

A total of 53 species were observed at HA 29. Of those, 27 were native shrubs or perennials, eight were native annual herbaceous species, and 18 were non-native species (see Table 8-56).

**Table 8-56.** Species observed on HA 29, 2016

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Anaphalis margaritacea</i>	pearly everlasting	ANMA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy barked manzanita	ARTO
<i>Artemisia californica</i>	California sagebrush	ARCA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Briza maxima</i>	rattlesnake weed	BRMA
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus hordeaceus</i>	softchess	BRHO
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMA
<i>Carex</i> sp.		CA
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe diffusa</i>	diffuse chorizanthe	CHDI
<i>Cortaderia jubata</i>	pampas grass	COJU

**Table 8-56. Species observed on HA 29, 2016**

Scientific Name	Common Name	Code
<i>Crocianthemum scoparium</i>	peak rush-rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Festuca octoflora</i>	sixweeks grass	FEOC
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ears	HYGL
<i>Lepechinia calycina</i>	pitcher sage	LECA
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Logfia gallica</i>	narrow leaf cotton rose	LOGA
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Madia</i> sp.	tarweed	MA
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHA
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Plantago erecta</i>	California plantain	PLER
<i>Populus trichocarpa</i>	black cottonwood	POTR
<i>Potentilla glandulosa</i>	sticky cinquefoil	POGL
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene</i> sp.	catchfly	SI
<i>Toxicodendron diversilobum</i>	poison oak	TODI
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN

<sup>1</sup>HMP species

#### 8.9.2.4 Vegetative Cover Transects and Quadrats

Burleson completed one 50-meter line-intercept transect at HA 29. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 19.04%. Table 8-57 summarizes the vegetation cover and Table 8-58 presents vegetation cover by species.

**Table 8-57. Line-intercept Transect Survey Summary for HA 29**

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA29T01	20.48	19.04	0.96	0.48	3.04	78.10
<b>AVERAGE</b>	<b>20.48</b>	<b>19.04</b>	<b>0.96</b>	<b>0.48</b>	<b>3.04</b>	<b>78.10</b>

**Table 8-58.** Line-intercept Transect Survey Results for HA 29 by Species

Transect	ACGL (%)	ARPU <sup>1</sup> (%)	CEDE (%)	CRSC (%)	DIAU (%)	HOCU (%)	HYGL (%)	SAME (%)	TH (%)	BG (%)
HA29T01	5.14	2.56	3.00	0.56	0.24	0.96	0.48	6.42	3.04	78.10
<b>AVERAGE</b>	<b>5.14</b>	<b>2.56</b>	<b>3.00</b>	<b>0.56</b>	<b>0.24</b>	<b>0.96</b>	<b>0.48</b>	<b>6.42</b>	<b>3.04</b>	<b>78.10</b>

<sup>1</sup>HMP species

### 8.9.3 Discussion

#### 8.9.3.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 29. Therefore, no HMP annuals need to be present at this restoration site.

#### 8.9.3.2 Plant Survivorship

Plant survivorship results show that 87% of the plants installed in 2013 were still alive after three years of monitoring. Survivorship increased from 84% in year 1 to 89% in year 2. The increase in survivorship between years 1 and 2 was attributed to some plants being recorded as dead in year 1 but then recorded as alive in year 2 because they showed new growth. Due to natural plant mortality over time, year 3 survivorship results slightly decreased from year 2. Overall, survivorship at HA 29 is high and all species are doing well.

#### 8.9.3.3 Species Richness

Chamise, Hooker's manzanita, Toro manzanita, sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, Eastwood's goldenbush, golden yarrow, peak rush rose, wedge-leaved horkelia, deerweed, sticky monkey flower, and black sage were all present. Toyon was not present. HA 29 included 27 shrub and perennial native species; however, it did not meet the success criterion for objective 1 because toyon was not present.

#### 8.9.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes fifteen shrub and perennial species presented in Table 2 of the HA 29 SSRP (Burlison, 2013). Currently the HA includes 15.88% cover and this success criterion was not met.

Objective 2 considers the percent cover of non-native target weeds. Target weeds were not observed during the transect surveys. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 4. Cover class 4 is from 26-50% of absolute cover. The HMP shrub species at HA 29 are providing an absolute cover of 2.56%, and the HA has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 29 this means a vegetative cover average of at least 2% for Hooker's manzanita, 7% for Toro manzanita, 27% for sandmat manzanita, 1% for Monterey ceanothus, and 2% for Eastwood's goldenbush. The average vegetative cover for Hooker's manzanita was 0.00%, Toro manzanita 0.00%, sandmat manzanita 2.56%,

Monterey ceanothus 0.00% and Eastwood's goldenbush 0.00%. None of the species met the success criteria.

The baseline data from the SSRP indicated no HMP annual species at HA 29. Therefore, no HMP annuals need to be present at this restoration site, and the success criterion is not applicable.

#### 8.9.3.5 Recommendations

HA 29 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth, and improvement of the HA. Overall, HA 29 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort. In addition to time, it is recommended that toyon be planted to meet the species richness success criterion. Toyon has not previously been included in the plant palette but was listed as a required species for HA 29 in objective 1 of the SSRP.

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-59 summarizes the current status of HA 29 including which success criteria have been met as well as our recommendation to move towards meeting success criteria.

**Table 8-59.** Status and Recommendations for Achieving the Success Criteria at HA 29

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant toyon
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	NA	NA
Objective 3 – No. 4	HMP annual cover	NA	NA

## 8.10 HA 33

HA 33 was used by the Army as a demolitions range. Soil remediation was completed in 2010, and resulted in 20 cubic yards of soil being excavated from 0.01 acre (Shaw, 2008). HA 33 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 33 is relatively flat with a southwest and west aspect. The adjacent lands are heavily dominated by ice-plant and other non-native species, and disturbed central maritime chaparral.

HA 33 is located on the eastern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).



The prescription for passive restoration at HA 33 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 33 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 33 occurred in 2011 and 2012 and monitoring began in 2011. The HA has been monitored for five years by photo documentation, four years for HMP annual density in plots, and one year for vegetative cover. Figure 8-31 shows the HA footprint, passive restoration area, and quadrat survey location. Success criteria for HA 33 are summarized in Table 8-60.



**Figure 8-31.** HA 33 Restoration Areas and Monitoring Locations Map

**Table 8-60. Success Criteria and Acceptable Limits for Restoration of HA 33**

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			white yarrow
			Toro manzanita <sup>2</sup>
			shaggy-bark manzanita
			coyote brush
			Monterey ceanothus <sup>2</sup>
			dwarf ceanothus
			golden yarrow
			toyon
			peak rush rose
			wedge-leaved Horkelia
			deerweed
			sticky monkey flower
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline surveys indicated that ice plant was present at HA-33 but was not available in transect data <sup>3</sup> . Therefore, no more than 5% non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4

**Table 8-60. Success Criteria and Acceptable Limits for Restoration of HA 33**

		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Toro manzanita percent cover, as an average of transect data, must be equal or greater than 30
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 5
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>4</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> Source: Shaw 2009a		
	<sup>4</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals but seed bank will have been replaced during the early successional stages.		

**8.10.1 Restoration Activities**

Burleson performed passive restoration at HA 33 for two years in 2011 and 2012. The total amount of seed broadcast on the site was 0.317 lb compared to 0.238 lb prescribed in the SSRP. Table 8-61 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. No active restoration activities have been conducted at HA 33. Burleson performed passive restoration for the HMP annual species Monterey spineflower. One plot was chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-61.** Summary of Passive Restoration Activities for HA 33

Species	Pounds of Seed Broadcast			
	SSRP Target	2011	2012	Total by Species
ACGL	0.0200	0.0110	0.0110	0.0220
ACMI	0.0100	0.0070	0.0070	0.0140
ADFA	0.0100	0.0070	0.0110	0.0180
ARMO <sup>1</sup>	0.0200	0.0120	0.0110	0.0230
ARPU <sup>1</sup>	-	0.0070	0.0070	0.0140
BAPI	0.0015	0.0000	0.0010	0.0010
CERI <sup>1</sup>	0.0100	0.0100	0.0060	0.0160
CHPUP <sup>1</sup>	0.0002	0.0110	0.0010	0.0120
CRCA	0.0100	0.0070	0.0070	0.0140
CRSC	0.0100	0.0070	0.0070	0.0140
DIAU	0.0010	0.0030	0.0110	0.0140
ERCO	0.0030	0.0030	0.0020	0.0050
ERER	0.0025	0.0030	0.0020	0.0050
HOCU	0.0200	0.0110	0.0110	0.0220
<i>Hordeum sp.</i>	0.0900	0.0000	0.0900	0.0900
SAME	0.0100	0.0000	0.0110	0.0110
STCE	0.0200	0.0110	0.0110	0.0220
<b>TOTAL</b>	<b>0.2380</b>	<b>0.1100</b>	<b>0.2070</b>	<b>0.3170</b>

<sup>1</sup>HMP species

## 8.10.2 Monitoring Results

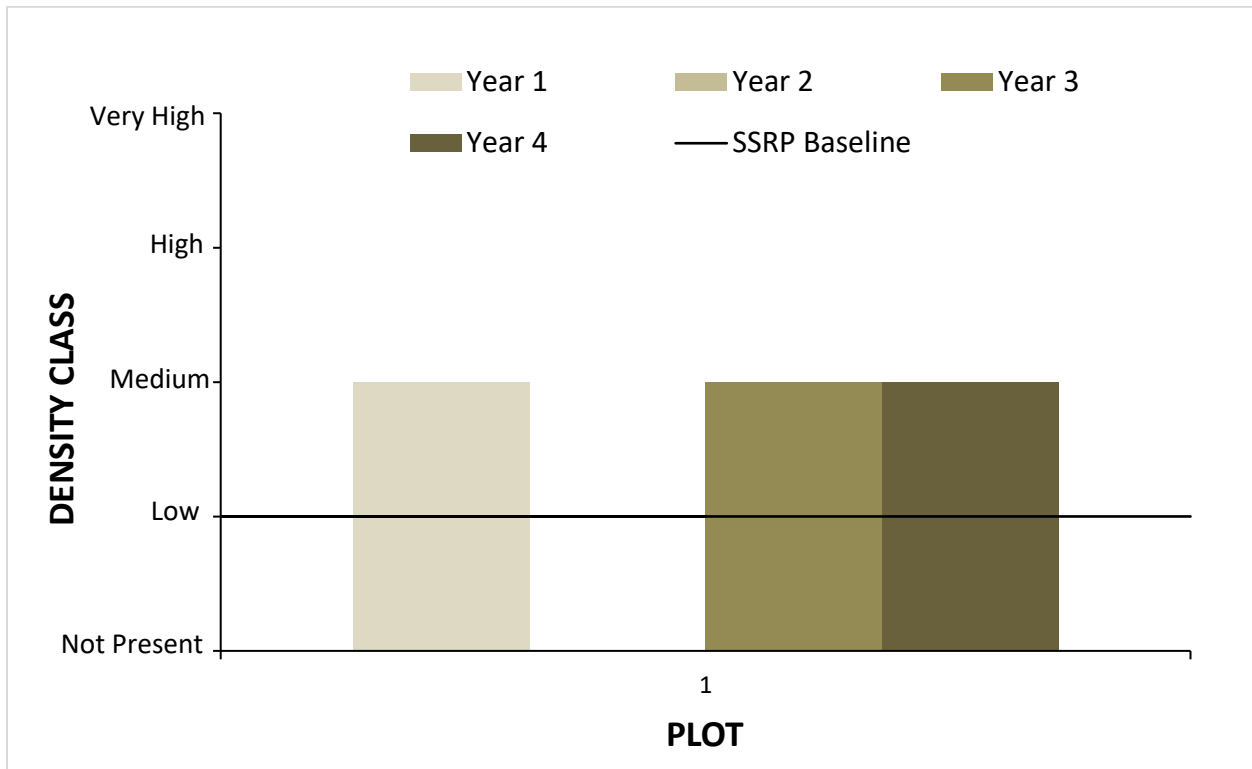
### 8.10.2.1 HMP Annual Density

One Monterey spineflower restoration plot was monitored for year 4 density at HA 33 in 2016. The plot is numbered 1 on Figure 8-32 and located in the northern part of the site. Monterey spineflower was medium density at plot 1. Figure 8-33 represents Monterey spineflower restoration plot densities for HA 33.





Figure 8-32. HA 33 Year 1 Monterey Spineflower Plot Density Map



**Figure 8-33.** HA 33 Year 1-4 Monterey Spineflower Density Classes

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. One discrete patch of Monterey spineflower was mapped and individuals counted within the patch. The density was low. The total acreage of Monterey spineflower patches with a density at or above the SSRP baseline was 0.0008 acre. Figure 8-34 illustrates the meandering transect densities.



Figure 8-34. HA 33 Monterey Spineflower Transect Density Map



### 8.10.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.10.2.3 Species Richness

A total of 22 species were observed at HA 33. Of those, 11 were native shrubs or perennials, four were native annual herbaceous species, and seven were non-native species. Table 8-62 shows all species observed at HA 33.

**Table 8-62. Species observed on HA 33, 2016**

Scientific Name	Common Names	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMA
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crocانthemum scoparium</i>	peak rush-rose	CRSC
<i>Festuca octoflora</i>	sixweeks grass	FEOC
<i>Filago</i> sp.		FI
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Juncus</i> sp.	rush	
<i>Madia</i> sp.	tarweed	MA
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Silene</i> sp.	catchfly	SI
<i>Stipa pulchra</i>	purple needle grass	STPU

<sup>1</sup>HMP species

### 8.10.2.4 Vegetative Cover Transects and Quadrats

One quadrat survey was completed at HA 33. The survey indicated that vegetative cover by native shrubs and perennials was 0.00%. Table 8-63 summarizes vegetation cover and Table 8-64 presents vegetation cover by species.

**Table 8-63. Quadrat Survey Summary for HA 33**

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA33Q01	9	0	8	1	31	60
<b>AVERAGE</b>	9	0	8	1	31	60

**Table 8-64.** Quadrat Survey Results for HA 33 by Species

Transect	CARA (%)	HEGR (%)	PLCO (%)	PLER (%)	TH (%)	BG (%)
HA33Q01	5	1	2	1	31	60
<b>AVERAGE</b>	5	1	2	1	31	60

### 8.10.3 Discussion

#### 8.10.3.1 HMP Annual Density

The HMP annual density criterion was met in HA 33 for Monterey spineflower. Its density in the HA 33 restoration plot was medium, which exceeded the success criteria of low density.

#### 8.10.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.10.3.3 Species Richness

Common yarrow, coyote brush, Monterey ceanothus, peak rush rose, wedge-leaved horkelia, and deerweed were all present. The species not observed included shaggy-barked manzanita, Toro manzanita, dwarf ceanothus, golden yarrow, toyon, sticky monkey flower, and black sage. HA 33 does not meet the success criterion for objective 1.

#### 8.10.3.4 Vegetative Cover Transects and Quadrats

Quadrats were completed to give us a preliminary idea of vegetative cover with a limited amount of effort; however, multiple objectives outlined in the SSRP specifically require transect data. Quadrat data will not be compared to the success criteria.

#### 8.10.3.5 Recommendations

HA 33 has just begun to respond to restoration efforts. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate some growth in cover. Overall, HA 33 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort. In addition to time, it is recommended that three of each of the following species are planted: shaggy-barked manzanita, Toro manzanita, dwarf ceanothus, golden yarrow, toyon, sticky monkey flower, and black sage.

Additionally, it is recommended that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy, this is already captured in objective 3 success criteria number 3.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover surveys.



Table 8-65 summarizes the current status of HA 33 including which success criteria have been met as well as our recommendation to move towards meeting all success criteria.

**Table 8-65.** Status and Recommendations for Achieving the Success Criteria at HA 33

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant shaggy-barked manzanita, Toro manzanita, dwarf ceanothus, golden yarrow, toyon, sticky monkey flower and black sage
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	Cannot assess	Install transects

### 8.11 HA 34

HA 34 was used by the Army as a multi-use range that included closed combat course, machine gun assault course, and mortar range. An estimated total of 26,300 cubic yards of soil was excavated, including additional erosion control activities, over approximately 9.7 acres. HA 34 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). The lower portion of HA 34 is moderately sloped, and oriented east-west, with a ridge in the center of the range and resides within low to very high quality habitat. The upper portion of HA 34 is steep and highly susceptible to erosion.

HA 34 is located on the northeastern portion of Site 39, within the Aromas formation containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive and active restoration activities were prescribed for HA 34. The prescription for passive restoration at HA 34 consisted of hand broadcast non-irrigated seed and annual weed management activities. The prescription for active restoration at HA 34 included transplanting native or greenhouse-grown individuals. The lower portion of HA 34 is moderately sloped with potential for erosion. The upper portion of the site is steep and highly susceptible to erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 34 began in 2012 and is ongoing. Monitoring began in 2013. HA 34 has been monitored for four years by photo documentation, one year for vegetative cover, and one year for plant survivorship. Figure 8-35 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 34 are summarized in Table 8-66.

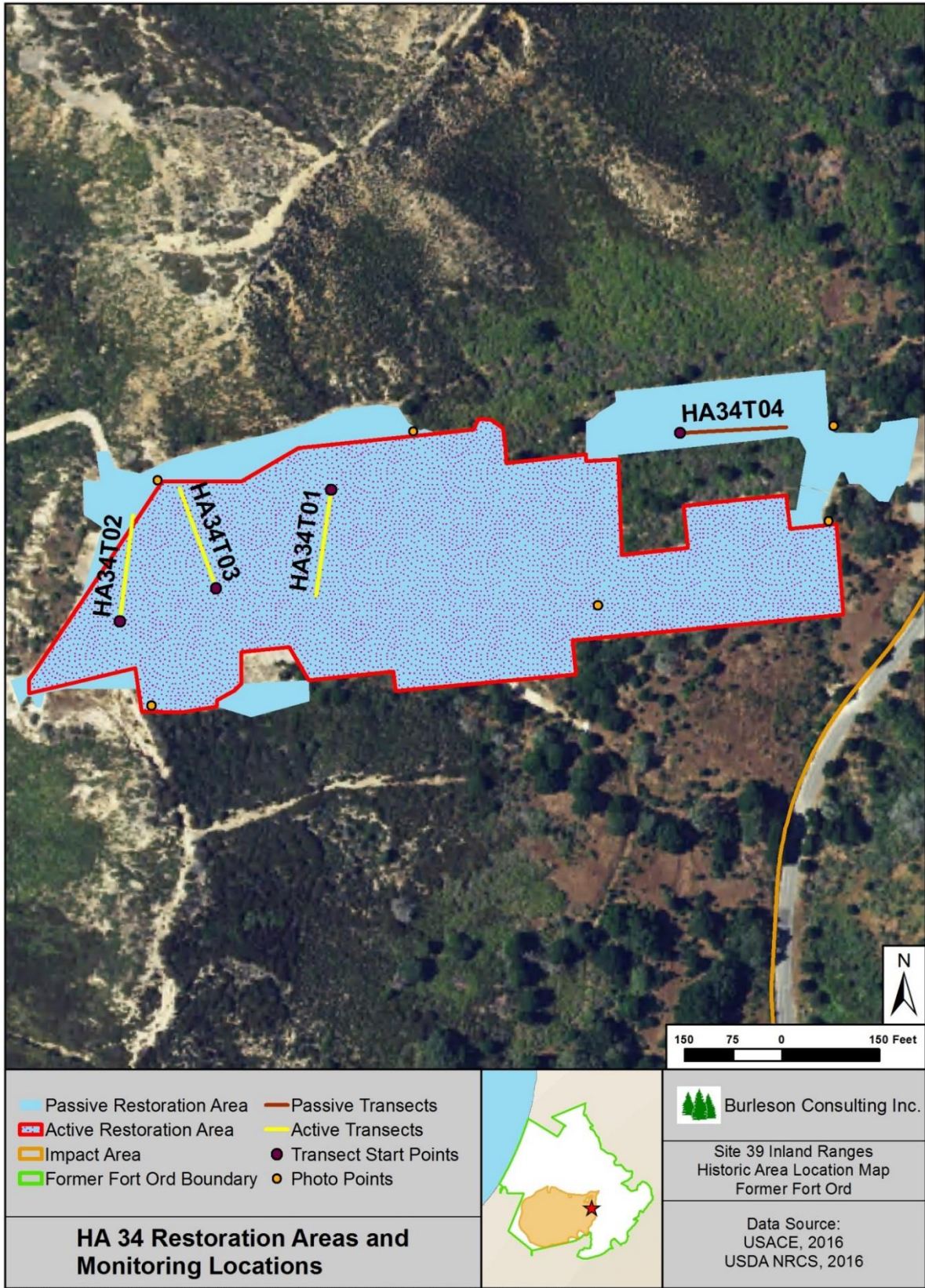


Figure 8-35. HA 34 Restoration Areas and Monitoring Locations Map

**Table 8-66. Success Criteria and Acceptable Limits for Restoration of HA 34**

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			Toro manzanita <sup>2</sup>
			shaggy-bark manzanita
			Hooker's manzanita <sup>2</sup>
			Monterey ceanothus <sup>2</sup>
			sticky monkey flower
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species iceplant. No more than 5 percent non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
			Toro manzanita percent cover, as an average of transect data, must be equal or greater than 31
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 7

**Table 8-66. Success Criteria and Acceptable Limits for Restoration of HA 34**

			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 4
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Baseline data indicated no HMP annual species. Therefore, no HMP annuals need to be present at this restoration site <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP forb results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.11.1 Restoration Activities**

Burleson has performed passive restoration at HA 34 for five years with eight different applications of seed including twice in 2012, twice in 2014, once in 2015, and three times in 2016. The total amount of seed broadcast on the site was 962.52 lb compared to the 320.41 lb prescribed in the SSRP. Table 8-67 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

**Table 8-67. HA 34 Passive Restoration Activities between 2012 and 2016**

Species	Pounds of Seed Broadcast						Total by Species
	SSRP Target	2012	2013	2014	2015	2016	
ACGL	19.40	18.29	0.00	3.37	2.00	11.40	35.06
ACMI	15.41	9.51	0.00	1.69	1.00	5.72	17.92
ADFA	NA	9.50	0.00	0.00	0.00	0.00	9.50
ARCA	15.50	9.50	4.60	0.00	1.00	0.00	15.10
ARHO <sup>1</sup>	NA	9.50	0.00	0.00	0.00	0.00	9.50
ARMO <sup>1</sup>	NA	9.50	0.00	0.00	0.00	0.00	9.50
ARPU <sup>1</sup>	NA	0.00	0.00	0.00	0.00	0.00	0.00
ARTO	NA	19.00	0.00	0.00	0.00	0.00	19.00
BAPI	1.90	1.40	1.35	0.25	0.20	0.00	3.20
CERI <sup>1</sup>	15.50	9.50	3.30	0.00	1.00	0.00	13.80
CRSC	15.50	9.15	0.00	1.26	1.00	0.00	11.41
DIAU	1.50	0.95	0.00	0.25	0.10	0.00	1.30
ELGL	87.30	85.50	46.00	80.34	9.00	14.88	235.72
ERCO	2.90	2.85	0.00	2.11	0.30	0.00	5.26
ERFA <sup>1</sup>	NA	0.00	0.00	0.00	0.00	0.00	0.00
FRCA	NA	0.00	0.00	0.00	0.00	0.00	0.00
HOCU	19.40	18.29	4.60	46.97	2.00	11.40	83.26
HORD	87.30	150.00	245.00	33.70	9.00	2.32	440.02
LUAR	9.70	9.50	0.00	0.00	1.00	0.00	10.50
SAME	9.70	9.51	0.60	3.37	1.00	0.00	14.48
STPU	19.40	19.00	0.00	0.00	2.00	6.99	27.99
<b>TOTAL</b>	<b>320.41</b>	<b>400.45</b>	<b>305.45</b>	<b>173.31</b>	<b>30.60</b>	<b>52.71</b>	<b>962.52</b>

<sup>1</sup>HMP species

Active restoration was conducted in 2016, during two planting events. The total number of plants installed at HA 34 was 2,502 compared to 12,150 prescribed in the SSRP. Planting quantities are shown in Table 8-68.



**Table 8-68. HA 34 Summary of Active Restoration Plantings**

Species	Number of Individual Plants			
	SSRP Target	2016 (Jan)	2016 (Dec)	Total by Species
ACGL	1,500	350	-	350
ACMI	500	54	-	54
ADFA	500	158	25	183
ARCA	500	135	20	155
ARHO <sup>1</sup>	500	76	100	176
ARMO <sup>1</sup>	500	76	186	262
ARTO	500	76	118	194
BAPI	500	95	55	150
CERI <sup>1</sup>	500	132	-	132
CRSC	1,500	228	-	228
DIAU	1,500	246	75	321
ERCO	800	-	100	100
HOCU	1,500	17	-	17
LUAR	500	95	40	135
SAME	850	45	-	45
<b>TOTAL</b>	<b>12,150</b>	<b>1,783</b>	<b>719</b>	<b>2,502</b>

<sup>1</sup>HMP species

### 8.11.2 Monitoring Results

#### 8.11.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 34. Therefore, no HMP annuals need to be present at this restoration site.

#### 8.11.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 34. A total of nine shrub species and 92 individual plants were monitored for survivorship. By the end of year 1 monitoring, 73% of the plants were alive. Table 8-69 presents results by species.

**Table 8-69.** Survivorship Monitoring Results for HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2016)
			Alive (%)
ADFA	158	16	94
ARCA	135	14	79
ARHO <sup>1</sup>	76	8	63
ARMO <sup>1</sup>	76	8	75
ARTO	76	8	75
BAPI	95	10	90
CERI <sup>1</sup>	132	13	38
LUAR	95	10	60
SAME	45	5	80
<b>TOTAL</b>	<b>888</b>	<b>92</b>	<b>73*</b>

\*average

<sup>1</sup>HMP species

## 8.11.2.3 Species Richness

A total of 76 species were observed at HA 34. Of those, 30 were native shrubs or perennials, 19 were native annual herbaceous species, and 27 were non-native species (see Table 8-70).

**Table 8-70.** Species observed on HA 34, 2016

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon americanus</i>	Spanish clover, American bird's foot trefoil	ACAM
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Aira caryophyllea</i>	silvery hairgrass	AICA
<i>Anaphalis margaritacea</i>	pearly everlasting	ANMA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos tomentosa</i>	shaggy barked manzanita	ARTO
<i>Artemisia californica</i>	California sagebrush	ARCA
<i>Avena barbata</i>	slender oat	AVBA
<i>Avena fatua</i>	wild oat	AVFA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Briza maxima</i>	rattlesnake grass	BRMA
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus hordeaceus</i>	soft chess	BRHO
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMAR
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Carpobrotus edulis</i>	ice plant	CAED
<i>Caryx</i> sp.		
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI

**Table 8-70. Species observed on HA 34, 2016**

Scientific Name	Common Name	Code
<i>Centaurea melitensis</i>	toalote	CEME
<i>Chorizanthe douglasii</i>	douglas' spine flower	CHDO
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Dichelostemma capitatum</i>	blue dicks	DICA
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Eschscholzia californica</i>	California poppy	ESCA
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Festuca octoflora</i>	slender fescue	FEOC
<i>Festuca perennis</i>	Italian rye grass	FEPE
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Hordeum brachyantherum</i>	meadow barley	HOBR
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Juncus bufonius</i>	common toad rush	JUBU
<i>Juncus patens</i>	spreading rush	JUPA
<i>Layia platyglossa</i>	tidy tips	LAPL
<i>Logfia gallica</i>	narrow leaved filago	LOGA
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR
<i>Lupinus concinnus</i>	bajada lupine	LUCO
<i>Lupinus nanus</i>	sky lupine	LUNA
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Lysimachia monelli</i>	flaxleaf pimpernel	LYMO
<i>Madia gracilis</i>	slender tarweed	MAGR
<i>Madia sativa</i>	coast tarweed	MASA
<i>Medicago polymorpha</i>	burclover	MEPA
<i>Medicago sativa</i>	alfalfa	MESA
<i>Melilotus indicus</i>	indian melilot	MEIN
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Plantago coronopus</i>	buckhorn plantain	PLCO
<i>Plantago erecta</i>	California plantain	PLER
<i>Plantago lanceolata</i>	English plantain	PLLA
<i>Polygala californica</i>	California milkwort	POCA
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	POMO
<i>Pseudognaphalium stramineum</i>	cotton batting plant	PSST
<i>Pseudognaphalium californicum</i>	ladies' tobacco, california everlasting	PSCA
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU
<i>Pseudognaphalium ramosissimum</i>	pink cudweed	PSRA
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep's sorrel	RUAC
<i>Salix lasiolepis</i>	arroyo willow	SALA
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA
<i>Stipa pulchra</i>	purple needle grass	STPU
<i>Toxicodendron diversilobum</i>	poison oak	TODI

**Table 8-70.** Species observed on HA 34, 2016

Scientific Name	Common Name	Code
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN
<i>Trifolium dubium</i>	shamrock	TRDU
<i>Trifolium gracilentum</i>	pinpoint clover	TRGR
<i>Trifolium hirtum</i>	rose clover	TRHI
<i>Trifolium willdenovii</i>	tomcat clover	TRWI

<sup>1</sup>HMP species

#### 8.11.2.4 Vegetative Cover Transects and Quadrats

Burleson completed four 50-meter line-intercept transects at HA 34. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 31.49%. Table 8-71 summarizes the vegetation cover and Table 8-72 presents vegetation cover by species.

**Table 8-71.** Line-intercept Transect Survey Summary for HA 34

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA34T01	37.52	36.06	0.82	0.64	1.40	62.12
HA34T02	18.64	17.22	0.76	0.66	2.80	78.78
HA34T03	10.02	8.52	1.18	0.32	7.66	82.32
HA34T04	69.10	64.16	4.94	0.00	21.90	27.20
<b>AVERAGE</b>	<b>33.82</b>	<b>31.49</b>	<b>1.93</b>	<b>0.40</b>	<b>8.44</b>	<b>62.61</b>

**Table 8-72.** Line-intercept Transect Survey Results for HA 34 by Species

Transect	ACAMA (%)	ACMI (%)	ACGL (%)	ARCA (%)	BAPI (%)	ELGL (%)	HOCU (%)	HYGL (%)	LUAR (%)	PLCO (%)	TH (%)	BG (%)
HA34T01	0.00	0.00	25.28	4.50	6.28	0.00	0.82	0.64	0.00	0.00	1.40	62.12
HA34T02	0.42	0.00	7.30	0.00	0.94	0.00	0.00	0.36	8.66	0.30	2.80	78.78
HA34T03	0.48	0.38	7.64	0.00	0.58	0.32	0.00	0.00	0.00	0.32	7.66	82.32
HA34T04	0.70	0.00	23.08	8.26	5.90	0.00	4.24	0.00	26.92	0.00	21.90	27.20
<b>AVERAGE</b>	<b>0.40</b>	<b>0.10</b>	<b>15.83</b>	<b>3.19</b>	<b>3.43</b>	<b>0.08</b>	<b>1.27</b>	<b>0.25</b>	<b>8.90</b>	<b>0.16</b>	<b>8.44</b>	<b>62.61</b>

### 8.11.3 Discussion

#### 8.11.3.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 34. Therefore, no HMP annuals need to be present at this restoration site.

#### 8.11.3.2 Plant Survivorship

Nine shrub species at HA 34 were monitored for year 1 plant survivorship in 2016. Overall survivorship was moderate at 73%. Monterey ceanothus was the only species with low survivorship. Table 8-69 presents results by species. Low survivorship for Monterey ceanothus is not surprising as this species had a very small sample size and has had low survivorship on multiple sites. In 2017, more Monterey

ceanothus will be planted which will increase the sample size being monitored. Burleson will continue to monitor this species closely. If survivorship remains low, we may recommend installing additional plants. A more comprehensive evaluation will be provided for HA 34 in year 5 of monitoring.

#### 8.11.3.3 Species Richness

Chamise, Toro manzanita, shaggy-barked manzanita, Hooker's manzanita, Monterey ceanothus, sticky monkey flower, and black sage were all present. HA 34 met the success criterion for objective 1.

#### 8.11.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 18 shrub and perennial species presented in Table 2 of the HA 34 SSRP (Burleson, 2013). Currently the HA includes 32.8% vegetative cover; therefore, this success criterion was not met.

Objective 2 considers the percent cover of non-native target weeds. Target weeds were not observed during transect surveys. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 3. Cover class 3 is from 6-25% of absolute cover. The HMP shrub species at HA 34 are providing an absolute cover of 0.00%, and the HA has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 34 this means a vegetative cover average of at least 31% cover for Toro manzanita, 7% for Monterey ceanothus, and 4% for Hooker's manzanita. The average vegetative cover for Toro manzanita was 0.00%, for Monterey ceanothus 0.00%, and for Hooker's manzanita 0.00%. None of the three species met the success criterion.

Baseline data from the SSRP indicated no HMP annual species at HA 34. Therefore, no HMP annuals need to be present at this restoration site, and the success criterion is not applicable.

#### 8.11.3.5 Recommendations

Due to significant erosion issues, many areas at HA 34 will need both further effort as well as time to respond to restoration. A qualitative overview is documented by the reference photo points (see Appendix D). HA 34 has not received the SSRP target for active restoration. An additional 9,648 plants need to be installed to reach this target. It is also recommended that more transects be installed at HA 34 to better capture the vegetative cover at this site. After the prescribed restoration targets are met and year 5 of monitoring is complete, the site will be reevaluated and further recommendations will be made.

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-73 summarizes the current status of HA 34 including which success criteria have been met as well as our recommendation to move towards meeting all success criteria.



**Table 8-73.** Status and Recommendations for Achieving the Success Criteria at HA 34

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Install additional transects
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Install additional transects
Objective 3 – No. 4	HMP shrub cover by species	No	Install additional transects
Objective 3 – No. 4	HMP annual density	NA	NA
Objective 3 – No. 4	HMP annual cover	NA	NA

### 8.12 HA 36

HA 36 was used by the Army as both a grenade and explosive ordnance disposal range. Soil remediation was completed in 2010, and resulted in 2,750 cubic yards of soil being excavated from 0.5 acre (Shaw, 2008). HA 36 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 36 is relatively flat with an east aspect. The adjacent lands are disturbed central maritime chaparral.

HA 36 is located on the northeastern portion of Site 39, occurring within the Aromas formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 36 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 36 is relatively flat with some potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration occurred at HA 36 twice in 2012 and once in 2016 and monitoring began in 2013. HA 36 has been monitored for four years by photo documentation and one year for vegetative cover. Figure 8-36 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 36 are summarized in Table 8-74.



**Figure 8-36.** HA 36 Restoration Areas and Monitoring Locations Map

**Table 8-74. Success Criteria and Acceptable Limits for Restoration of HA 36**

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native	Equivalent native species richness equal to baseline	Native species that must be present to demonstrate richness:
			chamise
			sandmat manzanita <sup>2</sup>
			Toro manzanita <sup>2</sup>
			shaggy-bark manzanita
			coyote brush
			Monterey ceanothus <sup>2</sup>
			golden yarrow
			peak rush rose
			wedge-leaved Horkelia
			deerweed
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
			Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2
			Toro manzanita percent cover, as an average of transect data, must be equal or greater than 9

**Table 8-74. Success Criteria and Acceptable Limits for Restoration of HA 36**

			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 12
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1
			Eastwood's golden fleece percent cover, as an average of transect data, must be equal or greater than 1
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Baseline data indicated no HMP annual species. Therefore, no HMP annuals need to be present at this restoration site.
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced		

**8.12.1 Restoration Activities**

Burleson has performed passive restoration at HA 36 for three years with three different applications of seed. Seed was broadcast twice in 2012 and once in 2016. The total amount of seed broadcast on the site was 20.258 lb compared to the 12.775 lb prescribed in the SSRP. Table 8-75 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. No active restoration activities have been completed at HA 36 by Burleson. However, BRAC installed approximately 300 surplus plants to HA 36 in 2014.

**Table 8-75. HA 36 Summary of Passive Restoration Activities**

Species	Pounds of Seed Broadcast				Total by Species
	SSRP Target	2012 (Jan)	2012 (Dec)	2016 (Dec)	
ACGL	1.000	0.500	0.507	1.800	2.807
ACMI	-	-	-	0.900	0.900
ADFA	0.500	0.300	0.254	0.000	0.554
ARHO <sup>1</sup>	1.000	0.500	0.518	0.000	1.018
ARMO <sup>1</sup>	1.000	0.500	0.507	0.000	1.007
ARPU <sup>1</sup>	0.500	0.300	0.263	0.000	0.563
ARTO	1.000	0.500	0.514	0.000	1.014
BAPI	0.075	0.000	0.037	0.000	0.037
CERI <sup>1</sup>	0.500	0.000	0.252	0.000	0.252
CRSC	0.500	0.300	0.251	0.000	0.551
ELGL	-	-	-	1.800	1.800
ERCO	0.150	0.077	0.077	0.000	0.154
ERFA <sup>1</sup>	0.050	0.025	0.064	0.000	0.089
FRCA	0.500	0.300	0.251	0.000	0.551
HOCU	1.000	0.500	0.500	1.800	2.800
HORD	4.500	0.000	4.510	0.000	4.510
SAME	0.500	0.300	0.251	0.000	0.551
STPU	-	-	-	1.100	1.100
<b>TOTAL</b>	<b>12.775</b>	<b>4.102</b>	<b>8.756</b>	<b>7.400</b>	<b>20.258</b>

<sup>1</sup>HMP species**8.12.2 Monitoring Results****8.12.2.1 HMP Annual Density**

The baseline data from the SSRP indicated no HMP annual species at HA 36. Therefore, no HMP annuals need to be present at this restoration site.

**8.12.2.2 Plant Survivorship**

No active restoration was prescribed, therefore, no survivorship data were collected.

**8.12.2.3 Species Richness**

A total of 34 species were observed at HA 36. Of those, 24 were native shrubs or perennials, three were native annual herbaceous species, and seven were non-native species. Table 8-76 shows all species observed in HA 36.



**Table 8-76. Species observed on HA 36, 2016**

Scientific Name	Common Name	Code
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	wooley leaf manzanita	ARTO
<i>Artemisia californica</i>	California sagebrush	ARCA
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus madritensis</i>	foxtail brome	BRMA
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Crocianthemum scoparium</i>	peak rush-rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Festuca myuros</i>	rat tail fescue	FEMY
<i>Frangula californica</i>	coffeberry	FRCA
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Madia gracilis</i>	slender tarweed	MAGR
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Pseudognaphalium</i> sp.		
<i>Rubus ursinus</i>	California blackberry	RUUR
<i>Salix</i> sp.	willow	SA
<i>Salvia mellifera</i>	black sage	SAME
<i>Sisyrinchium bellum</i>	blue-eyed grass	SIBE

<sup>1</sup>HMP species

#### 8.12.2.4 Vegetative Cover Transects and Quadrats

One line transect survey was completed at HA 36. The survey indicates that vegetative cover by native shrubs and perennials was 8.10%. Table 8-77 summarizes the vegetation cover and Table 8-78 presents the vegetation cover by species.

**Table 8-77.** Line-intercept Transect Survey Summary for HA 36

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA36T01	15.38	8.10	0.00	7.28	0.26	84.40
<b>AVERAGE</b>	<b>15.38</b>	<b>8.10</b>	<b>0.00</b>	<b>7.28</b>	<b>0.26</b>	<b>84.40</b>

**Table 8-78.** Line-intercept Transect Survey Results for HA 36 by Species

Transect	ACGL (%)	ARHO <sup>1</sup> (%)	COJU (%)	TH (%)	BG (%)
HA36T01	4.98	2.14	7.28	0.26	84.40
<b>AVERAGE</b>	<b>4.98</b>	<b>2.14</b>	<b>7.28</b>	<b>0.26</b>	<b>84.40</b>

<sup>1</sup>HMP species

### 8.12.3 Discussion

#### 8.12.3.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 36. Therefore, no HMP annuals need to be present at this restoration site.

#### 8.12.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.12.3.3 Species Richness

Chamise, sandmat manzanita, Toro manzanita, shaggy-barked manzanita, coyote brush, Monterey ceanothus, golden yarrow, peak rush rose, wedge-leaved horkelia, and black sage were all present. HA 36 met the success criterion for objective 1.

#### 8.12.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 15 shrub and perennial species presented in Table 2 of the HA 36 SSRP (Burlison, 2013). Currently the HA contains 2.14% vegetative cover; therefore, this success criterion is not met.

Objective 2 considers the percent cover of non-native target weeds. Pampas grass cover was 7.28%, more than the maximum allowable threshold of 5% for HA 36. This success criterion was not met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class has met or exceeded the baseline cover class of 3. Cover class 3 is from 6-25% of absolute cover. The HMP shrub species at HA 36 are providing an absolute cover of 2.14%; therefore, the HA has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 36 this means a vegetative cover average of at least 2% cover for sandmat manzanita, 9% Toro manzanita, 12% Monterey ceanothus, 1% Hooker's manzanita, and 1% Eastwood's goldenbush. The average

vegetative cover for sandmat manzanita was 0.00%, for Toro manzanita 0.00%, for Monterey ceanothus 0.00%, for Hooker's manzanita 2.14% and for Eastwood's goldenbush 0.00%. Only one of the five species, Hooker's manzanita, met the acceptable limits. This success criterion was not met.

The baseline data from the SSRP indicated no HMP annual species at HA 36. Therefore, no HMP annuals need to be present at this restoration site, and the success criterion is not applicable.

#### 8.12.3.5 Recommendations

HA 36 is responding modestly well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth and improvement of the HA. We recommend weed eradication at HA 36 to manage pampas grass. Otherwise, HA 36 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-79 summarizes the current status of HA 36 including which success criteria have been met as well as our recommendation to meeting all of the success criteria.

**Table 8-79.** Status and Recommendations for Achieving the Success Criteria at HA 36

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	No	Eradicate pampas grass
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	NA	NA
Objective 3 – No. 4	HMP annual cover	NA	NA

### 8.13 HA 37

HA 37 was used by the Army as a short distance firing range, bazooka range, and rifle grenade range. An estimated total of 19,500 cubic yards of soil were excavated over 9.4 acres. HA 37 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 37 is relatively flat and is surrounded by low to very high quality habitat with known presence of CTS on the range.

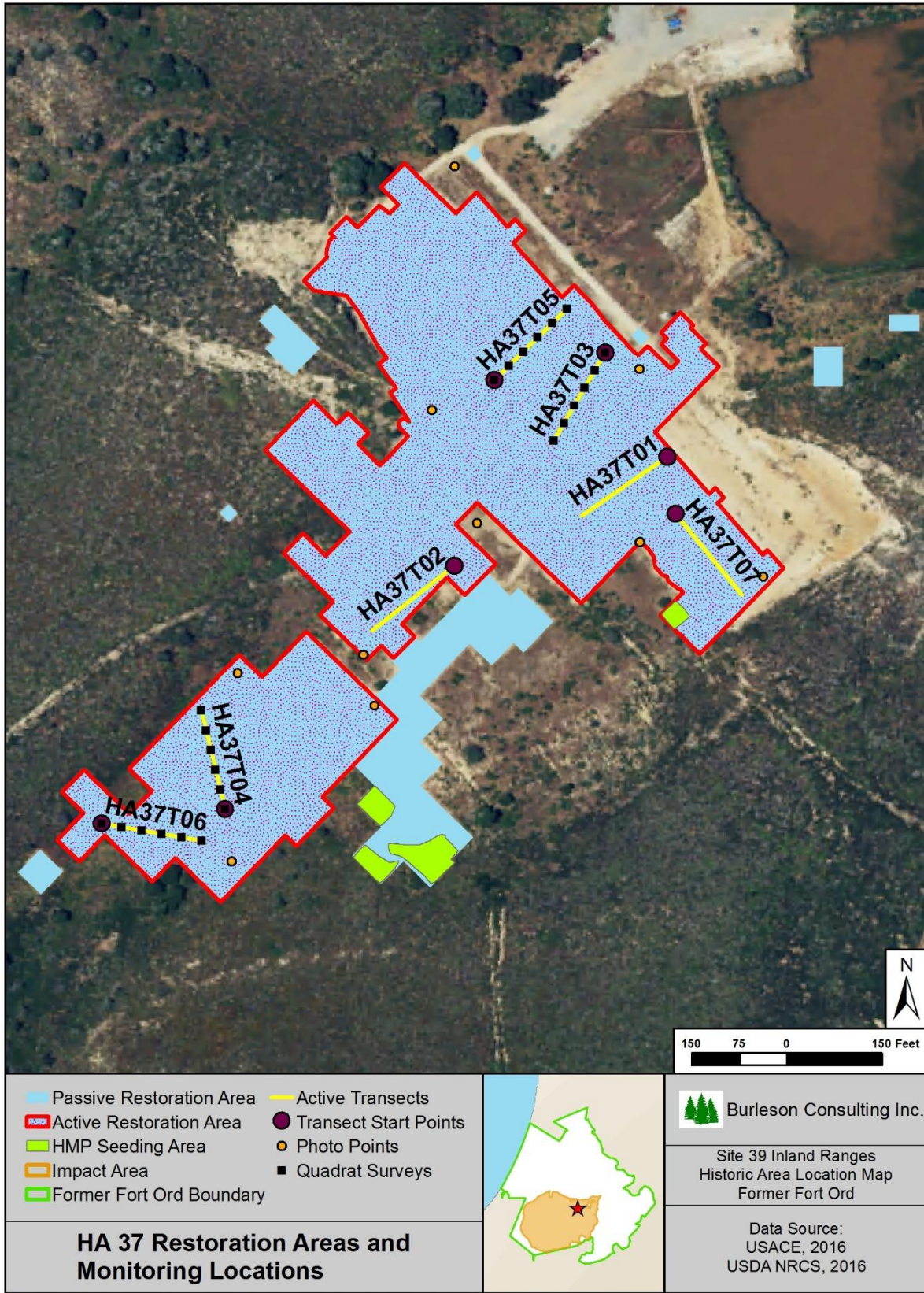
HA 37 is located on the northeastern portion of Site 39, within the Aromas formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17, inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive and active restoration activities were prescribed for HA 37. The prescription for passive restoration at HA 37 consisted of hand broadcast non-irrigated seed and annual weed management

activities. The prescription for active restoration at HA 37 included transplanting native or greenhouse-grown individuals. HA 37 is relatively flat to moderately sloped with potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 37 began in 2014 and is underway and monitoring began in 2013. HA 37 has been monitored for four years by photo documentation, two years for HMP annual density in plots, three years for 2014 planting survivorship, two years for 2015 planting survivorship, one year for 2016 planting survivorship, and one year for vegetative cover. Figure 8-37 shows the HA footprint, passive restoration area, and quadrat survey location. Success criteria for HA 37 are summarized in Table 8-80.





**Figure 8-37.** HA 37 Restoration Areas and Monitoring Locations Map



**Table 8-80. Success Criteria and Acceptable Limits for Restoration of HA 37**

Objective 1 <sup>1</sup>			
No.	Success Element	Decision Rule	Acceptable Limits
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			shaggy-bark manzanita
			chamise
			black sage
			silk tassel
			Toro manzanita <sup>2</sup>
			Monterey ceanothus <sup>2</sup>
			sandmat manzanita <sup>2</sup>
			coyote brush
			Hooker's manzanita <sup>2</sup>
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
Objective 2 <sup>1</sup>			
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicates presence of non-native target weed species <i>Cortaderia jubata</i> (pampas grass), <i>Genista</i> sp. (broom), and <i>Carpobrotus chilensis</i> (ice plant). No more than 5 percent non-native target weeds may be present at this restoration site.
Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Toro manzanita <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 4.

**Table 8-80. Success Criteria and Acceptable Limits for Restoration of HA 37**

			Monterey ceanothus <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 2.
			Hooker's manzanita <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 1.
			Sandmat manzanita <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 2.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower <sup>3</sup> percent cover, as an average of transect data, must be equal or greater than 1 <sup>4</sup> .
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP Annual		
	<sup>4</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.13.1 Restoration Activities**

Burleson performed passive restoration at HA 37 for four years with nine different applications of seed. Seed was broadcast multiple times in 2014, 2015, and 2016. The total amount of seed broadcast on the site was 597.45 lb compared to 247.00 lb prescribed in the SSRP. Table 8-81 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Four plots were chosen in the HA based on having suitable habitat for the Monterey spineflower and adjacent extant populations.

**Table 8-81. Summary of Passive Restoration Activities in HA 37**

Species	Pounds of Seed Broadcast					
	SSRP Target	2014 (Jan)	2014	2015	2016	Total by Species
ACGL	18.70	8.70	4.00	10.34	16.10	39.14
ACMI	9.40	4.80	2.00	8.07	8.14	23.01
ADFA	-	3.30	0.00	0.00	0.00	3.30
ARCA	-	-	0.00	2.40	0.00	2.40
BAPI	1.40	1.40	0.32	0.52	0.00	2.24
CERI <sup>1</sup>	9.40	0.00	2.00	2.67	0.00	4.67
CHPUP <sup>1</sup>	1.40	0.00	0.32	0.04	0.00	0.36
CRSC	7.00	5.20	1.52	2.60	0.00	9.32
DIAU	1.40	0.10	0.32	0.28	0.00	0.70
ELGL	28.10	100.00	69.00	69.01	17.90	255.91
ERCO	11.70	5.00	1.44	1.06	0.00	7.50
ERER	-	4.20	0.00	0.00	0.00	4.20
ERFA <sup>1</sup>	1.90	0.00	1.40	0.05	0.00	1.45
HOCU	18.70	16.10	4.00	5.34	16.10	41.54
HORD	93.50	50.00	63.60	52.70	1.20	167.50
LUAR	-	-	1.52	2.40	0.00	3.92
LUAL	7.00	0.00	0.00	0.00	0.00	0.00
LUNA	-	-	0.00	0.27	0.00	0.27
SAME	18.70	7.10	4.00	2.94	0.00	14.04
STCE	-	-	0.00	0.54	0.00	0.54
STPU	18.70	0.00	0.00	5.34	10.10	15.44
<b>TOTAL</b>	<b>247.00</b>	<b>205.90</b>	<b>155.44</b>	<b>166.57</b>	<b>69.54</b>	<b>597.45</b>

<sup>1</sup>HMP species

Active restoration was conducted twice in 2014, once in 2015, and once in 2016. The total number of plants installed at HA 37 was 12,949 compared to 17,300 prescribed in the SSRP as presented in Table 8-82.

**Table 8-82.** Summary of Active Restoration Plantings in HA 37

Species	Number of Individual Plants				Total by Species
	SSRP Target	2014	2015	2016	
ACGL	1,000	380	208	213	801
ACMI	800	13	252	244	509
ADFA	1,700	636	363	316	1,315
ARHO <sup>1</sup>	700	234	325	270	829
ARMO <sup>1</sup>	1,000	389	370	141	900
ARPU <sup>1</sup>	1,000	-	100	220	320
ARTO	2,500	621	554	497	1,672
BAPI	800	234	284	431	949
CERI <sup>1</sup>	1,000	315	652	239	1,206
CRSC	1,000	389	208	22	619
DIAU	800	389	250	437	1,076
ERCO	500	311	182	-	493
GAEL	500	-	-	17	17
HOCU	1,000	389	258	32	679
LUAL	1,000	-	165	146	311
LUAR	1,000	208	243	175	626
SAME	1,000	362	250	15	627
<b>TOTAL</b>	<b>17,300</b>	<b>4,870</b>	<b>4,664</b>	<b>3,415</b>	<b>12,949</b>

<sup>1</sup>HMP species

### 8.13.2 Monitoring Results

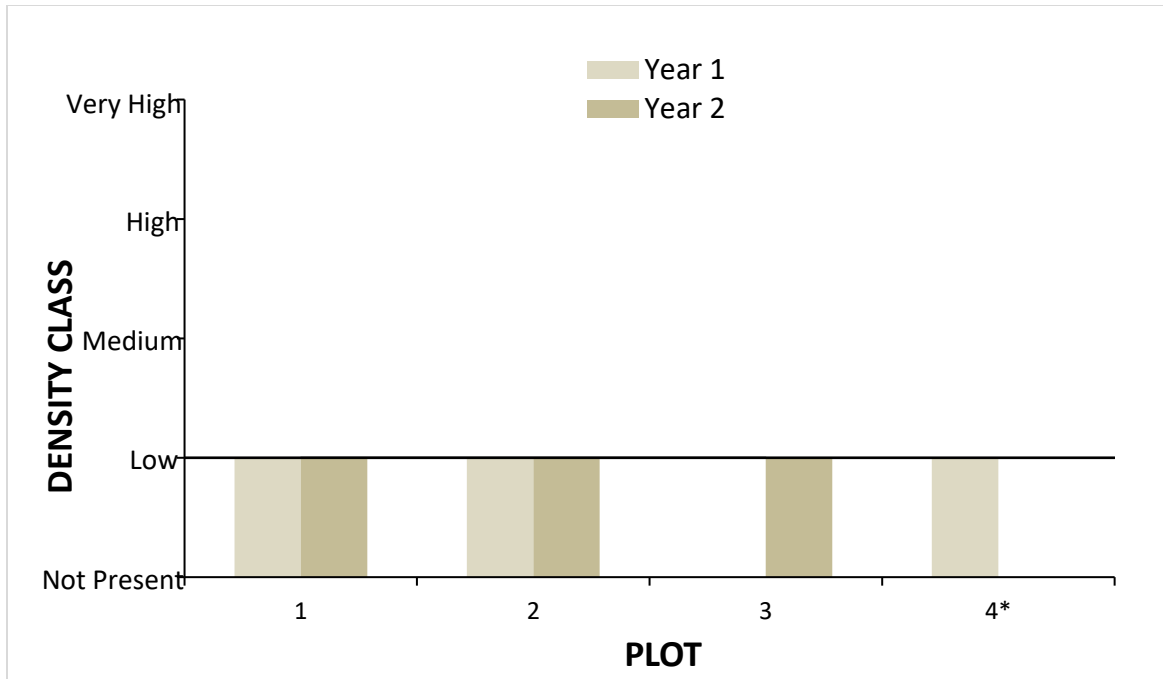
#### 8.13.2.1 HMP Annual Density

Four Monterey spineflower restoration plots were monitored for density at HA 37 in 2016. Plots 1-3 were established in January, 2015 and plot 4 was established in November, 2015. Monterey spineflower monitoring was completed for year 2 for plots 1-3 and year 1 for plot 4 (see Figure 8-38). Monterey spineflower density was low for all plots. Figure 8-39 represents Monterey spineflower restoration plot densities for HA 37.



**Figure 8-38.** HA 37 Year 1 and P1-3 Year 2 Monterey Spineflower Plot Density Map





**Figure 8-39.** Plot Densities in HA 37, Plots 1-4, Years 1 and 2. (\*Plot 4 was established in Nov 2015 and has only been monitored for year 1)

HMP annual density monitoring includes mapping discrete patches of HMP annuals within the restoration site but outside of the HMP annual restoration plots. This survey was completed for Monterey spineflower, which was not observed outside of the restoration plots at HA 37.

8.13.2.2 Plant Survivorship

A total of 11 shrub species and 816 individual plants were monitored for survivorship at HA 37. By year 3 monitoring for the 2014 planting, 64% of the plants were alive. By year 2 monitoring for the 2015 planting, 46% of the plants were alive. By the end of year 1 monitoring for the 2016 planting, 55% of the plants were alive. See tables 8-83 through 8-85 for results by species.

**Table 8-83.** Summary of Survivorship Monitoring in HA 37 for 2014 Plantings

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2014)	Year Two (2015)	Year Three (2016)
			Alive (%)	Alive (%)	Alive (%)
ADFA	636	61	95	93	90
ARHO <sup>1</sup>	234	23	74	74	65
ARMO <sup>1</sup>	389	40	75	63	58
ARTO	621	62	74	68	65
BAPI	234	24	100	92	83
CERI <sup>1</sup>	315	32	53	38	38
LUAR	208	16	50	31	31
SAME	362	25	100	100	84
<b>TOTAL</b>	<b>2,999</b>	<b>283</b>	<b>78*</b>	<b>70*</b>	<b>64*</b>

\*average

<sup>1</sup>HMP species

**Table 8-84.** Summary of Survivorship Monitoring in HA 37 for 2015 Plantings

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2015)	Year Two (2016)
			Alive (%)	Alive (%)
ADFA	363	36	89	83
ARHO <sup>1</sup>	325	33	61	58
ARMO <sup>1</sup>	370	37	46	27
ARPU <sup>1</sup>	100	0	--	--
ARTO	554	55	44	35
BAPI	284	28	75	61
CERI <sup>1</sup>	652	65	40	18
LUAL	165	17	65	47
SAME	250	25	88	40
<b>TOTAL</b>	<b>3,063</b>	<b>296</b>	<b>63*</b>	<b>46*</b>

\*average

<sup>1</sup>HMP species**Table 8-85.** Summary of Survivorship Monitoring in HA 37 for 2016 Plantings

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2016)
			Alive (%)
ADFA	316	32	88
ARHO <sup>1</sup>	270	28	75
ARMO <sup>1</sup>	141	14	64
ARPU <sup>1</sup>	220	23	70
ARTO	497	49	57
BAPI	431	43	44
CERI <sup>1</sup>	239	24	21
GAEL	17	4	25
LUAL	146	18	56
SAME	15	2	50
<b>TOTAL</b>	<b>2,292</b>	<b>237</b>	<b>55*</b>

\*average

<sup>1</sup>HMP species

### 8.13.2.3 Species Richness

A total of 81 species were observed at HA 37. Of those, 37 were native shrubs or perennials, 21 were native annual herbaceous species, and 23 were non-native species (see Table 8-86).

**Table 8-86. Species observed on HA 37, 2016**

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon americanus</i>	American bird's foot trefoil	ACAM
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Agoseris</i> sp.		AG
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Artemisia californica</i>	California sagebrush	ARCA
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Briza maxima</i>	rattlesnake grass	BRMA
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus hordeaceus</i>	softchess	BRHO
<i>Calandrinia menziesii</i>	red maids	CAME
<i>Calochortus albus</i>	white globe lily	CAAL
<i>Carex</i> sp.		CA
<i>Carpobrotus edulis</i>	ice plant	CAED
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Crocianthemum scoparium</i>	peak rush-rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Eschscholzia californica</i>	California poppy	ESCA
<i>Festuca myuros</i>	rat tail fescue	FEMY
<i>Filago</i> sp.		FI
<i>Gallium nuttallii</i>	climbing bedstraw	GANU
<i>Garrya elliptica</i>	coast silk tassel	GAEL
<i>Gnaphalium</i> sp.	gnaphalium	GN
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Hordeum</i> sp.		HO
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Hypochaeris radicata</i>	hairy cat's ear	HYRA
<i>Isocoma menziesii</i> var. <i>verniooides</i>	coastal isocome	ISMEV
<i>Juncus bufonius</i>	toad rush	JUBU
<i>Layia platyglossa</i>	tidy tips	LAPL
<i>Lepechinia calycina</i>	pitcher sage	LECA
<i>Lessingia pectinata</i>	common lessingia	LEPE

**Table 8-86.** Species observed on HA 37, 2016

Scientific Name	Common Name	Code
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR
<i>Lupinus bicolor</i>	annual lupine	LUBI
<i>Lupinus nanus</i>	sky lupine	LUNA
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Madia gracilis</i>	slender tarweed	MAGR
<i>Madia sativa</i>	coast tarweed	MASA
<i>Marah fabaceus</i>	wild cucumber	MAFA
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Navarretia squarrosa</i>	skunkbush	NASQ
<i>Petrorhagia dubia</i>	hairy pink	PEDU
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Plantago erecta</i>	California plantain	PLER
<i>Potentilla glandulosa</i>	sticky cinquefoil	POGL
<i>Pseudognaphalium ramisissimum</i>	pink everlasting	PSRA
<i>Rubus ursinus</i>	California blackberry	RUUR
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Rumex crispus</i>	curly dock	RUCR
<i>Salix lasiolepis</i>	arroyo willow	SALA
<i>Salix sp.</i>	willow	SA
<i>Salvia mellifera</i>	black sage	SAME
<i>Senecio glomeratus</i>	cutleaf fireweed	SEGL
<i>Silene gallica</i>	windmill pink	SIGA
<i>Sisyrinchium bellum</i>	blue-eyed grass	SIBE
<i>Sonchus asper</i>	common sow thistle	SOAS
<i>Stachys bullata</i>	wood mint	STBU
<i>Stipa cernua</i>	nodding needle grass	STCE
<i>Stipa pulchra</i>	purple needle grass	STPU
<i>Toxicodendron diversilobum</i>	poison oak	TODI
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN
<i>Trifolium campestre</i>	hop clover	TRCA
<i>Trifolium hirtum</i>	rose clover	TRHI
<i>Trifolium microcephalum</i>	maiden clover	TRMI
<i>Trifolium willdenovii</i>	tomcat clover	TRWI

<sup>1</sup>HMP species

#### 8.13.2.4 Vegetative Cover Transects and Quadrats

Seven line-intercept transects and 24 quadrats were conducted at HA 37. These surveys indicate that the mean vegetative cover by native shrubs and perennials was 22.69% and native herbaceous cover was 15.38%. Quadrats were completed along the transect line when 10% or more of the transect line was herbaceous cover, in accordance to the Protocol for Conducting Vegetation Monitoring (Burluson, 2009). Table 8-87 summarizes vegetation cover, Table 8-88 presents vegetation cover by species, and Table 8-89 presents quadrat results.

**Table 8-87.** Line-intercept Transect Survey Summary for HA 37

<b>Transect</b>	<b>Total Vegetative Cover (%)</b>	<b>Native Shrub and Perennial Cover (%)</b>	<b>Native Herbaceous Cover (%)</b>	<b>Non-Native Vegetative Cover (%)</b>	<b>Thatch (%)</b>	<b>Bare Ground (%)</b>
HA37T01	17.92	14.14	1.52	2.26	0.38	82.12
HA37T02	17.32	6.48	6.82	4.02	17.36	66.08
HA37T03	58.62	2.08	6.98	49.56	12.16	31.68
HA37T04	142.60	86.54	56.06	0.00	24.16	0.00
HA37T05	43.06	3.08	13.18	26.80	5.02	53.48
HA37T06	63.42	40.52	22.56	0.34	28.52	10.24
HA37T07	7.42	5.96	0.52	0.94	14.42	78.20
<b>AVERAGE</b>	<b>50.05</b>	<b>22.69</b>	<b>15.38</b>	<b>11.99</b>	<b>14.57</b>	<b>45.97</b>



**Table 8-88.** Line-intercept Transect Survey Results for HA 37 by Species

Transect	ACAMA (%)	ACMI (%)	ACGL (%)	ARCA (%)	ARHO <sup>1</sup> (%)	ARMO <sup>1</sup> (%)	ARPU <sup>1</sup> (%)	ARTO (%)	BAPI (%)	CER1 <sup>1</sup> (%)	CRSC (%)	DIAU (%)	ELGL (%)	ERCO (%)	HEGR (%)	HOCU (%)	HYGL (%)	LUAR (%)	MAGR (%)	PLCO (%)	PLER (%)	PSRA (%)	RUUR (%)	RUAC (%)	SAME (%)	TODI (%)	TH (%)	BG (%)
HA37T01	0.00	0.00	9.18	0.00	2.32	0.00	0.00	0.40	0.00	0.00	0.60	0.00	0.00	0.00	1.00	0.96	0.00	0.00	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	82.12
HA37T02	0.34	0.34	0.00	0.68	0.00	0.98	0.24	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.32	2.04	0.78	0.00	0.00	3.24	3.78	0.00	0.00	0.00	0.00	0.00	17.36	66.08
HA37T03	1.28	1.44	1.12	0.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.36	0.00	0.00	2.50	0.40	0.00	0.00	49.56	0.00	0.00	0.00	0.00	0.00	0.00	12.16	31.68
HA37T04	45.26	0.26	59.10	2.24	0.76	2.58	0.00	0.74	0.00	3.16	0.00	1.44	0.00	0.34	0.00	5.88	0.00	5.82	0.64	0.00	0.00	0.00	0.00	4.02	1.36	9.00	24.16	0.00
HA37T05	11.98	0.00	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	26.80	0.80	0.00	0.00	0.00	0.00	0.00	0.00	5.02	53.48
HA37T06	17.80	0.20	13.98	3.72	1.20	1.10	0.20	0.36	2.98	0.00	0.00	0.20	0.00	1.82	0.42	2.18	0.00	4.62	0.00	0.00	0.00	0.34	4.26	2.34	2.56	1.48	28.52	10.24
HA37T07	0.00	0.00	2.42	0.00	0.00	0.00	0.00	0.86	0.36	0.00	0.00	0.56	0.00	0.00	0.00	0.00	1.52	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	14.42	78.20	
<b>AVERAGE</b>	<b>10.95</b>	<b>0.32</b>	<b>12.61</b>	<b>1.09</b>	<b>0.61</b>	<b>0.67</b>	<b>0.06</b>	<b>0.34</b>	<b>0.48</b>	<b>0.54</b>	<b>0.24</b>	<b>0.31</b>	<b>0.19</b>	<b>0.31</b>	<b>0.11</b>	<b>1.94</b>	<b>0.31</b>	<b>1.71</b>	<b>0.15</b>	<b>11.77</b>	<b>0.65</b>	<b>0.05</b>	<b>0.61</b>	<b>0.91</b>	<b>0.56</b>	<b>1.50</b>	<b>14.57</b>	<b>45.97</b>

<sup>1</sup>HMP species

**Table 8-89.** Quadrats Along the Transect Line for T03, T04, T05 and T06 Summary for HA37

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA37T03Q01	38.0	8.0	10.0	20.0	47.0	15.0
HA37T03Q02	40.0	0.0	4.0	36.0	37.0	32.0
HA37T03Q03	50.0	0.0	10.0	40.0	47.0	12.0
HA37T03Q04	41.0	0.0	1.0	40.0	48.0	12.0
HA37T03Q05	11.0	7.0	0.0	4.0	90.0	6.0
HA37T03Q06	24.0	22.0	0.0	2.0	71.0	5.0
HA37T04Q01	18.0	7.0	5.0	6.0	66.0	16.0
HA37T04Q02	49.0	30.0	19.0	0.0	50.0	2.0
HA37T04Q03	54.0	28.0	18.0	8.0	46.0	0.0
HA37T04Q04	76.0	46.0	12.0	18.0	22.0	0.0
HA37T04Q05	96.0	95.0	1.0	0.0	3.0	1.0
HA37T04Q06	98.0	90.0	8.0	0.0	10.0	1.0
HA37T05Q01	3.0	0.0	0.0	3.0	0.0	97.0
HA37T05Q02	11.0	0.0	5.0	6.0	15.0	74.0
HA37T05Q03	15.0	1.0	6.0	8.0	0.0	85.0
HA37T05Q04	55.0	0.0	0.0	55.0	0.0	45.0
HA37T05Q05	4.0	0.0	0.0	4.0	0.0	96.0
HA37T05Q06	15.0	2.0	1.0	12.0	0.0	85.0
HA37T06Q01	43.0	43.0	0.0	0.0	52.0	4.0
HA37T06Q02	42.0	30.0	12.0	0.0	57.0	0.0
HA37T06Q03	59.0	53.0	6.0	0.0	41.0	0.0
HA37T06Q04	49.0	31.0	18.0	0.0	48.0	4.0
HA37T06Q05	50.0	18.0	32.0	0.0	40.0	10.0
HA37T06Q06	15.0	13.0	2.0	0.0	53.0	32.0
<b>AVERAGE</b>	41.8	27.1	8.1	6.7	27.9	30.7

### 8.13.3 Discussion

#### 8.13.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limits for HMP annual density because the SSRP baseline density class was low, and all plots met success criteria. The density classes in plots 1 and 2 were low for both years of monitoring while plot 3 increased from not present to low density by year 2. Plot 4 has only had one year of monitoring and was also low density. Monterey spineflower was not present outside of the restoration plots, however, seeding occurred in 2015 and 2016. It is likely that the site needs more time for Monterey spineflower to spread outside of the seeded restoration plots.

### 8.13.3.2 Plant Survivorship

Survivorship rates varied by species and year planted. Plantings that occurred in 2014 indicated a moderate survival rate, in 2015 a low rate, and in 2016 a moderate rate. In the 2015 planting, Toro manzanita and Monterey ceanothus had a low survivorship. Monterey ceanothus also had a low survivorship in the 2016 planting. These two species will continue to be monitored closely. Low survivorship for Monterey ceanothus is not surprising, as this species has had low survivorship on multiple sites. In 2017, more Monterey ceanothus and Toro manzanita will be planted. If survivorship rates remain low, we may recommend increasing the number of plants installed. A more comprehensive evaluation will be provided for HA 37 in year 5 of monitoring.

### 8.13.3.3 Species Richness

Chamise, sandmat manzanita, shaggy-barked manzanita, Hooker's manzanita, Toro manzanita, coyote brush, Monterey ceanothus, silk tassel, and black sage were all present. HA 37 met the success criterion for objective 1.

### 8.13.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 22 shrub and perennial species presented in Table 2 of the HA 37 SSRP (Burlison, 2013). Currently the HA includes 20.55% cover; therefore, this success criterion was not met.

Objective 2 considers the percent cover of non-native target weeds. Target weeds were not observed in the transect surveys. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class has met or exceeded the baseline cover class of 3. Cover class 3 is from 6-25% of absolute cover. The HMP shrub species at HA 37 are providing an absolute cover of 1.88%, and the HA has not met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 37 this means a vegetative cover average of at least 2% for sandmat manzanita, 4% for Toro manzanita, 2% for Monterey ceanothus, and 1% for Hooker's manzanita. The average vegetative cover for sandmat manzanita was 0.06%, for Toro manzanita 0.67%, for Monterey ceanothus 0.54%, and for Hooker's manzanita 0.61%. None of the four species met the success criterion. In addition, HMP annuals were evaluated for vegetative cover. Monterey spineflower are required to provide at least 1% cover from the transect surveys. Monterey spineflower was not detected in the transect survey or the corresponding quadrats along the transect line. The HMP annual vegetative cover success criterion was not met.

### 8.13.3.5 Recommendations

HA 37 is a highly-disturbed site with significant erosion issues that will likely need both further effort as well as time to respond to restoration. A qualitative overview is documented by the reference photo points (see Appendix D). HA 37 has not received the SSRP target for active restoration, and an additional 4,351 plants need to be installed to reach this target. It is also recommended that more transects be installed at HA 37 to better capture the vegetative cover, particularly in new planting areas. After the prescribed restoration targets are met, and year 5 of monitoring is complete, the site will be reevaluated and further recommendations will be made at that time.

We recommend Monterey spineflower seeding, as the site has only received 0.36 lb of the SSRP target of 1.4 lb.

Additionally, it is recommended that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy, this is already captured in objective 3.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-90 summarizes the current status of HA 37 including which success criteria have been met as well as our recommendation to meeting all of the success criteria.

**Table 8-90.** Status and Recommendations for Achieving the Success Criteria at HA 37

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Install additional transects
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Install additional transects
Objective 3 – No. 4	HMP shrub cover by species	No	Install additional transects
Objective 3 – No. 4	HMP annual density	Yes	Fulfill SSRP seed prescription for Monterey spineflower
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

## 8.14 HA 38

HA 38 was used by the Army as a firing range. Soil was excavated over 1.01 acres. HA 38 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 38 is moderately sloped and is surrounded by low to very high quality habitat.

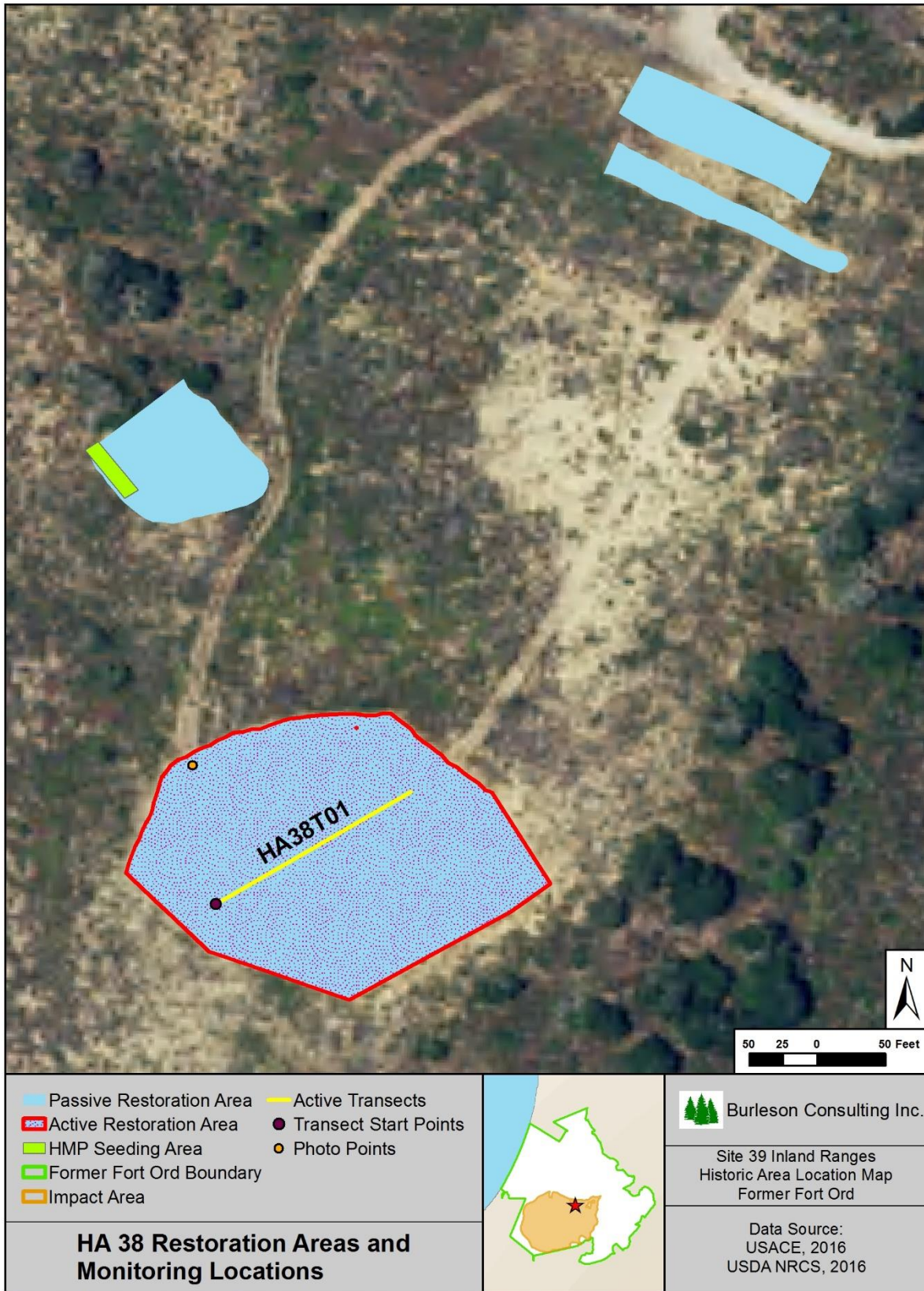
HA 38 is located on the northeastern portion of Site 39, occurring within the Aromas formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive and active restoration activities were prescribed for HA 38. The prescription for passive restoration at HA 38 consisted of hand broadcast non-irrigated seed and annual weed management activities. The prescription for active restoration at HA 38 included transplanting native or

greenhouse-grown individuals. HA 38 is moderately sloped and has little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 38 began in 2013 and was completed in 2015 with the exception of HMP annuals and monitoring began in 2014. HA 38 has been monitored for three years by photo documentation, two years for HMP annual density in plots, one year for HMP annual density across the HA, one year for species richness, one year for vegetative cover, and three years for plant survivorship. Figure 8-40 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 38 are summarized in Table 8-91.





**Figure 8-40.** HA 38 Restoration Areas and Monitoring Locations Map

**Table 8-91.** Success Criteria and Acceptable Limits for Restoration of HA 38

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			shaggy-bark manzanita
			chamise
			coyote brush
			deerweed
			black sage
			Toro manzanita <sup>2</sup>
			Monterey ceanothus <sup>2</sup>
			sandmat manzanita <sup>2</sup>
			Hooker's manzanita <sup>2</sup>
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species <sup>3</sup>	For the restoration area, percent cover monitoring data must meet or exceed 20 percent for native species listed as part of the plant palette in Table 2 <sup>3</sup>
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicates presence of non-native target weed species <i>Carpobrotus edulis</i> (ice plant). No more than 5 percent non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 2
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Toro manzanita <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 1.

**Table 8-91. Success Criteria and Acceptable Limits for Restoration of HA 38**

			Monterey ceanothus <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 1.
			Hooker's manzanita <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 1.
			Sandmat manzanita <sup>2</sup> percent cover, as an average of transect data, must be equal or greater than 4.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 3 <sup>3</sup>
			Seaside bird's beak percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Sand gilia percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.14.1 Restoration Activities**

Burleson has performed passive restoration at HA 38 for three years with three different applications of seed broadcast in 2013, 2014, and 2015. The total amount of seed broadcast on the site was 31.40 lb compared to 28.98 lb prescribed in the SSRP. Table 8-92 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP

annual species Monterey spineflower. One plot was chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations.

**Table 8-92.** Summary of Passive Restoration Activities from 2013-2016 for HA 38

Species	Pounds of Seed Broadcast				Total by Species
	SSRP Target	2013 (Oct)	2014 (Dec)	2015 (Jan)	
ACGL	2.020	0.400	1.410	0.000	1.810
ACMI	1.010	0.200	0.710	0.000	0.910
BAPI	0.150	0.030	0.080	0.000	0.110
CERI <sup>1</sup>	1.010	0.000	0.510	0.000	0.510
CHPUP <sup>1</sup>	0.150	0.000	0.000	0.010	0.010
CORIL <sup>1</sup>	0.150	0.000	0.000	0.000	0.000
CRSC	0.760	0.152	0.580	0.000	0.732
DIAU	0.150	0.180	0.280	0.000	0.460
ELGL	4.040	0.600	6.600	0.000	7.200
ERCO	1.260	0.252	0.930	0.000	1.182
ERFA <sup>1</sup>	0.200	0.000	0.100	0.000	0.100
GAEL	1.010	0.000	0.000	0.000	0.000
GITEA <sup>1</sup>	0.150	0.000	0.000	0.000	0.000
HOCU	2.020	0.404	1.410	0.000	1.814
HORD	10.100	2.020	12.000	0.000	14.020
LUAL	0.760	0.150	0.000	0.000	0.150
LUAR	NA	0.000	0.580	0.000	0.580
SAME	2.020	0.404	1.410	0.000	1.814
STPU	2.020	0.000	0.000	0.000	0.000
<b>TOTAL</b>	<b>28.980</b>	<b>4.790</b>	<b>26.600</b>	<b>0.010</b>	<b>31.400</b>

<sup>1</sup>HMP species

Active restoration was completed in 2014 and 2015. The total number of plants installed at HA 38 was 1,842 compared to 1,842 prescribed in the SSRP. Table 8-93 summarizes the active restoration plantings.

**Table 8-93.** Summary of Active Restoration Activities from 2014-2015 for HA 38

Species	Number of Individual Plants			Total by Species
	SSRP Target	2014 (Feb)	2015 (Feb)	
ACGL	82	82	-	82
ACMI	82	82	-	82
ADFA	163	163	-	163
ARHO <sup>1</sup>	123	123	-	123
ARMO <sup>1</sup>	123	123	-	123
ARPU <sup>1</sup>	327	-	327	327
ARTO	204	204	-	204
BAPI	82	82	-	82
CERI <sup>1</sup>	82	82	-	82
CRSC	82	82	-	82
DIAU	82	82	-	82
ERCO	82	82	-	82
GAEL	82	-	82	82
HOCU	82	82	-	82
LUAL	82	-	82	82
SAME	82	82	-	82
<b>TOTAL</b>	<b>1,842</b>	<b>1,351</b>	<b>491</b>	<b>1,842</b>

<sup>1</sup>HMP species**8.14.2 Monitoring Results**

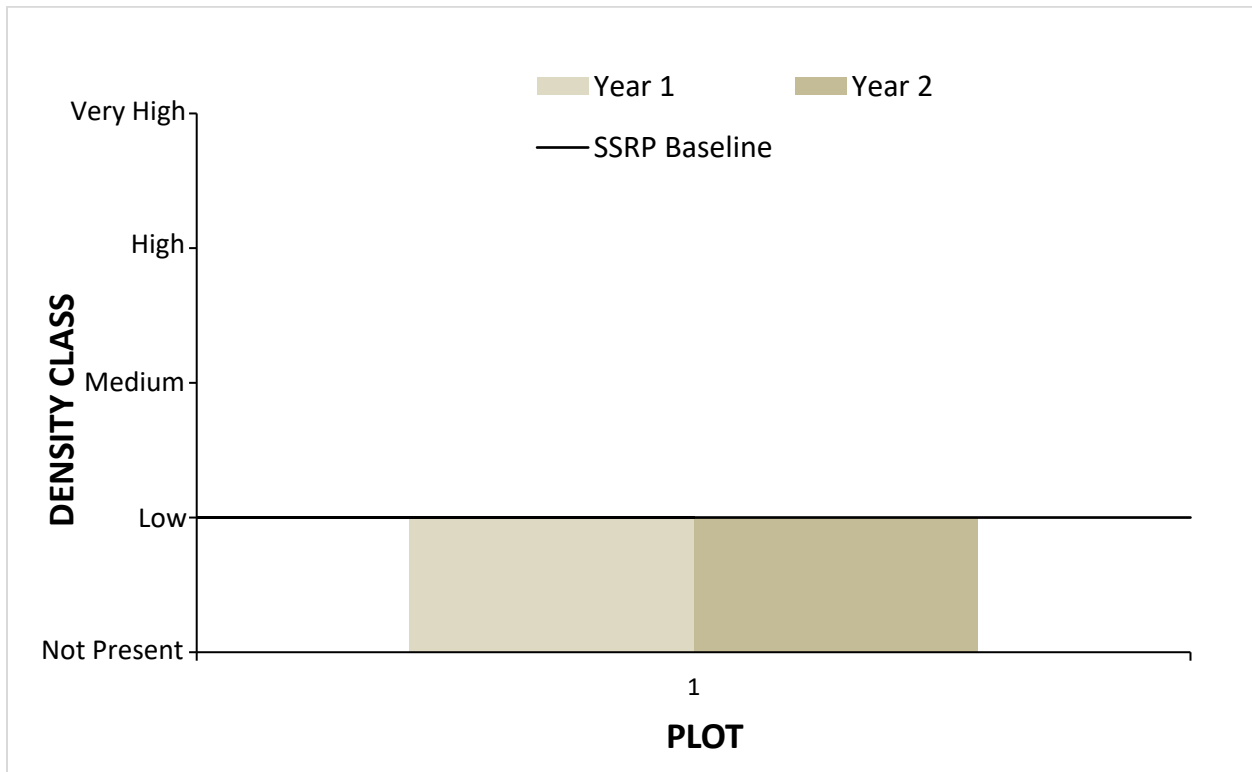
## 8.14.2.1 HMP Annual Density

One Monterey spineflower restoration plot was monitored for year 2 density at HA 38 in 2016. The plot is located in the eastern side of the site as shown on Figure 8-41. Monterey spineflower density was low at plot 1. Figure 8-42 presents Monterey spineflower restoration plot densities for HA 38.





Figure 8-41. HA 38 Year 2 Monterey Spineflower Plot Density Map



**Figure 8-42.** HA 38 Years 1 and 2 Monterey Spineflower Densities Compared to SSRP Baseline

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. Two discrete patches of Monterey spineflower were mapped and individuals counted within each patch. The densities were low. The total acreage of Monterey spineflower patches with a density at or above the SSRP baseline was 0.08 acre. Figure 8-43 shows the locations of the discrete patches.





**Figure 8-43.** HA 38 Monterey Spineflower Meandering Transect Density Map

## 8.14.2.2 Plant Survivorship

A total of 10 shrub species and 133 individual plants were monitored for survivorship. By year 3 of monitoring for 2014 planting, 80% of the plants were alive. By year 2 of monitoring for 2015 planting, 80% of the plants were alive. Tables 8-94 and Table 8-95 present results by species.

**Table 8-94.** Plant Survivorship Monitoring Summary and Results for 2014 Planting at HA 38

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2014)	Year Two (2015)	Year Three (2016)
			Alive (%)	Alive (%)	Alive (%)
ADFA	163	16	100	100	100
ARHO <sup>1</sup>	123	12	92	100	100
ARMO <sup>1</sup>	123	12	100	100	100
ARTO	204	20	95	100	100
BAPI	82	8	100	75	63
CERI <sup>1</sup>	82	8	75	75	25
SAME	82	8	100	100	75
<b>TOTAL</b>	<b>859</b>	<b>84</b>	<b>95*</b>	<b>93*</b>	<b>80*</b>

\*average

<sup>1</sup>HMP species

**Table 8-95.** Plant Survivorship Monitoring Summary and Results for 2015 Planting at HA 38

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2015)	Year Two (2016)
			Alive (%)	Alive (%)
ARPU <sup>1</sup>	327	33	91	91
GAEL	82	8	88	50
LUAL	82	8	100	100
<b>TOTAL</b>	<b>491</b>	<b>49</b>	<b>93*</b>	<b>80*</b>

\* average

<sup>1</sup> HMP species

## 8.14.2.3 Species Richness

A total of 39 species were observed at HA 38. Of those, 23 were native shrubs or perennials, nine were native annual herbaceous species, and seven were non-native species (see Table 8-96).

**Table 8-96. Species observed on HA 38, 2016**

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Arctostaphylos hookeri</i> <sup>1</sup>	Hooker's manzanita	ARHO
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromis madritensis</i>	red brome	BRMA
<i>Carex</i> sp.		CA
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Festuca myuros</i>	rat tail fescue	FEMY
<i>Frangula californica</i>	California coffeeberry	FRCA
<i>Garrya elliptica</i>	coast silk tassel	GAEL
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Hordeum</i> sp.		HO
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Madia gracilis</i>	slender tarweed	MAGR
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	western bracken fern	PTAQP
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Solanum umbellifera</i>	blue witch	SOUM
<i>Toxicodendron diversilobum</i>	poison oak	TODI

<sup>1</sup> HMP species

#### 8.14.2.4 Vegetative Cover Transects and Quadrats

One line-intercept transect survey was conducted at HA 38. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 20.86%. Table 8-97 summarizes the vegetation cover and Tables 8-98 presents the vegetation cover by species.



**Table 8-97.** Line-intercept Transect Survey Summary for HA 38

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA38T01	21.20	20.86	0.00	0.34	1.36	77.44
<b>AVERAGE</b>	<b>21.20</b>	<b>20.86</b>	<b>0.00</b>	<b>0.34</b>	<b>1.36</b>	<b>77.44</b>

**Table 8-98.** Line-intercept Transect Survey Results for HA 38 by Species

Transect	ADFA	ARMO	CRSC	DIAU	ERCO	HOCU	LUAL	PTAQP	RUAC	TH	BG
HA38T01	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
<b>AVERAGE</b>	7.28	0.88	3.34	0.42	0.68	0.42	7.56	0.28	0.34	1.36	77.44

### 8.14.3 Discussion

#### 8.14.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limits for HMP annual density at HA 38. The SSRP baseline density class for Monterey spineflower was low. Restoration plot results show that by year 2 the density met the success criterion under objective 3. In addition, Monterey spineflower was present outside of the restoration plots. Discrete patches, with density that either met or exceeded the success criteria, cover 0.08 acre of HA 38.

Seaside bird's beak and sand gilia restoration plots have not been established at HA 38 and were not observed on site.

Because all three HMP annual species were not within the acceptable limits, the site as a whole has not met this success criteria.

#### 8.14.3.2 Plant Survivorship

Survivorship rates varied by species and year planted. Plantings that occurred in 2014 resulted in an 80% survival rate. Monterey ceanothus was the only species with low survivorship. Low survivorship for Monterey ceanothus is not surprising as this species has had low survivorship on multiple sites. We will continue to monitor this species closely. If survivorship remains low, we will recommend installing additional plants. A more comprehensive evaluation will be provided for HA 38 in year 5 of monitoring. Plantings that occurred in 2015 resulted in an 80% survival rate and all species are doing well.

#### 8.14.3.3 Species Richness

Shaggy-barked manzanita, chamise, coyote brush, deerweed, black sage, Toro manzanita, Monterey ceanothus, sandmat manzanita, and Hooker's manzanita were all present. HA 38 has met the success criterion for objective 1.

#### 8.14.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 20% for native species listed as part of the plant palette. This list includes 23 shrub and perennial species presented in Table 2 of the HA 38 SSRP

(Burluson, 2013). Currently the HA includes 20.58% vegetative cover; therefore, this success criterion was met.

Objective 2 considers the percent cover of non-native target weeds. The transect surveys did not encounter any target weeds. The vegetative cover for non-native species was 0.34%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 2. Cover class 2 is from 1-5% of absolute cover. The HMP shrub species at HA 38 are providing an absolute cover of 0.88%, and the HA has not met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 38 this means a vegetative cover average of at least 1% cover for Toro manzanita, 1% Monterey ceanothus, 1% Hooker's manzanita, and 4% sandmat manzanita. The average vegetative cover for Toro manzanita was 0.88%, for Monterey ceanothus 0.00%, for Hooker's manzanita 0.00%, and for sandmat manzanita 0.00%. None of the four species met the acceptable limit and this success criterion was not met. In addition, HMP annuals were evaluated for vegetative cover. Monterey spineflower is required to provide at least 3% cover from the transect surveys and seaside bird's beak and sand gilia are required to provide at least 1% cover. None of the HMP annual species were detected through the transect surveys. The HMP annual vegetation cover success criterion was not met.

#### 8.14.3.5 Recommendations

HA 38 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D) that illustrate progress, growth, and improvement. HA 38 has not received the full SSRP target prescription for passive restoration. An additional 0.15 lb of sand gilia and 0.15 lb of seaside bird's beak is required to reach this target. We recommend that both species are applied to their full seed prescription. Overall, HA 38 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort. We also recommend installing a second transect to obtain more vegetative cover data for future site evaluation.

Additionally, we recommend that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 3% transect cover for Monterey spineflower and 1% each for sand gilia and seaside bird's beak. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy, and this is already captured in objective 3 success criteria.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-99 summarizes the current status of HA 38 including which success criteria have been met as well as our recommendation to meeting the success criteria.

**Table 8-99.** Status and Recommendations for Achieving the Success Criteria at HA 38

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	Yes	None
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	No	Establish restoration plots for sand gilia and seaside bird's beak
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

### 8.15 HA 39/40

HA 39/40 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010, and resulted in approximately 6,500 cubic yards of soil excavated from 2.4 acres (Shaw, 2008).

HA 39/40 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 39/40 is broken up into four distinct areas (P1-P4) which are located in the upland zone of a vernal pool with surface water runoff from the south draining towards the north into the vernal pool. P1 area is grassland habitat, P2 area is a combination of grassland and wet meadow, P3 area is wet meadow, and the P4 area is a combination of coastal scrub and grassland which includes the active restoration area.

HA 39/40 is located on the northeastern portion of Site 39, occurring within the Aromas formation containing the Baywood soils series based on previous reference data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Both passive and active restoration areas were designated at HA 39/40. The main focus of restoration was to broadcast non-irrigated seed. However, for the active restoration efforts, container-grown plants were planted. HA 39/40 is relatively flat to moderately sloped and has some potential for erosion where special care should be taken to prevent runoff from entering the vernal pool.

Restoration at HA 39/40 began in 2012 and was completed by 2013 and monitoring began in 2011. HA 39/40 has been monitored for five years by photo documentation, four years for HMP annual density in plots, one year for HMP annual density outside of plots, one year for species richness, and one year for vegetative cover. Figure 8-44 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 39/40 are summarized in Table 8-100.

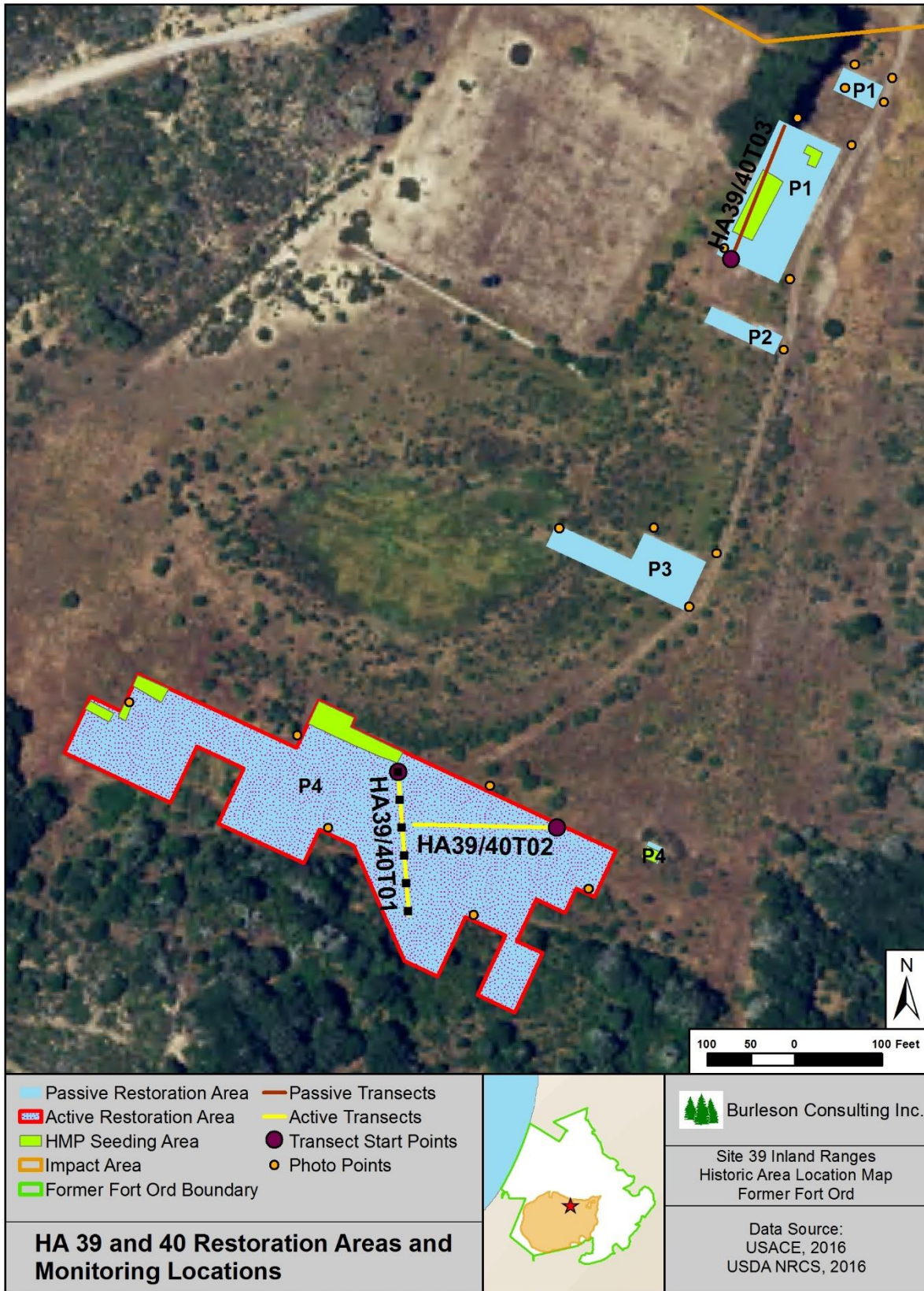


Figure 8-44. HA 39/40 Restoration Areas and Monitoring Locations Map

**Table 8-100. Success Criteria and Acceptable Limits for Restoration of HA 39/40**

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			common yarrow
			coyote brush
			sedge
			saltgrass
			blue wild-rye
			California poppy
			rush
			wedge-leaved Horkelia
			yellow bush lupine
			silver bush lupine
			deerweed
			sticky monkey flower
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 <sup>2</sup>
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline surveys indicate that non-native weeds were present in lands adjacent to HA-39/40. Therefore, no more than 5% non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 1



**Table 8-100. Success Criteria and Acceptable Limits for Restoration of HA 39/40**

		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Baseline data indicated no HMP shrubs. Therefore, no HMP shrubs need to be present at this restoration site.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Sand gilia percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Seaside bird's beak percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes: <sup>1</sup> Objectives presented in HRP (Shaw, 2009b)			
<sup>2</sup> Each habitat zone (P1-P4) will be evaluated separately based on its unique plant palette			
<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals but seed bank will have been replaced during the early successional stages.			

**8.15.1 Restoration Activities**

Burleson performed passive restoration at HA 39/40 Plot 1 twice in 2012 and once in 2013. The total amount of seed broadcast on the site was 16.75 lb compared to the 11.42 lb prescribed in the SSRP. Table 8-101 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

Burleson performed passive restoration for the HMP annual species Monterey spineflower, sand gilia, and seaside bird's beak. Two plots of Monterey spineflower, five plots of sand gilia, and one plot of seaside bird's beak were chosen in the HA based on suitable habitat for the HMP annuals and adjacent extant populations.

**Table 8-101.** Summary of Passive Restoration Activities at Plot 1 from 2012-2016 for HA 39/40

Species	Pounds of Seed Broadcast				Total by Species
	SSRP Target	2012 (Jan)	2012 (Dec)	2013 (Oct)	
ACMI	0.34	0.17	0.17	0.00	0.34
BAPI	0.05	0.00	0.02	0.00	0.02
CHPUP <sup>1</sup>	0.04	0.07	0.04	0.00	0.11
CORIL <sup>1</sup>	0.04	0.00	0.00	0.00	0.00
CRCA	0.34	0.17	0.17	0.00	0.34
DIAU	0.03	0.10	0.10	0.00	0.20
ELGL	3.06	3.00	3.00	0.00	6.00
ESCA	0.34	0.00	0.057	0.00	0.057
GITEA <sup>1</sup>	0.04	0.00	0.00	0.017	0.017
HOCU	0.68	0.34	0.34	0.00	0.68
HORD	3.06	3.00	3.00	0.00	6.00
JUPA	0.34	0.17	0.17	0.00	0.34
LUAL	0.34	0.29	0.29	0.00	0.58
LUAR	0.34	0.17	0.17	0.00	0.34
LUNA	0.34	0.00	0.34	0.00	0.34
SOVE	0.34	0.17	0.17	0.00	0.34
STCE	0.68	0.00	0.00	0.00	0.00
STPU	0.68	0.34	0.34	0.00	0.68
TRWI	0.34	0.00	0.34	0.00	0.34
<b>TOTAL</b>	<b>11.42</b>	<b>7.99</b>	<b>8.72</b>	<b>0.017</b>	<b>16.71</b>

<sup>1</sup>HMP species

Burleson performed passive restoration at HA 39/40 Plot 2 twice in 2012, once for each seeding season. The total amount of seed broadcast on the site was 0.98 lb compared to the 1.28 lb prescribed in the SSRP. Table 8-102 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

**Table 8-102.** Summary of Passive Restoration Activities at Plot 2 from 2012-2016 for HA 39/40

Species	Pounds of Seed Broadcast			
	SSRP Target	2012 (Jan)	2012 (Dec)	Total by Species
ACMI	0.04	0.02	0.02	0.04
ARDO	0.04	0.02	0.02	0.04
<i>Carex</i> sp.	0.04	0.00	0.00	0.00
CRCA	0.04	0.02	0.02	0.04
DISP	0.04	0.00	0.00	0.00
ELGL	0.36	0.00	0.36	0.36
ESCA	0.04	0.00	0.04	0.04
HORD	0.36	0.04	0.04	0.08
JUPA	0.04	0.02	0.02	0.04
LUAL	0.04	0.09	0.09	0.18
LUAR	0.04	0.02	0.02	0.04
LUNA	0.04	0.00	0.04	0.04
SOVE	0.04	0.02	0.02	0.04
STCE	0.08	0.00	0.00	0.00
TRWI	0.04	0.00	0.04	0.04
<b>TOTAL</b>	<b>1.28</b>	<b>0.25</b>	<b>0.73</b>	<b>0.98</b>

Burleson performed passive restoration at HA 39/40 Plot 3 twice in 2012, once for each seeding season. The total amount of seed broadcast on the site is 3.44 lb compared to the 4.76 lb prescribed in the SSRP. Table 8-103 summarizes the amount of seed applied by year and species, in comparison to the SSRP target.

**Table 8-103.** Summary of Passive Restoration Activities at Plot 3 from 2012-2016 for HA 39/40

Species	Pounds of Seed Broadcast			
	SSRP Target	2012 (Jan)	2012 (Dec)	Total by Species
ARDO	0.17	0.085	0.085	0.17
<i>Carex</i> sp.	0.17	0.00	0.00	0.00
CRCA	0.17	0.09	0.09	0.18
DISP	0.17	0.00	0.00	0.00
ELGL	1.53	0.00	1.50	1.50
HORD	1.53	0.36	0.36	0.72
JUPA	0.17	0.09	0.09	0.18
LUNA	0.17	0.00	0.17	0.17
SOVE	0.17	0.09	0.09	0.18
STPU	0.34	0.17	0.17	0.34
TRWI	0.17	0.00	0.00	0.00
<b>TOTAL</b>	<b>4.76</b>	<b>0.89</b>	<b>2.56</b>	<b>3.44</b>

Burleson performed passive restoration at HA 39/40 Plot 4 twice in 2012, once for each seeding season, and once in 2013. The total amount of seed broadcast on the site was 70.50 lbs compared to the 59.81 lbs prescribed in the SSRP. Table 8-104 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species sand gilia, seaside bird's beak and Monterey spineflower.

**Table 8-104.** Summary of Passive Restoration Activities at Plot 4 from 2012-2016 for HA 39/40

Species	Pounds of Seed Broadcast				
	SSRP Target	2012 (Jan)	2012 (Dec)	2013 (Oct)	Total by Species
ACGL	3.82	1.90	0.81	0.00	2.71
ACMI	1.91	0.95	0.95	0.00	1.90
BAPI	0.29	0.00	0.15	0.00	0.15
CHPUP <sup>1</sup>	0.04	0.07	0.04	0.00	0.11
CORIL <sup>1</sup>	0.04	0.04	0.04	0.00	0.08
DIAU	0.19	0.60	0.09	0.00	0.69
ELGL	17.19	0.00	17.22	0.00	17.22
ESCA	1.91	0.00	0.45	0.00	0.45
GITEA <sup>1</sup>	0.04	0.00	0.020	0.004	0.024
HOCU	3.82	1.90	1.90	0.00	3.80
HORD	17.19	17.22	17.22	0.00	34.44
LUAL	1.91	0.52	1.01	0.00	1.53
LUAR	1.91	0.95	0.95	0.00	1.90
LUNA	1.91	0.00	1.90	0.00	1.90
STCE	3.82	0.00	0.00	0.00	0.00
STPU	3.82	1.7	1.9	0.00	3.60
<b>TOTAL</b>	<b>59.81</b>	<b>25.85</b>	<b>44.56</b>	<b>0.00</b>	<b>70.50</b>

<sup>1</sup>HMP species

Burleson completed active restoration only in Plot 4 of HA 39/40 in 2012 and 2013. The total number of plants installed at HA 39/40 was 2,818 compared to 1,950 prescribed in the SSRP. Table 8-105 summarizes active restoration plantings.

**Table 8-105.** Summary of Active Restoration Activities at Plot 4 from 2012-2016 for HA 39/40

Species	Number of Individual Plants			
	SSRP Target	2012 (Jan)	2013 (Feb)	Total by Species
ACGL	150	150	-	150
ACMI	380	200	-	200
BAPI	75	75	-	75
<i>Carex</i> sp.	NA	-	623	623
DIAU	75	75	-	75
DISP	NA	-	240	240
ELGL	300	300	-	300
ESCA	250	-	260	260
HOCU	150	150	-	150
LUAL	75	-	75	75
LUAR	75	75	-	75
LUNA	150	-	150	150
STCE	250	285	-	285
STPU	200	160	-	160
<b>TOTAL</b>	<b>1,950</b>	<b>1,470</b>	<b>1,348</b>	<b>2,818</b>

### 8.15.2 Monitoring Results

#### 8.15.2.1 HMP Annual Density

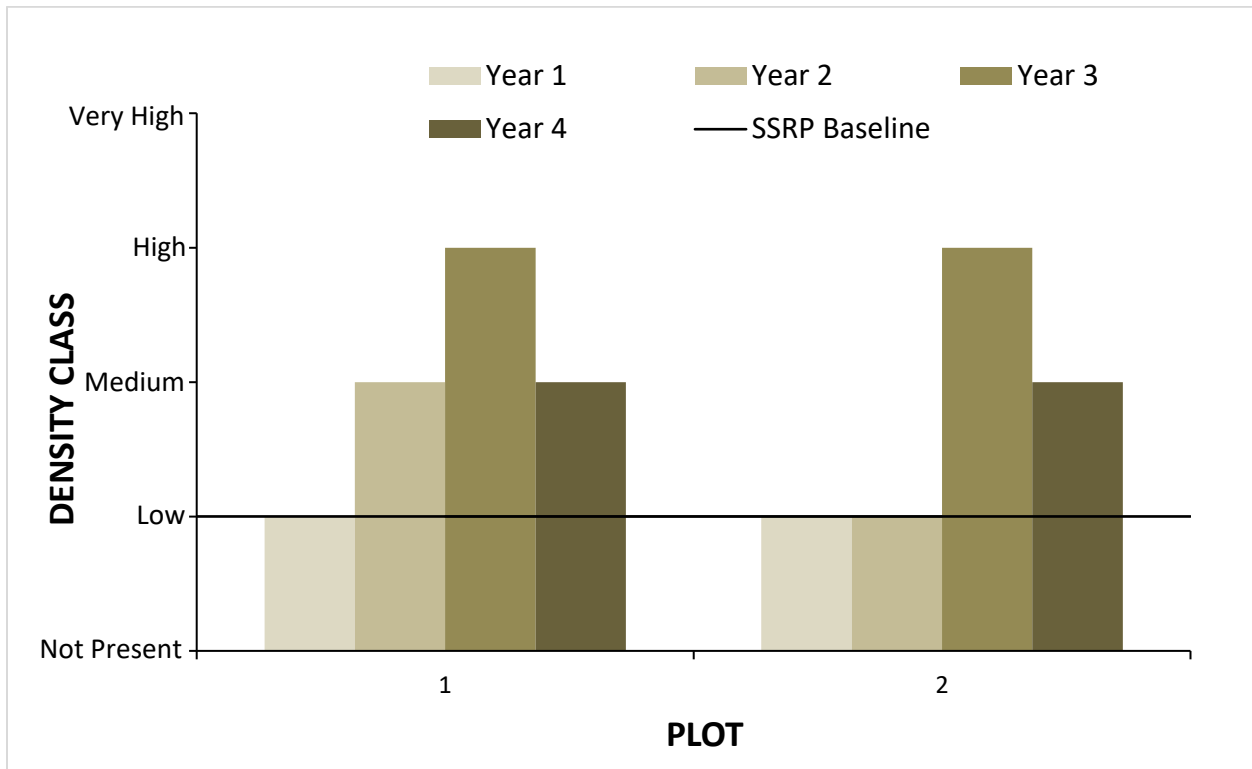
Monterey spineflower, sand gilia, and seaside bird's beak restoration plots were monitored for density. Burleson completed year 4 monitoring at HA 39/40 for Monterey spineflower, years 3 and 4 for sand gilia, and year 4 for seaside bird's beak.

Two Monterey spineflower plots were surveyed for year 4 density at HA 39/40 in 2016. The plots are numbered 1 and 2 on Figure 8-45 and are primarily located on the southwestern part of the site. Monterey spineflower densities at both plots were medium. Figure 8-46 summarizes the Monterey spineflower restoration plot densities.





**Figure 8-45.** HA 39/40 Year 4 Monterey Spineflower Plot Density Map



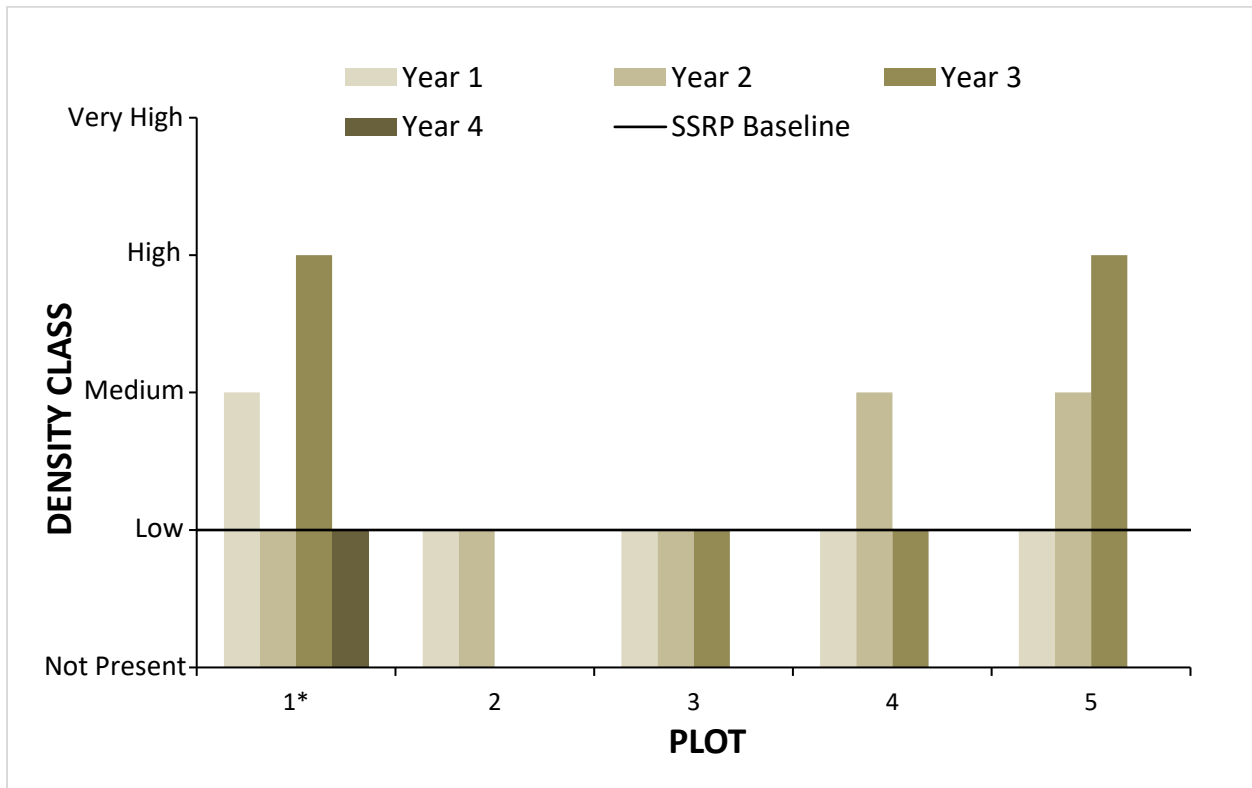
**Figure 8-46.** HA 39/40 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plots 1 and 2

Five sand gilia plots were surveyed at HA 39/40 in 2016. Plot 1 was surveyed for year 4 and plots 2-5 were surveyed for year 3. The plots are numbered 1-5 on Figure 8-47 and are located throughout the site. Sand gilia density was low for plots 1, 3, and 4, absent from plot 2, and high for plot 5. Figure 8-48 summarizes all the Monterey spineflower restoration plot densities for HA 39/40.





**Figure 8-47. HA 39/40 P2-5 Year 3 and P1 Year 4 Sand Gilia Plot Density Map**



\*Plot 1 established one year prior to Plots 2-5

**Figure 8-48.** HA 39/40 Comparison of Sand Gilia Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plot 1, and Years 1-3 at Restoration Plots 2-5

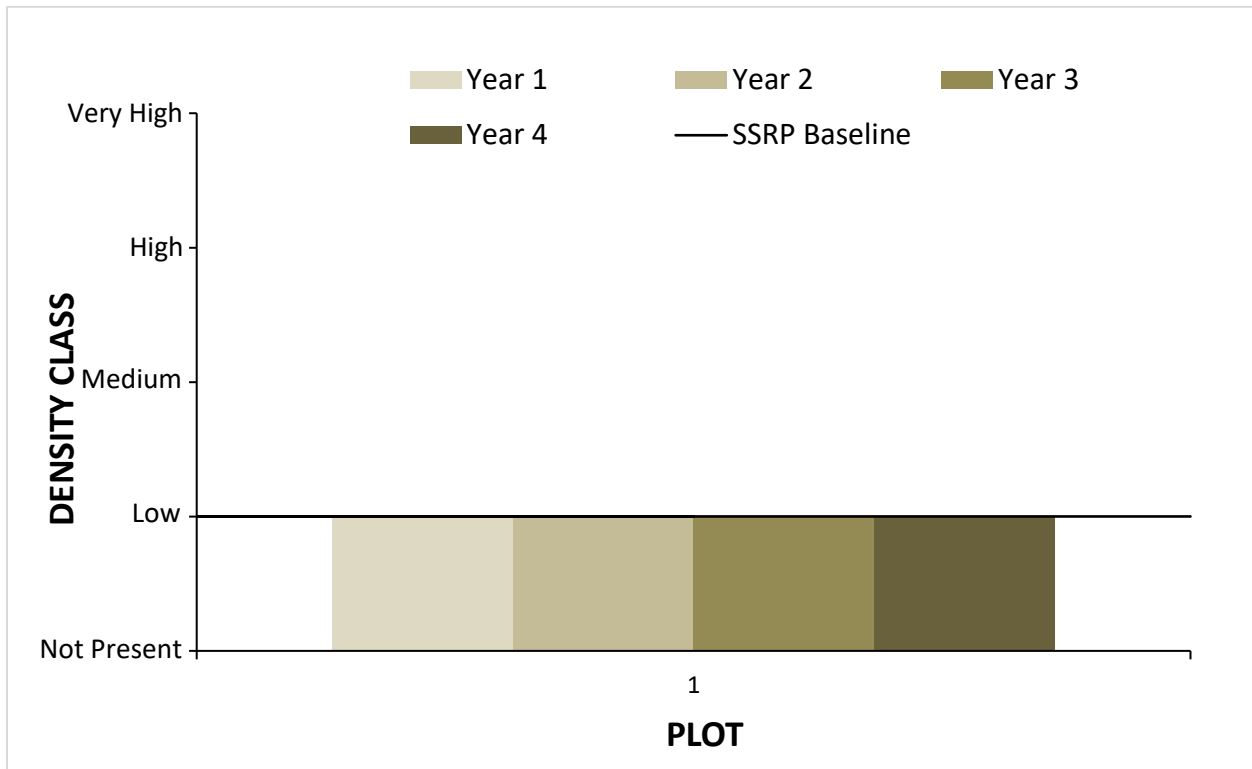
One seaside bird’s beak plot was surveyed for year 4 density at HA 39/40. The plot is numbered 1 on Figure 8-49 and is located on the southeastern part of the site. Seaside bird’s beak density was low at plot 1. Figure 8-50 represents all the seaside bird’s beak restoration plot densities for HA 39/40.





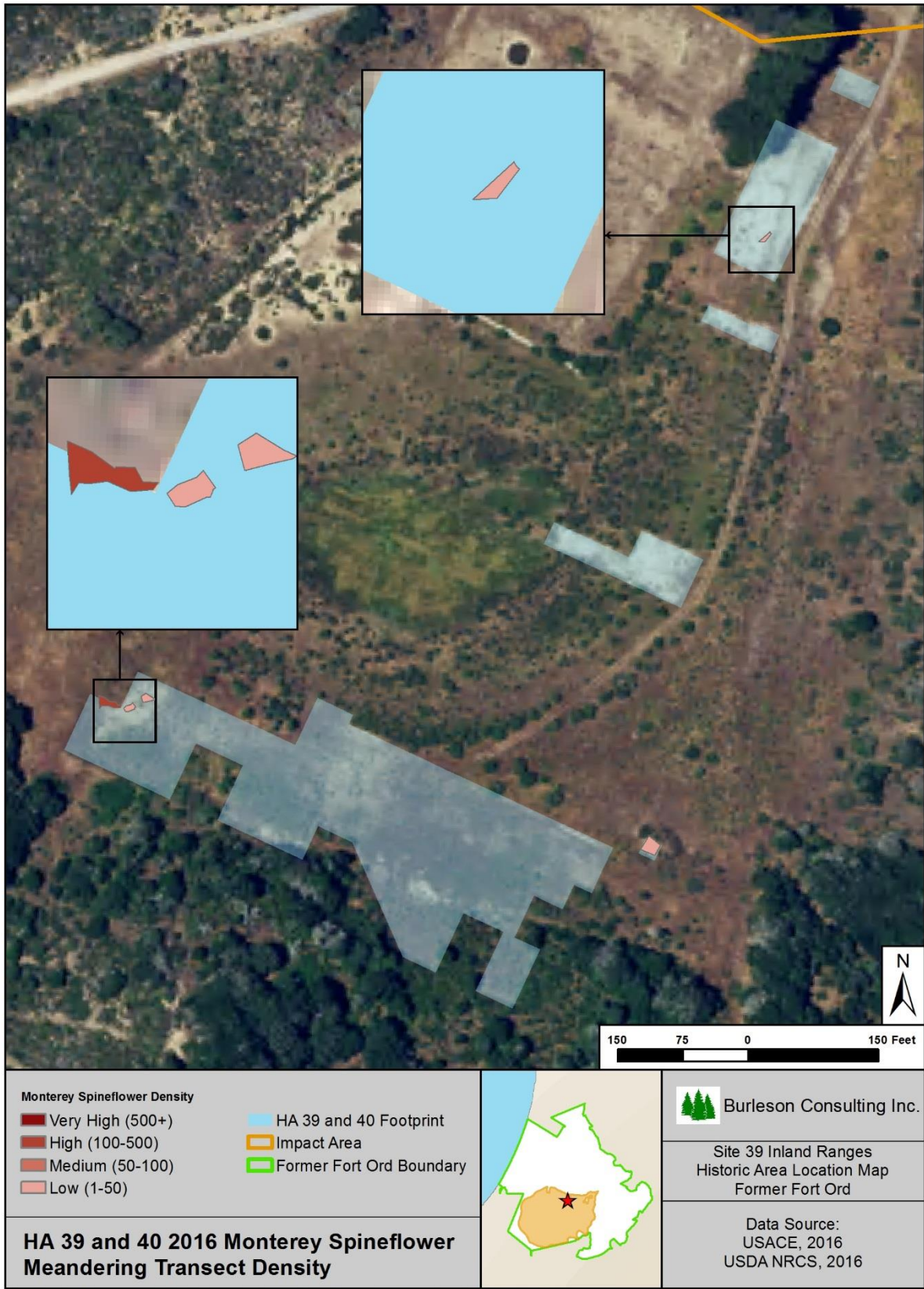
Figure 8-49. HA 39/40 Year 4 Seaside Bird's Beak Plot Density Map





**Figure 8-50.** HA 39/40 Comparison of Seaside Bird’s Beak Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plots 1

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. Five discrete patches of Monterey spineflower were mapped and individuals counted within each patch. The densities ranged from low to high. The total acreage of Monterey spineflower patches with a density above the SSRP baseline was 0.02 acre. One discrete patch of sand gilia was mapped and individuals counted within the patch. The density was low. The total acreage of sand gilia patches with a density above the SSRP baseline was 0.001 acre. Seaside bird’s beak was not observed outside of the restoration plots. Figures 8-51 and 8-52 show the meandering transect discrete patches for Monterey spineflower and sand gilia, respectively.



**Figure 8-51. HA 39/40 Year 4 Monterey Spineflower Meandering Transect Density Map**



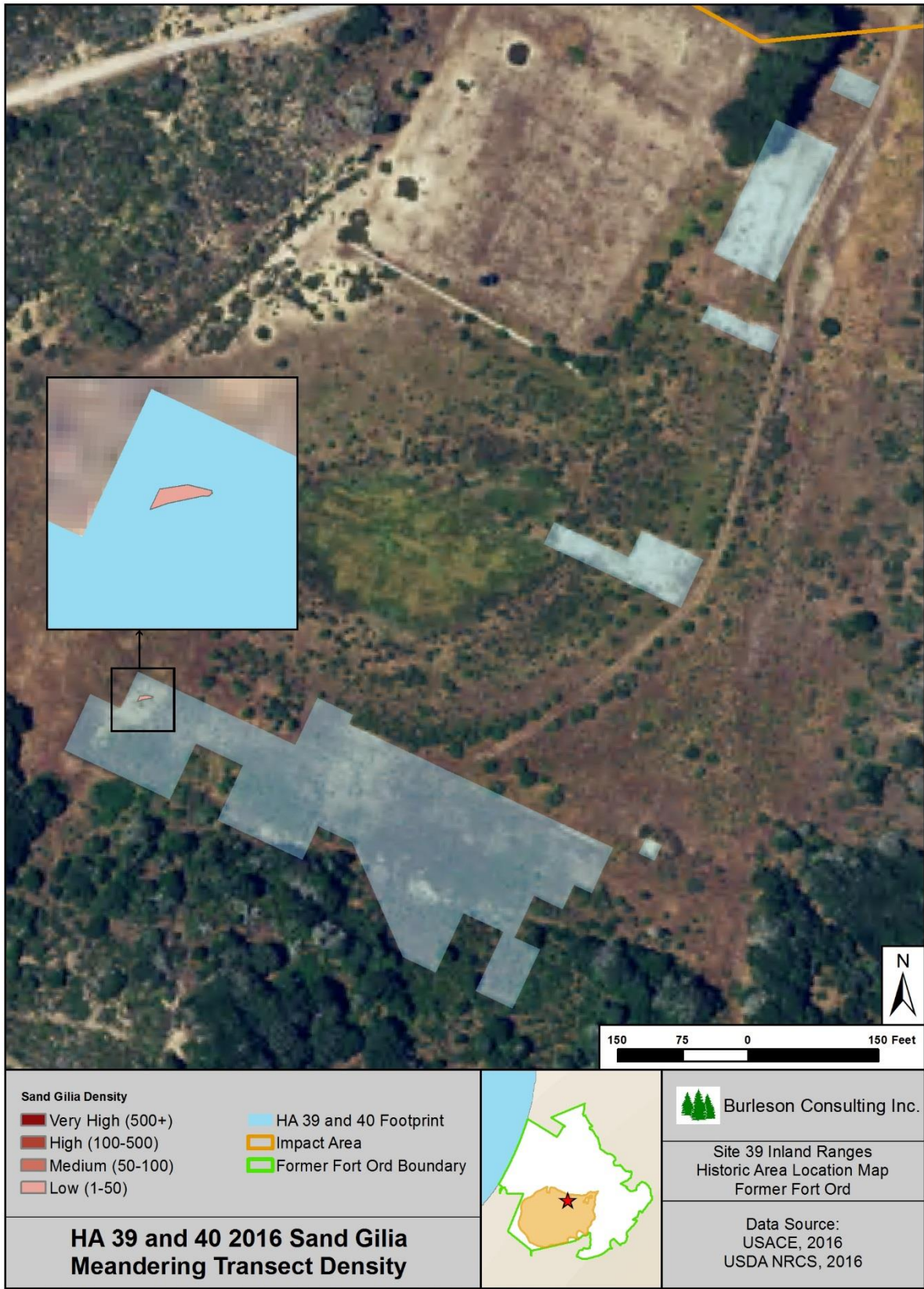


Figure 8-52. HA 39/40 Year 4 Sand Gilia Meandering Transect Density Map

## 8.15.2.2 Plant Survivorship

No survivorship data were collected due to the fact that the planting palette did not include any HMP shrubs.

## 8.15.2.3 Species Richness

A total of 86 species were observed at HA 39/40. Of those, 32 were native shrubs or perennials, 29 were native annual herbaceous species, and 25 were non-native species (see Table 8-106).

**Table 8-106.** Species observed on HA 39/40, 2016

Scientific Name	Common Name	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon parviflorus</i>	hill lotus	ACPA
<i>Agoseris grandiflora</i>	large-flowered agoseris	AGGR
<i>Agoseris heterophylla</i>	coast dandelion	AGHE
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Anaphalis margaritacea</i>	pearly everlasting	ANMA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Artemisia douglasiana</i>	mugwort	ARDO
<i>Asteracea</i> sp.	daisy species	AS
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Brodiaea terrestris</i>	dwarf brodiaea	BRTE
<i>Bromus carinatus</i>	California brome	BRCA
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus hordeaceus</i>	softchess	BRHO
<i>Bromus madritensis</i>	foxtail brome	BRMA
<i>Camissonia contorta</i>	contorted primrose	CACO
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Carex brevicaulis</i>	short stem sedge	CABR
<i>Castilleja affinis</i>	coast paint-brush	CAAF
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Cirsium occidental</i>	cobweb thistle	CIOC
<i>Clarkia lewisii</i>	Lewis' clarkia	CLLE
<i>Claytonia perfoliata</i>	miner's lettuce	CLPE
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>	seaside bird's beak	CORIL
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI
<i>Cortaderia jubata</i>	pampas grass	COJU
<i>Croton californica</i>	croton	CRCA
<i>Crocانthemum scoparium</i>	peak rush-rose	CRSC
<i>Cyperus eragrostis</i>	cyperus eragrostis	CYER
<i>Diplacus aurantiacus</i>	sticky monkey flower	DIAU
<i>Dichelostemma capitatum</i>	blue dicks	DICA
<i>Distichlis spicata</i>	salt grass	DISP
<i>Drymocallis glandulosa</i>	sticky cinquefoil	DRGL
<i>Elymus glaucus</i>	blue wildrye	ELGL
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Erodium botrys</i>	long-beaked filaree	ERBO

**Table 8-106.** Species observed on HA 39/40, 2016

Scientific Name	Common Name	Code
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Eschscholzia californica</i>	California poppy	ESCA
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Festuca octoflora</i>	sixweeks grass	FEOC
<i>Festuca perennis</i>	italian rye grass	FEPE
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> <sup>1</sup>	sand gilia	GITEA
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Logfia gallica</i>	narrow-leaved filago	LOGA
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR
<i>Lupinus bicolor</i>	annual lupine	LUBI
<i>Lupinus concinnus</i>	bajada lupine	LUCO
<i>Lupinus nanus</i>	sky lupine	LUNA
<i>Madia</i> sp.		
<i>Marah fabacea</i>	wild cucumber	MAFA
<i>Melica imperfecta</i>	California melica	MEIM
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Petrorhagia dubia</i>	hairy pink	PEDU
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Plantago major</i>	common plantain	PLMA
<i>Platystemon californicus</i>	cream cups	PLCA
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU
<i>Quercus agrifolia</i>	coast live oak	QUAG
<i>Ribes speciosum</i>	fuchsia flowered gooseberry	RISP
<i>Rubus ursinus</i>	California blackberry	RUUR
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salix</i> sp.	willow	SA
<i>Senecio glomeratus</i>	cutleaf fireweed	SEGL
<i>Silene gallica</i>	common fly catch	SIGA
<i>Sisyrinchium bellum</i>	blue-eyed grass	SIBE
<i>Sonchus asper</i>	prickly sow thistle	SOAS
<i>Stachys bullata</i>	wood mint	STBU
<i>Stipa cernua</i>	nodding needle grass	STCE
<i>Stipa pulchra</i>	purple needle grass	STPU
<i>Toxicodendron diversilobum</i>	poison oak	TODI
<i>Trifolium campestre</i>	hop clover	TRCA
<i>Trifolium dubium</i>	shamrock little hop clover	TRDU
<i>Trifolium gracilentum</i>	pinpoint clover	TRGR
<i>Trifolium hirtum</i>	rose clover	TRHI
<i>Trifolium microcephalum</i>	maiden clover	TIMI
<i>Trifolium willdenovii</i>	tomcat clover	TRWI
<i>Vicia benghalensis</i>	purple vetch	VIBE

<sup>1</sup>HMP species



#### 8.15.2.4 Vegetative Cover Transects and Quadrats

Three line-intercept transects and six quadrats were conducted at HA 39/40. These surveys indicate that the mean vegetative cover by native shrubs and perennials was 4.44% and native herbaceous cover was 5.37%. Quadrats were completed along the transect line when 10% or more of the transect line was herbaceous cover in accordance to the Protocol for Conducting Vegetation Monitoring (Burleson, 2009). Table 8-107 summarizes the vegetation cover, Table 8-108 presents the vegetation cover by species, and Table 8-109 presents quadrat results.

**Table 8-107.** Line-intercept Transect Survey Summary for HA 39/40

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA39/40T01	14.18	4.08	10.10	0.00	72.78	25.64
HA39/40T02	12.64	9.24	3.40	0.00	67.74	27.76
HA39/40T03	4.18	0.00	2.60	1.58	33.98	62.08
<b>AVERAGE</b>	<b>10.33</b>	<b>4.44</b>	<b>5.37</b>	<b>0.53</b>	<b>58.17</b>	<b>38.49</b>

**Table 8-108.** Line-intercept Transect Survey Results for HA 39/40 by Species

Transect	ACMI (%)	ACGL (%)	ANMA (%)	BAPI (%)	CARA (%)	ELGL (%)	ESCA (%)	FEPE (%)	HOCU (%)	LUAL (%)	LUAR (%)	LUNA (%)	PLCO (%)	SIBE (%)	STPU (%)	TODI (%)	TH (%)	BG (%)
HA39/40T01	1.80	1.72	0.00	1.46	0.00	0.94	0.00	0.90	0.30	0.60	0.00	8.60	0.00	0.48	1.98	0.30	72.78	25.64
HA39/40T02	0.00	0.00	0.54	6.66	0.00	1.38	1.14	0.00	0.00	0.00	0.30	0.34	0.00	0.00	0.00	2.28	67.74	27.76
HA39/40T03	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	2.28	0.00	0.00	0.00	1.58	0.00	0.00	0.00	33.98	62.08
<b>AVERAGE</b>	<b>0.60</b>	<b>0.57</b>	<b>0.18</b>	<b>2.71</b>	<b>0.11</b>	<b>0.77</b>	<b>0.38</b>	<b>0.30</b>	<b>0.86</b>	<b>0.20</b>	<b>0.10</b>	<b>2.98</b>	<b>0.53</b>	<b>0.16</b>	<b>0.66</b>	<b>0.86</b>	<b>58.17</b>	<b>38.49</b>

**Table 8-109.** Quadrats Along the Transect Line (T01) Summary for HA39/40

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA39/40T01Q01	16.0	11.0	3.0	2.0	65.0	20.0
HA39/40T01Q02	27.0	2.0	20.0	5.0	65.0	5.0
HA39/40T01Q03	19.0	14.0	2.0	3.0	60.0	20.0
HA39/40T01Q04	17.0	8.0	9.0	0.0	70.0	10.0
HA39/40T01Q05	7.0	3.0	2.0	2.0	60.0	33.0
HA39/40T01Q06	12.0	3.0	5.0	4.0	68.0	25.0
<b>AVERAGE</b>	<b>16.3</b>	<b>6.8</b>	<b>6.0</b>	<b>2.0</b>	<b>64.7</b>	<b>18.8</b>

### 8.15.3 Discussion

#### 8.15.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limits for HMP annual density at HA 39/40. The SSRP baseline density class for Monterey spineflower was low and both Monterey spineflower restoration plots have exceeded the success criterion. In addition, Monterey spineflower was present outside of the restoration plots with densities that met or exceeded the success criteria at 0.02 acre of HA 39/40.

Sand gilia density was within the acceptable limits for HMP annual density at HA 39/40. The SSRP baseline density class for sand gilia was low and the restoration plot achieved this density for all but plot 2 by Year 3. In addition, sand gilia was present outside of the restoration plots. Discrete patches, with density that either met or exceeded the success criteria, covered 0.02 acre.

Seaside bird's beak density was within the acceptable limits for HMP annual density at HA 39/40. The SSRP baseline density class for sand gilia was low and results showed that plots met this criterion for all four years of monitoring. Seaside bird's beak was not observed outside of the restoration plot.

Monterey spineflower, sand gilia, and seaside bird's beak restoration plot results indicate that all of the HMP species have met the success criterion.

#### 8.15.3.2 Plant Survivorship

No survivorship data were collected due to the fact that the planting palette did not include any HMP shrubs.

#### 8.15.3.3 Species Richness

Common yarrow, coyote brush, sedge, saltgrass, blue wild-rye, California poppy, rush, wedge leaved horkelia, yellow bush lupine, silver bush lupine, deerweed, and sticky monkey flower were all present. Rush (*Juncus* sp.) was not present. HA 39/40 included 32 native shrubs and perennials as well as 29 native annual herbaceous species; however, it did not meet the success criterion for objective 1 because rush was not present.

#### 8.15.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 20 shrub and perennial species presented in Table 2 of the HA 39/40 SSRP (Burlison, 2013). Currently the HA includes 9.83% native vegetative cover of Table 2 species using transect data, and 9.33% using quadrat data. This success criterion is not met.

Objective 2 considers the percent cover of non-native target weeds. Target weeds were not observed during the transect surveys. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 1. Cover class 1 is from 0% of absolute cover. The HMP shrub species at HA 39/40 are providing an absolute cover of 0.00%, the HA has met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 39/40, baseline data indicated no HMP shrubs. Therefore, no HMP shrubs need to be present at this restoration site and this success criterion is not applicable. In addition, HMP annuals were evaluated for vegetative cover. Monterey spineflower, sand gilia, and seaside bird's beak are all required to provide at least 1% cover from the transect surveys. None of these three species were present in the transect data. The HMP annual vegetative cover success criterion was not met.

#### 8.15.3.5 Recommendations

HA 39/40 is responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth and improvement of the HA. HA 39/40 has not received the full SSRP target prescription for passive restoration. Overall, HA 39/40 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional effort. In addition to time, it is recommended that rush seed be broadcast to help meet the species richness success criterion.

The SSRP success criteria specify that each habitat zone (P1-P4) will be evaluated separately based on its unique plant pallet. We recommend that line-intercept transects become established in each zone to evaluate individually.

Additionally, we recommend that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower, sand gilia and seaside bird's beak. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy, this is already captured in objective 3 success criteria number 3.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-110 summarizes the current status of HA 39/40 including which success criteria have been met as well as our recommendations.

**Table 8-110.** Status and Recommendations for Achieving the Success Criteria at HA 39/40

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Broadcast or planted rush
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	NA	NA
Objective 3 – No. 4	HMP shrub cover by species	NA	NA
Objective 3 – No. 4	HMP annual density	Yes	None
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

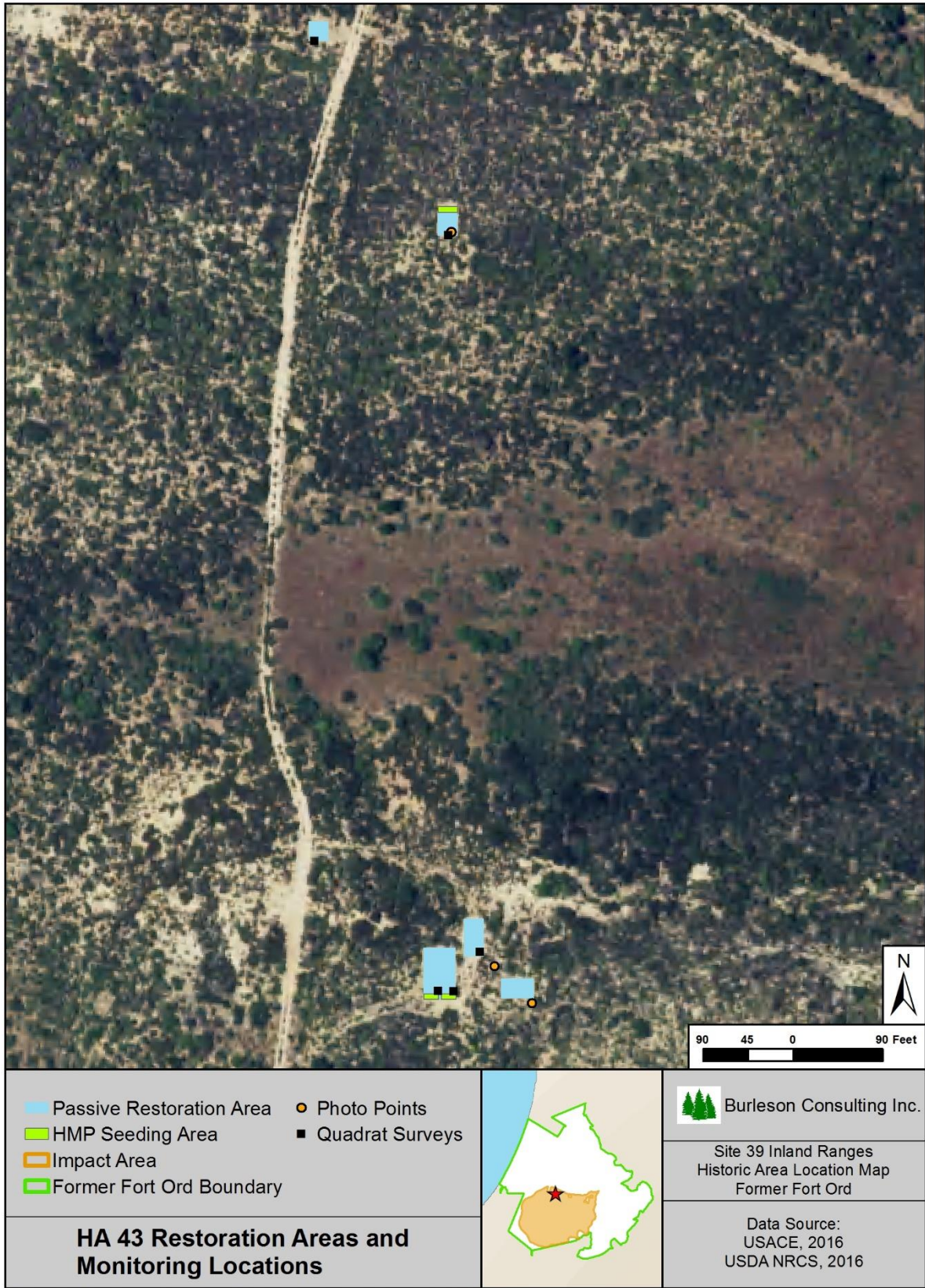
### 8.16 HA 43

HA 43 was used by the Army as a long-distance small-arms firing range. Munitions removal and soil remediation was completed in 2010 and resulted in 150 cubic yards of lead-contaminated soil being excavated from 0.09 acre. HA 43 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 43 is relatively flat with surface water runoff draining to the west. The adjacent lands are high quality habitat areas which contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

HA 43 is located on the north central portion of Site 39, occurring within the sand hill formation maritime chaparral containing the Baywood soils series based on previous reference data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 43 consisted of hand broadcasting non-irrigated seed and annual weed management activities. HA 43 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March. Restoration at HA 43 began in 2011 and was completed in 2012 and monitoring began in 2013. HA 43 has been monitored for five years by photo documentation, four years for HMP annual density in plots, one year for HMP annual density across the HA, one year for species richness, and one year for vegetative cover. Figure 8-53 shows the HA footprint, passive restoration area, and quadrat monitoring locations. Success criteria for HA 43 are summarized in Table 8-111.





**Figure 8-53.** HA 43 Restoration Areas and Monitoring Locations Map

**Table 8-111.** Success Criteria and Acceptable Limits for Restoration of HA 43

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			sandmat manzanita <sup>2</sup>
			shaggy-bark manzanita
			coyote brush
			Monterey ceanothus <sup>2</sup>
			dwarf ceanothus
			mock heather
			golden yarrow
			peak rush rose
			wedge-leaved horkelia
			deerweed
			sticky monkey flower
			coffeeberry
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3

**Table 8-111.** Success Criteria and Acceptable Limits for Restoration of HA 43

		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 6
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 15
			Eastwood's golden fleece percent cover, as an average of transect data, must be equal or greater than 1
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Medium
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP	Sand gilia percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Seaside bird's beak percent cover, as an average of transect data, must be equal or greater than 2 <sup>3</sup>
			Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals but seed bank will have been replaced during the early successional stages.		

**8.16.1 Restoration Activities**

Burleson performed passive restoration at HA 43 twice with seed broadcast in 2011 and 2012. The total amount of seed broadcast on the site was 2.55 lb compared to 1.94 lb prescribed in the SSRP. Table 8-112 summarizes the amount of seed applied by year and species, in comparison to the SSRP target. Burleson performed passive restoration for the HMP annual species sand gilia, seaside bird's beak, and Monterey spineflower. One plot for each species was chosen in the HA based on suitable habitat for the HMP annuals and adjacent extant populations. No active restoration activities were prescribed at HA 43.

**Table 8-112.** Summary of Passive Restoration Activities from 2011-2016 for HA 43

Species	Pounds of Seed Broadcast			
	SSRP Target	2011 (Dec)	2012 (Nov)	Total by Species
ACGL	0.180	0.091	0.099	0.190
ADFA	0.090	0.470	0.050	0.520
ARPU <sup>1</sup>	0.090	0.049	0.059	0.108
ARTO	0.180	0.092	0.102	0.194
BAPI	0.014	0.000	0.008	0.008
CERI <sup>1</sup>	0.090	0.052	0.055	0.107
CHPUP <sup>1</sup>	0.001	0.011	0.002	0.013
CORIL <sup>1</sup>	0.001	0.011	0.007	0.018
CRSC	0.090	0.049	0.069	0.118
ERCO	0.027	0.016	0.023	0.039
ERFA <sup>1</sup>	0.009	0.007	0.006	0.013
FRCA	0.090	0.046	0.046	0.092
GITEA <sup>1</sup>	0.001	0.000	0.002	0.002
HOCU	0.180	0.091	0.094	0.185
HORD	0.810	0.000	0.836	0.836
SAME	0.090	0.050	0.056	0.106
<b>TOTAL</b>	<b>1.940</b>	<b>1.040</b>	<b>1.510</b>	<b>2.550</b>

<sup>1</sup>HMP species

### 8.16.2 Monitoring Results

#### 8.16.2.1 HMP Annual Density

Monterey spineflower, sand gilia, and seaside bird's beak restoration plots were monitored for year 4 plant density.

One Monterey spineflower plot was surveyed for year 4 density, shown on Figure 8-54 located in the southern part of the site. Monterey spineflower density was medium. Figure 8-55 presents Monterey spineflower restoration plot densities for HA 43.



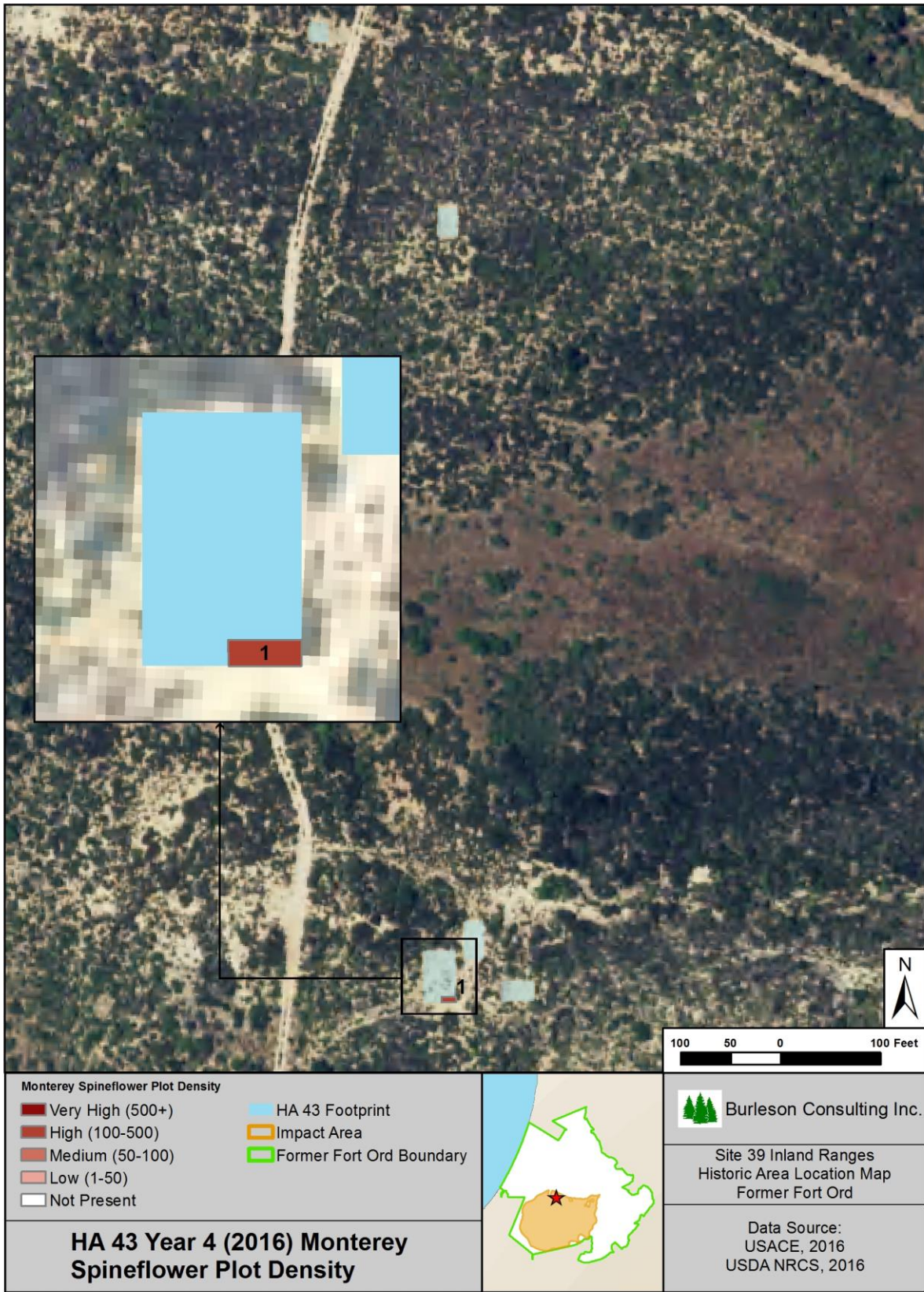
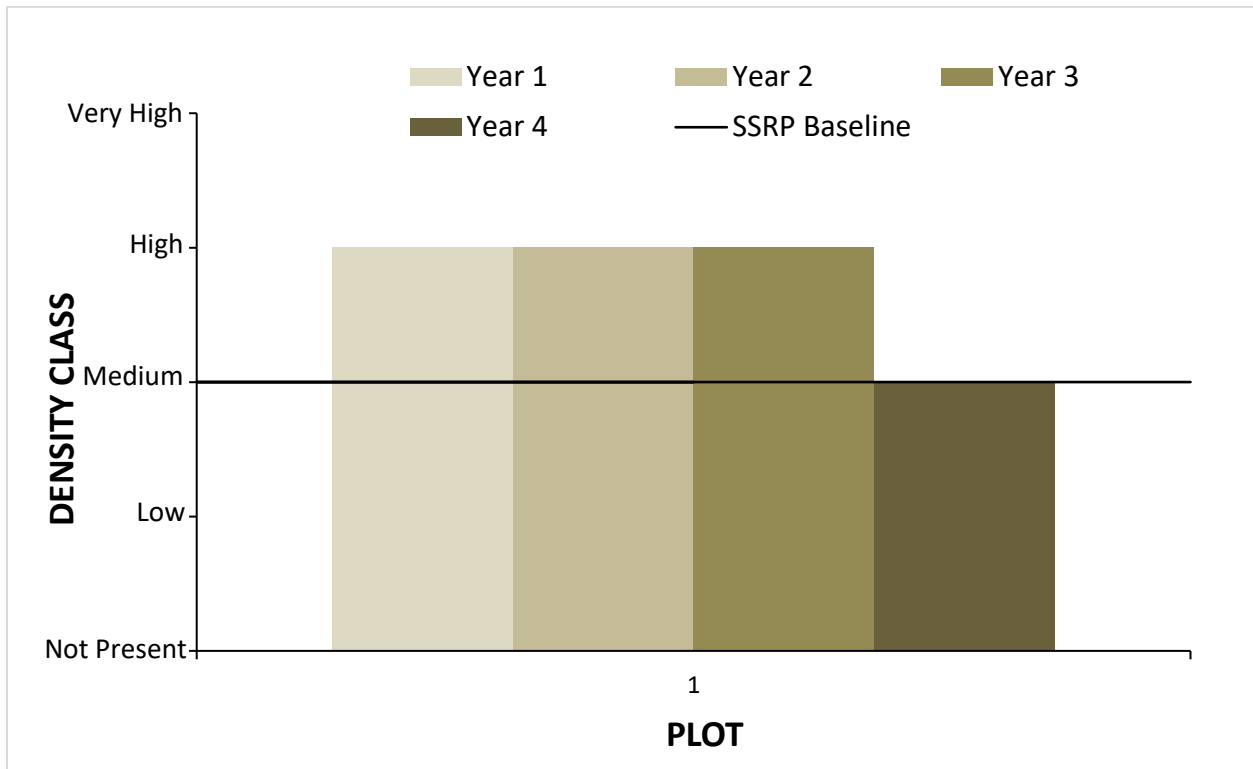


Figure 8-54. HA 43 Year 4 Monterey Spineflower Plot Density Map





**Figure 8-55.** HA 43 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plots 1

One sand gilia plot was surveyed for year 4 density, shown on Figure 8-56 located in the southern part of the site. Sand gilia density was low. Figure 8-57 below presents all the sand gilia restoration plot densities for HA 43.

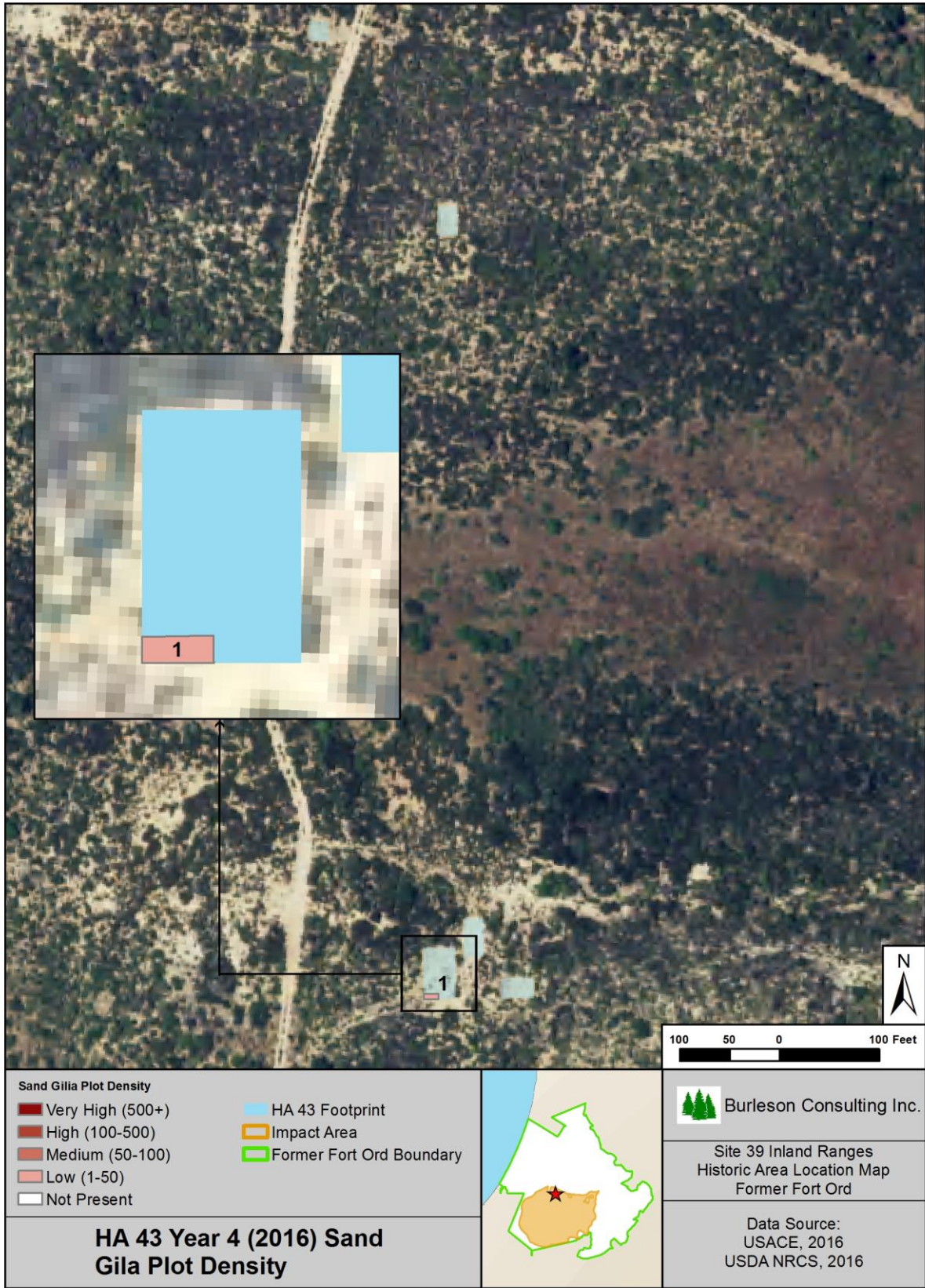
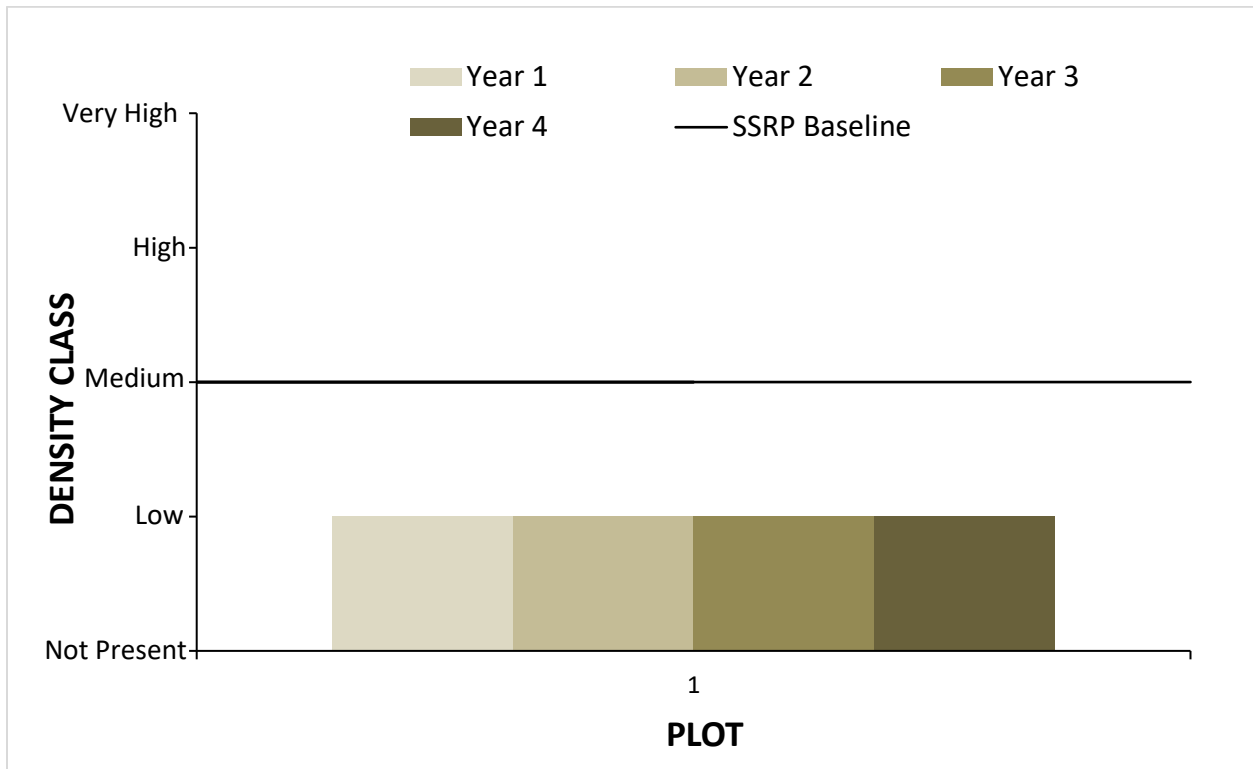


Figure 8-56. HA 43 Year 4 Sand Gilia Plot Density Map



**Figure 8-57.** HA 43 Comparison of Sand Gilia Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plot 1

One seaside bird’s beak plot was surveyed for year 4 density at HA 43 in 2016. The plot, on Figure 8-58, is located in the southern part of the site. Seaside bird’s beak density was medium. Figure 8-59 presents all the seaside bird’s beak restoration plot densities for HA 43.



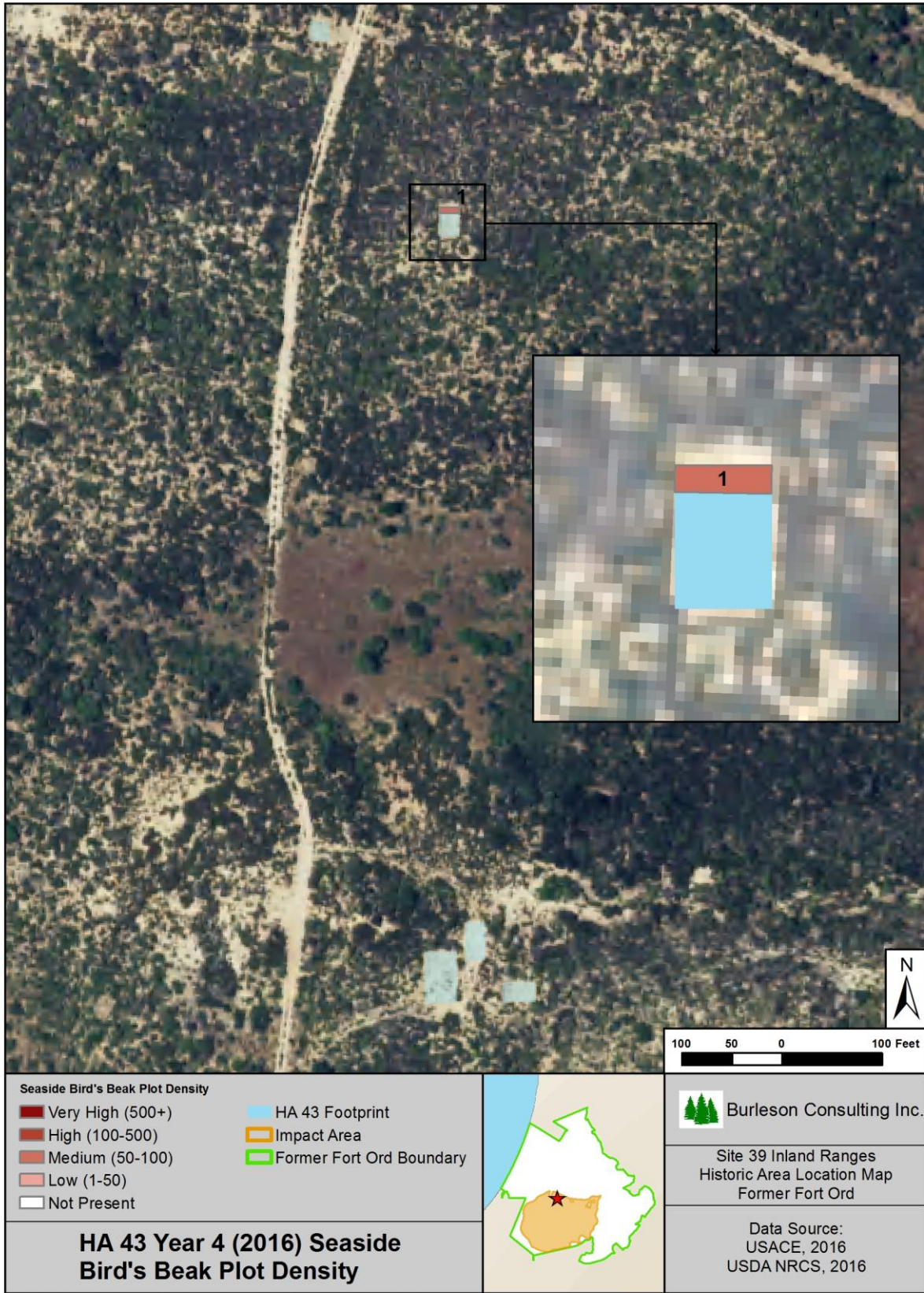
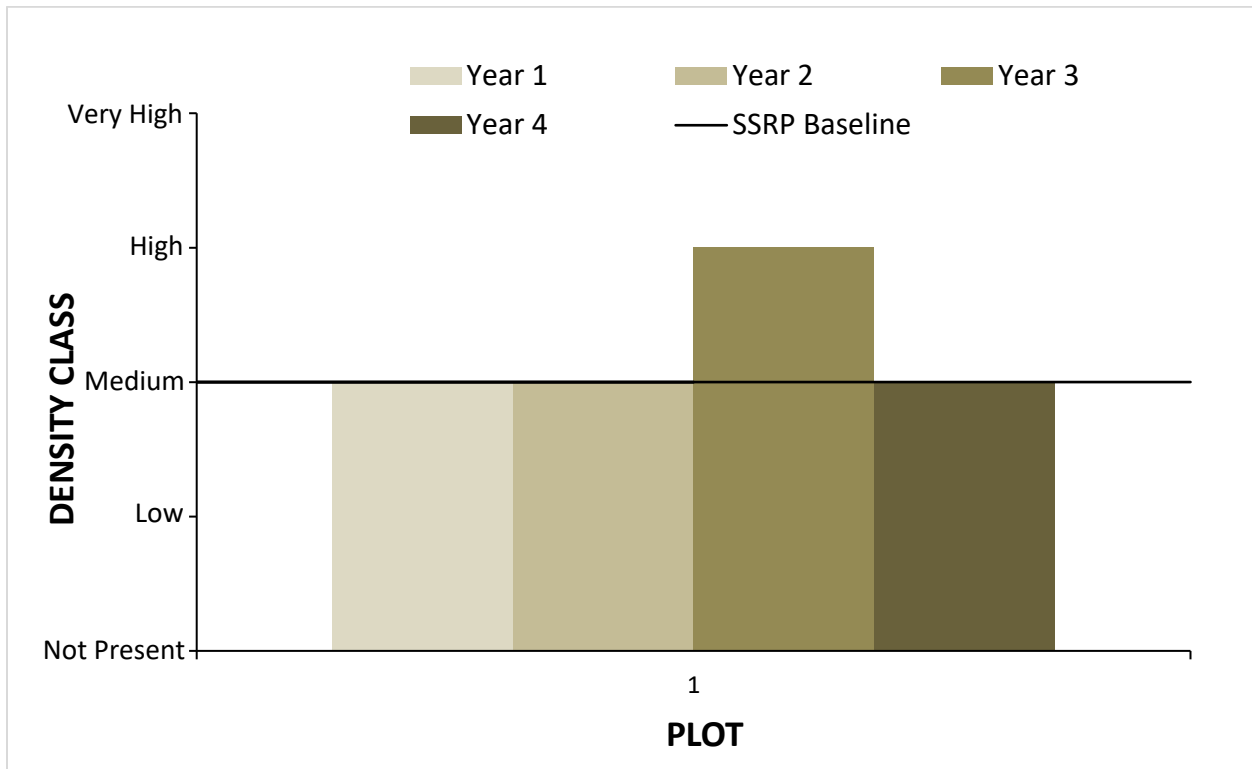


Figure 8-58. HA 43 Year 4 Seaside Bird's Beak Plot Density Map



**Figure 8-59.** HA 43 Comparison of Seaside Bird’s Beak Density Classes to the SSRP Baseline Density Class for Years 1-4 at Restoration Plots 1

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. Four discrete patches of Monterey spineflower were mapped and individuals counted within the patch. The densities were low, with no patches at or above the SSRP baseline of medium, and the total acreage of Monterey spineflower patches with low density was 0.09 acre. Figure 8-60 illustrates Monterey spineflower discrete patches. Four individual sand gilia plants were detected but not mapped as there were so few individuals. They were located adjacent to the restoration plot. Four discrete patches of seaside bird’s beak were mapped and individuals counted. The densities were low for all patches. None of these patches were at or above the SSRP baseline, and the total acreage of seaside bird’s beak patches with low density was 0.08 acre. Figure 8-61 illustrates seaside bird’s beak discrete patches.



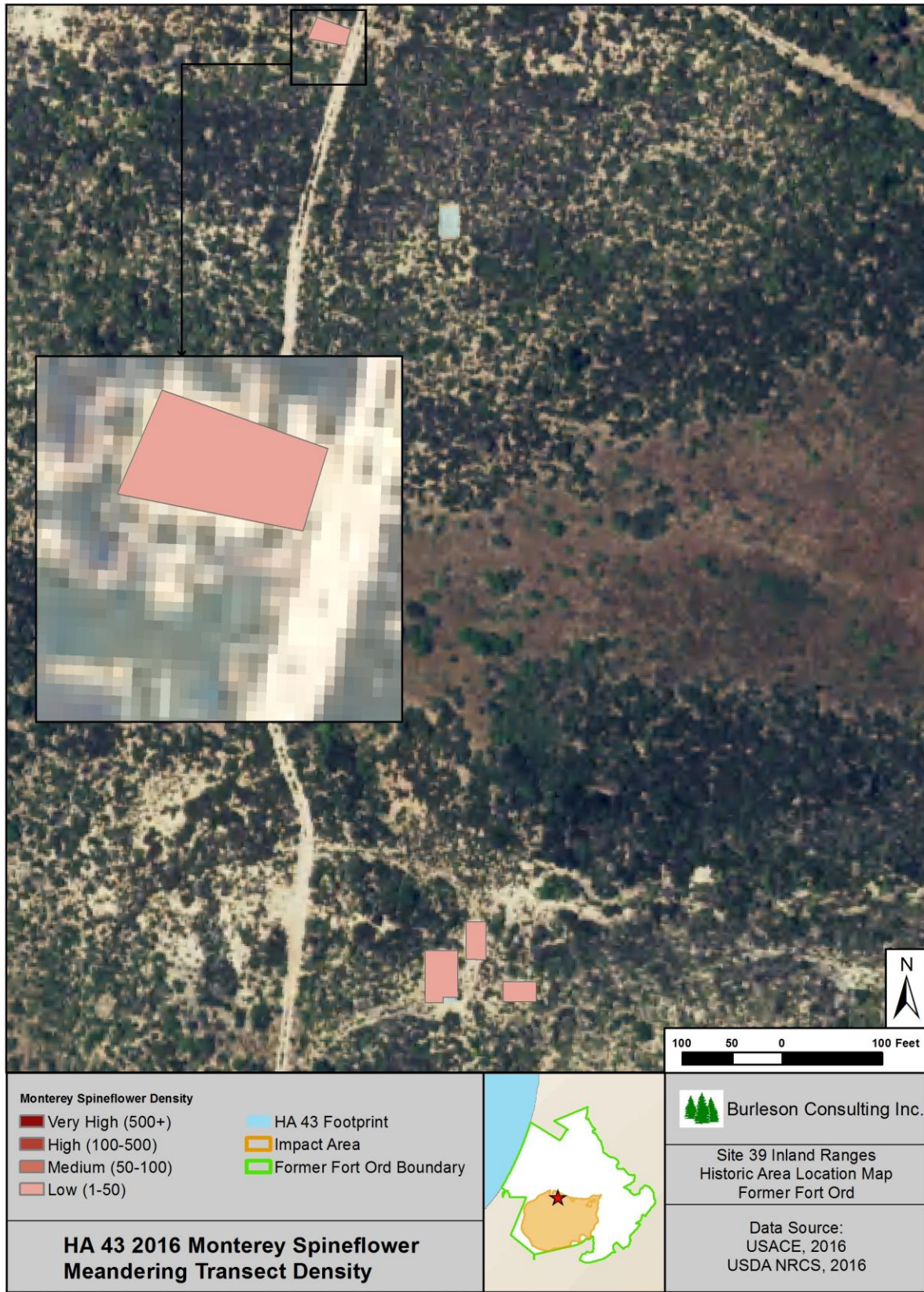
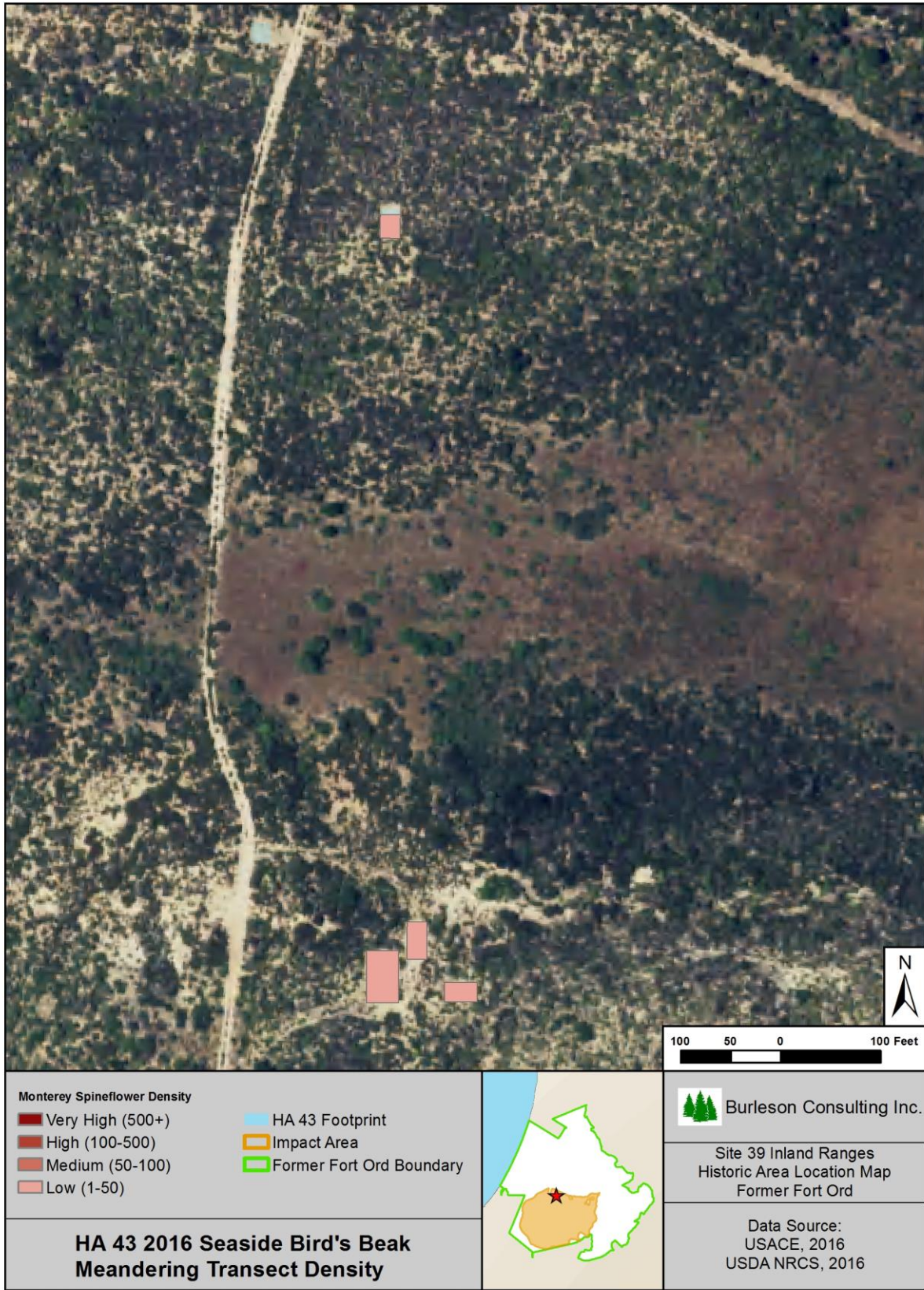


Figure 8-60. HA 43 Monterey Spineflower Meandering Transect Density Map





**Figure 8-61.** HA 43 Seaside Bird’s Beak Meandering Transect Density Map

### 8.16.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.16.2.3 Species Richness

A total of 25 species were observed at HA 43. Of those, 15 were native shrubs or perennials, eight were native annual herbaceous species, and two were non-native species (see Table 8-113).

**Table 8-113.** Species observed on HA 43, 2016

Scientific Names	Common Names	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Aira caryophylla</i>	silver hair grass	AICA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Cardionema ramosissimum</i>	sandmat	CARA
<i>Carex</i> sp.		CA
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> <sup>1</sup>	seaside bird's beak	CORIL
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Frangula californica</i>	California coffeeberry	FRCA
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> <sup>1</sup>	sand gilia	GITEA
<i>Gnaphalium</i> sp.		GN
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	western bracken fern	PTAQP
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME

<sup>1</sup>HMP species

### 8.16.2.4 Vegetative Cover Transects and Quadrats

Burleson completed five quadrats at HA 43. Results indicated that the mean vegetative cover by native shrubs and perennials was 10.0%. Table 8-114 summarizes the vegetation cover and Table 8-115 presents the vegetation cover by species.

**Table 8-114.** Quadrat Survey Summary for HA 43

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA43Q01	2.0	2.0	0.0	0.0	1.0	97.0
HA43Q02	33.0	19.0	14.0	0.0	0.0	67.0
HA43Q03	25.0	25.0	0.0	0.0	0.0	75.0
HA43Q04	4.0	4.0	0.0	0.0	0.0	96.0
HA43Q05	7.0	0.0	7.0	0.0	8.0	85.0
<b>AVERAGE</b>	<b>14.2</b>	<b>10.0</b>	<b>4.2</b>	<b>0.0</b>	<b>1.8</b>	<b>84.0</b>

**Table 8-115.** Quadrat Survey Results for HA 43 by Species

Transect	ARPU <sup>1</sup> (%)	BAPI (%)	CARA (%)	CEDE (%)	CORIL <sup>1</sup> (%)	CRSC (%)	HOCU (%)	TH (%)	BG (%)
HA43Q01	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0	97.0
HA43Q02	7.0	2.0	0.0	2.0	12.0	8.0	2.0	0.0	67.0
HA43Q03	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	75.0
HA43Q04	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	96.0
HA43Q05	0.0	0.0	3.0	0.0	0.0	0.0	4.0	8.0	85.0
<b>AVERAGE</b>	<b>1.4</b>	<b>0.4</b>	<b>0.6</b>	<b>0.4</b>	<b>2.4</b>	<b>7.8</b>	<b>1.2</b>	<b>1.8</b>	<b>84.0</b>

<sup>1</sup>HMP species

### 8.16.3 Discussion

#### 8.16.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limits for HMP annual density of medium and the Monterey spineflower restoration plot has met the success criterion.

Sand gilia density was less than the acceptable limits for the HMP annual density. The restoration plot density was low and four individuals were found adjacent to, but outside of, the restoration plot. Sand gilia has not met the success criterion.

Seaside bird's beak density was within the acceptable limits for the HMP annual density. In addition to the plots meeting the success criteria, four individual patches were mapped but were at low density. The restoration plot has met the success criterion.

Overall the HMP annual density success criteria were not met.

#### 8.16.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.16.3.3 Species Richness

Sandmat manzanita, shaggy-barked manzanita, coyote brush, dwarf ceanothus, mock heather, golden yarrow, peak rush rose, wedge-leaved horkelia, deerweed, coffeeberry, and black sage were all present. Chamise, Monterey ceanothus, and sticky monkey flower were not present. HA 43 did not meet the success criterion for objective 1.

### 8.16.3.4 Vegetative Cover Transects and Quadrats

Quadrats were completed to give us a preliminary idea of vegetative cover with a limited amount of effort; however, multiple objectives outlined in the SSRP specifically require transect data. Quadrat data will not be compared to the success criteria.

### 8.16.3.5 Recommendations

HA 43 is generally responding well to the restoration effort that has been completed. A qualitative overview is documented by the reference photo points (see Appendix D). The photos illustrate the progress, growth, and improvement of the HA. Despite the progress, the species richness criterion has not been met. We recommend to install three of each species: chamise, Monterey ceanothus, and sticky monkey flower. Other success criteria cannot be assessed at this time because transect data were not collected. Additionally, the HMP annual species sand gilia has not met the density success criteria. We will evaluate sand gilia after year 5 monitoring and make further recommendations at that time, if necessary.

The site will continue to be monitored by photo documentation, HMP annual density surveys, and species richness meandering transects. We recommend to collect line-intercept transects in the future at this site to effectively evaluate success criteria.

Table 8-116 summarizes the current status of HA 43 including which success criteria have been met as well as our recommendation to move towards meeting all of the success criteria.

**Table 8-116.** Status and Recommendations for Achieving the Success Criteria at HA 43

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant chamise, Monterey ceanothus and sticky monkey flower
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects
Objective 3 – No. 4	HMP annual density	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual cover	Cannot assess	Reconsider success criteria

## 8.17 HA 44

HA 44 was used by the Army as a range for anti-tank weapons and other explosive munitions. An estimated total of 2,900 cubic yards of soil was excavated over 1.8 acres. HA 44 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 44 is relatively flat with a southwest aspect and is surrounded by very high quality habitat.



HA 44 is located on the northern portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

Passive and active restoration activities were prescribed for HA 44. The prescription for passive restoration at HA 44 consisted of hand broadcast non-irrigated seed and annual weed management activities. The prescription for active restoration at HA 44 included transplanting native or greenhouse-grown individuals. HA 44 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration at HA 44 has not commenced; however, monitoring began in 2013. HA 44 has been monitored for four years by photo documentation and one year for vegetative cover. Figure 8-62 shows the HA footprint, passive restoration area, and transect monitoring locations.

The success criteria for HA 44 are summarized in Table 8-117.

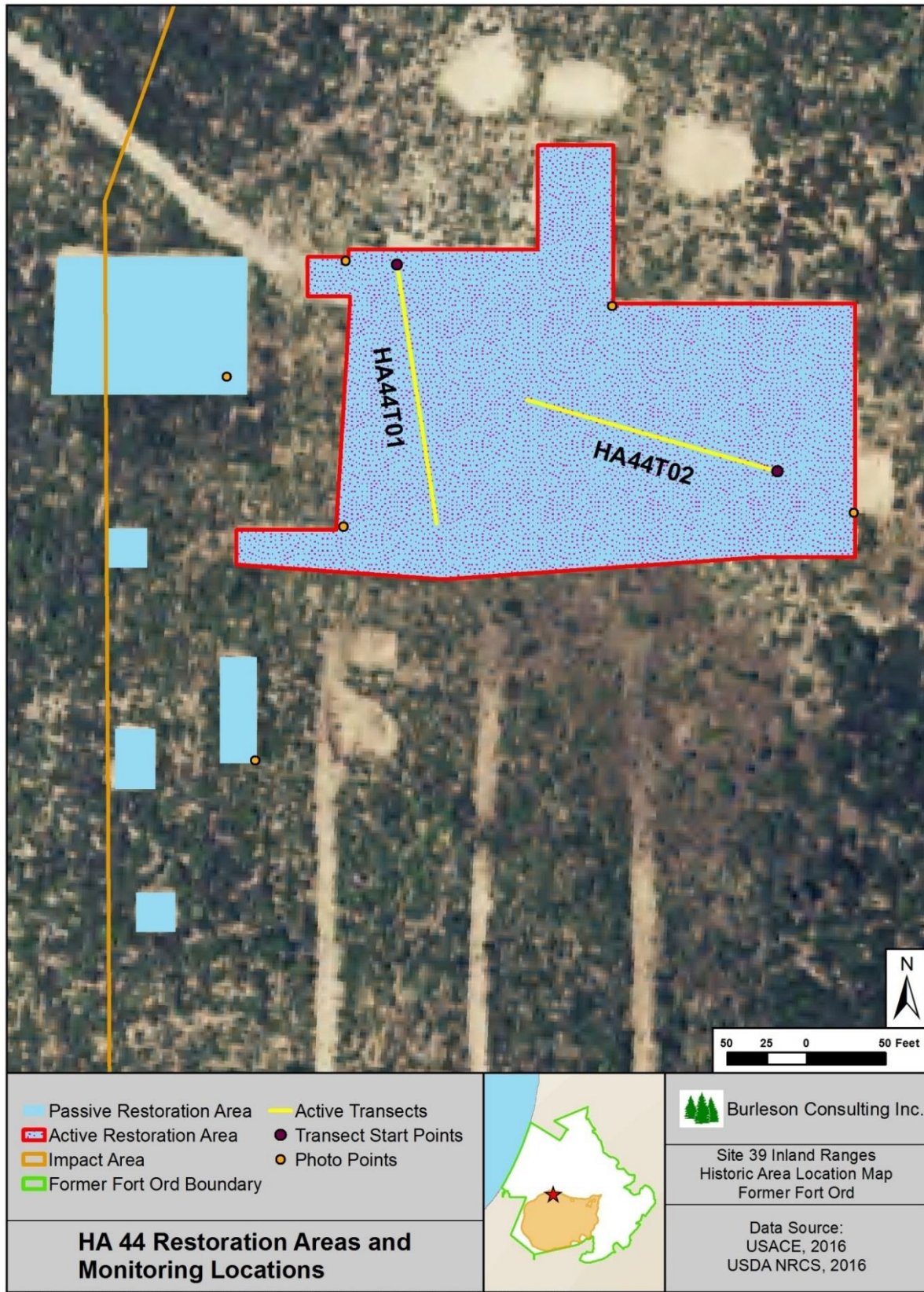


Figure 8-62. HA 44 Restoration Areas and Monitoring Locations Map

**Table 8-117.** Success Criteria and Acceptable Limits for Restoration of HA 44

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			sandmat manzanita <sup>2</sup>
			shaggy-bark manzanita
			Monterey ceanothus <sup>2</sup>
			California coffeeberry
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated absence of non-native target weed species. In the event of their establishment, no more than 5 percent non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
			No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data
			Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 10 percent is acceptable

**Table 8-117.** Success Criteria and Acceptable Limits for Restoration of HA 44

	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Seaside bird’s beak percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Sand gilia percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.17.1 Restoration Activities**

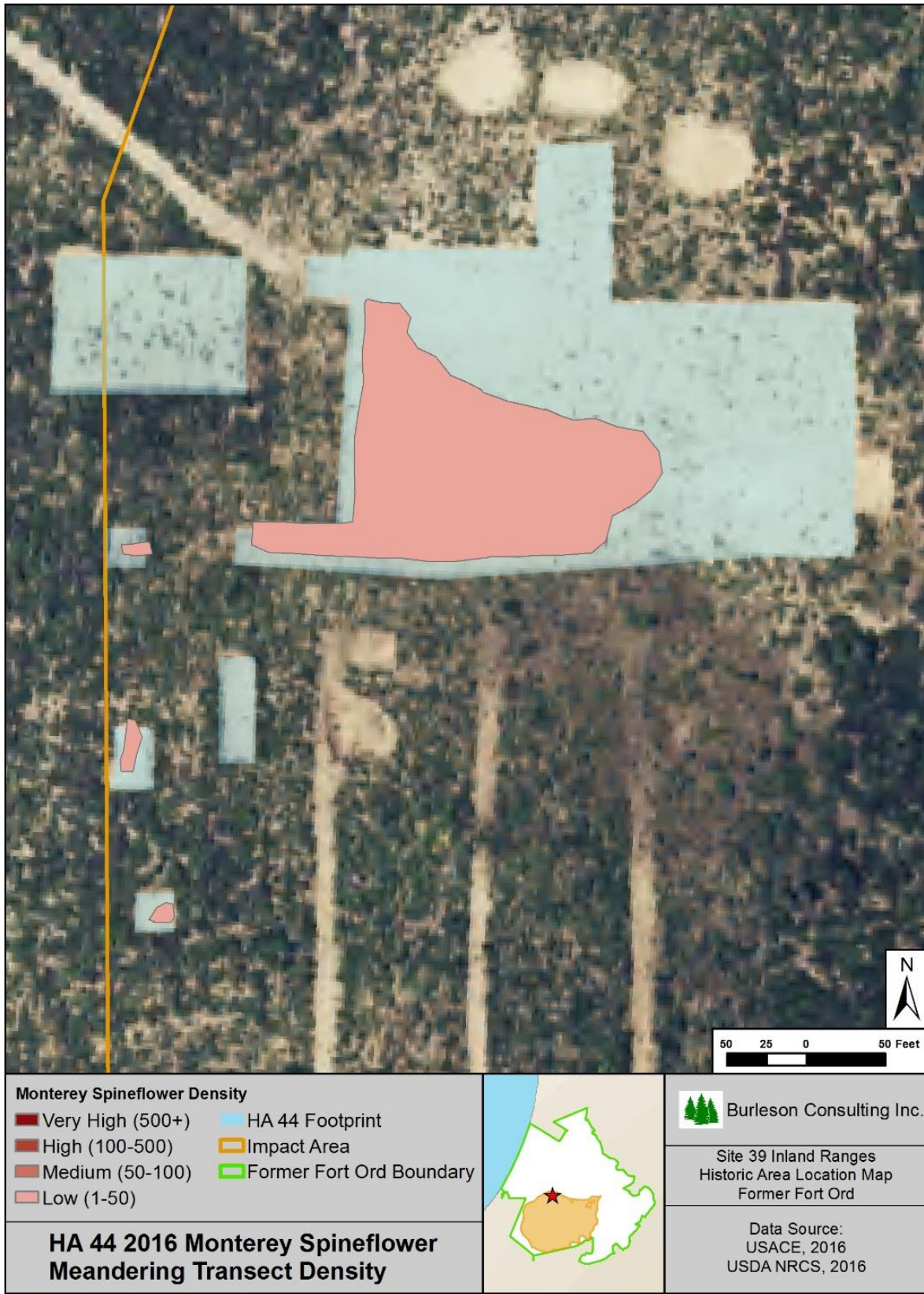
No passive or active restoration activities have occurred at HA 44 as of 2016.

**8.17.2 Monitoring Results**

8.17.2.1 HMP Annual Density

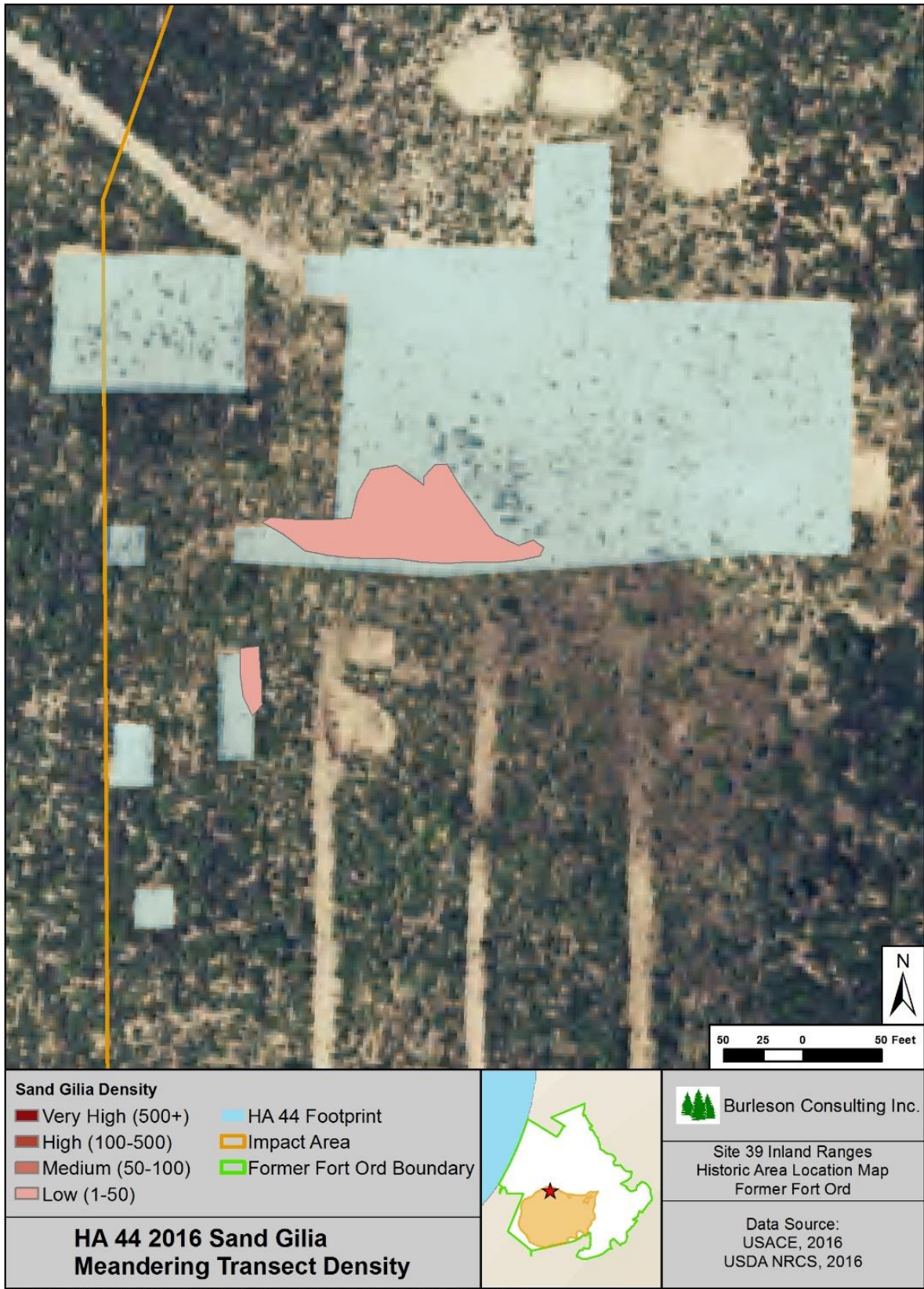
No restoration plots have been established for HMP annuals at HA 44. However, HMP annuals were mapped as a part of the meandering transect survey in 2016. Four discrete patches of Monterey spineflower were mapped and individuals counted within each patch. The densities were low. The total acreage of Monterey spineflower patches with a density above the SSRP baseline was 0.49 acre. Four discrete patches of sand gilia were mapped and individuals counted within each patch. The densities ranged from low to medium. The total acreage of sand gilia patches with a density above the SSRP baseline was 0.14 acre. Four discrete patches of seaside bird’s beak were mapped and individuals counted within each patch. The densities were low. The total acreage of seaside bird’s beak patches with a density above the SSRP baseline was 0.01 acre. Meandering transect locations and densities are illustrated in figures 8-63 through 8-65.





**Figure 8-63.** HA 44 Monterey Spineflower Meandering Transect Density Map





**Figure 8-64.** HA 44 Sand Gilia Meandering Transect Density Map





Figure 8-65. HA 44 Seaside Bird's Beak Meandering Transect Density Map

## 8.17.2.2 Plant Survivorship

No active restoration has occurred at HA 44, therefore, no survivorship data were collected.

## 8.17.2.3 Species Richness

A total of 59 species were observed at HA 44. Of those, 30 were native shrubs or perennials, 19 were native annual herbaceous species and 10 were non-native species. Table 8-118 shows the observed species in HA 44.

**Table 8-118.** Species observed on HA 44, 2016

Scientific Names	Common Names	Code
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Anaphalis margaritacea</i>	pearly everlasting	ANMA
<i>Arctostaphylos montereyensis</i> <sup>1</sup>	Toro manzanita	ARMO
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy barked manzanita	ARTO
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMA
<i>Calyptridium monandrum</i>	common calyptridium	CAMO
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Carex</i> sp.		CABR
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Castilleja exserta</i>	purple owl's clover	CAEX
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe diffusa</i>	diffuse chorizante	CHDI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spine-flower	CHPUP
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> <sup>1</sup>	seaside bird's-beak	CORIL
<i>Corethrogyne filaginifolia</i>	common corethrogyne	COFI
<i>Cryptantha clevelandii</i>	Cleveland's cryptantha	CRCLC
<i>Crocانthemum scoparium</i>	peak rush-rose	CRSC
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	redstem stork's bill	ERCI
<i>Erysimum ammodophilum</i> <sup>1</sup>	coast wallflower	ERAM
<i>Eschscholzia californica</i>	California poppy	ESCA
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Frangula californica</i>	California coffeeberry	FRCA
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> <sup>1</sup>	sand gilia	GITEA
<i>Horkelia cuneata</i> var. <i>cuneata</i>	wedge-leaved horkelia	HOCU
<i>Hypochaeris glabra</i>	smooth cat's ears	HYGL
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Logfia gallica</i>	narrow-leaved filago	LOGA
<i>Lomatium</i> sp.		LO

**Table 8-118.** Species observed on HA 44, 2016

Scientific Names	Common Names	Code
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Madia gracilis</i>	slender tarweed	MAGR
<i>Madia</i> sp.		MA
<i>Monardella sinuata</i> ssp. <i>nigrensens</i>		MOSI
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHA
<i>Phacelia douglasii</i>	Douglas phacelia	PHDO
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Plantago erecta</i>	California plantain	PLER
<i>Polygala californica</i>	California milkwort	POCA
<i>Pseudognaphalium</i> sp.		PS
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	western bracken fern	PTAQ
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME
<i>Sisyrinchium bellum</i>	blue-eyed grass	SIBE
<i>Solanum umbelliferum</i>	blue witch	SOUM
<i>Stylocline gnaphalioides</i>	woolly stylocline	STGN
<i>Toxicodendron diversilobum</i>	poison oak	TODI
<i>Trifolium hirtum</i>	rose clover	TRHI

<sup>1</sup>HMP species

8.17.2.4 Vegetative Cover Transects and Quadrats

Burleson completed two 50-meter line-intercept transects at HA 44. The transect survey results indicate that the mean vegetative cover by native shrubs and perennials was 14.96%. Table 8-119 summarizes the vegetation cover and Table 8-120 presents vegetation cover by species.

**Table 8-119.** Line-intercept Transect Survey Summary for HA 44

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA44T01	24.78	19.82	4.96	0.00	0.00	79.28
HA44T02	10.76	10.10	0.66	0.00	3.74	77.80
<b>AVERAGE</b>	<b>17.77</b>	<b>14.96</b>	<b>2.81</b>	<b>0.00</b>	<b>1.87</b>	<b>78.54</b>

**Table 8-120.** Line-intercept Transect Survey Results for HA 44 by Species

Transect	ACGL (%)	ARPU <sup>1</sup> (%)	CABR (%)	CEDE (%)	CERI <sup>1</sup> (%)	COFI (%)	CRSC (%)	ERFA <sup>1</sup> (%)	ERCO (%)	HOCU (%)	LUAL (%)	TH (%)	BG (%)
HA44T01	1.68	1.18	0.44	2.32	0.92	0.36	8.90	1.48	1.20	4.16	0.48	0.00	79.28
HA44T02	0.00	0.40	0.00	2.62	0.38	0.00	5.70	0.00	0.48	0.66	0.52	3.74	77.80
<b>AVERAGE</b>	<b>0.84</b>	<b>0.79</b>	<b>0.22</b>	<b>2.47</b>	<b>0.65</b>	<b>0.18</b>	<b>7.3</b>	<b>0.74</b>	<b>0.84</b>	<b>2.41</b>	<b>0.50</b>	<b>1.87</b>	<b>78.54</b>

<sup>1</sup>HMP species

### 8.17.3 Discussion

#### 8.17.3.1 HMP Annual Density

No restoration plots have been established for HMP annuals at HA 44. However, HMP annuals were mapped as a part of the meandering transect survey and all three HMP annuals met the density success criteria.

#### 8.17.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.17.3.3 Species Richness

Chamise, sandmat manzanita, shaggy-barked manzanita, Monterey ceanothus, and coffeeberry were all present. HA 44 met the success criterion for objective 1.

#### 8.17.3.4 Vegetative Cover Transects and Quadrats

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For objective 1 the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes fourteen shrub and perennial species and three annual species presented in Table 2 of the HA 44 SSRP (Burleson, 2013). Currently the HA has 13.33% vegetative cover; therefore, this success criterion was not met.

Objective 2 considers the percent cover of non-native target weeds. Target weeds were not observed during transect surveys. The vegetative cover for non-native species was 0.00%. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class was met or exceeded the baseline cover class of 3. Cover class 3 is from 6-25% of absolute cover. The HMP shrub species at HA 44 are providing an absolute cover of 2.18%, and the HA has not yet met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 44 this means a vegetative cover average of at least 2% cover for sandmat manzanita and Monterey ceanothus must be present but less than 10% is acceptable. The average vegetative cover for sandmat manzanita was 0.79% and Monterey ceanothus was 0.65%. Monterey ceanothus was within acceptable limits; however, the success criterion was not met. In addition, HMP annuals were evaluated for vegetative cover. Monterey spineflower, sand gilia, and seaside bird's beak are required to provide at least 1% cover from the transect surveys. None of the HMP annual species were present in the transect data. The HMP annual vegetative cover success criterion was not met.

#### 8.17.3.5 Recommendations

HA 44 has not yet had any restoration efforts. A qualitative overview of the site across a one year span was documented by the reference photo points (see Appendix D). HA 44 has met the success criteria for species richness and HMP annual density. We do not recommend that the SSRP prescription for HMP annuals be applied to the HA because they are already thriving. As restoration efforts progress in the future, HA 44 will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-121 summarizes the current status of HA 44 including which success criteria have been met and which have not as well as our recommendation to move towards meeting all of the success criteria at HA 44.



**Table 8-121.** Status and Recommendations for Achieving the Success Criteria at HA 44

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	Yes	Establishment of restoration plots is not necessary
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

### 8.18 HA 48

HA 48 was used by the Army as a range for various uses including mortars, weapons demonstrations, sniper training, anti-tank weapons, and various other weapons. An estimated total of 150 cubic yards of soil was excavated over 0.05 acre. HA 48 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). HA 48 is relatively flat with a southeast aspect and is surrounded by very high quality habitat.

HA 48 is located on the northern portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

The prescription for passive restoration at HA 48 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 48 is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration activities have not commenced at HA 48; however, monitoring began in 2013. HA 48 has been monitored for four years by photo documentation. Figure 8-66 shows the HA footprint and passive restoration area and photo point monitoring locations. Success criteria for HA 48 are summarized in Table 8-122.

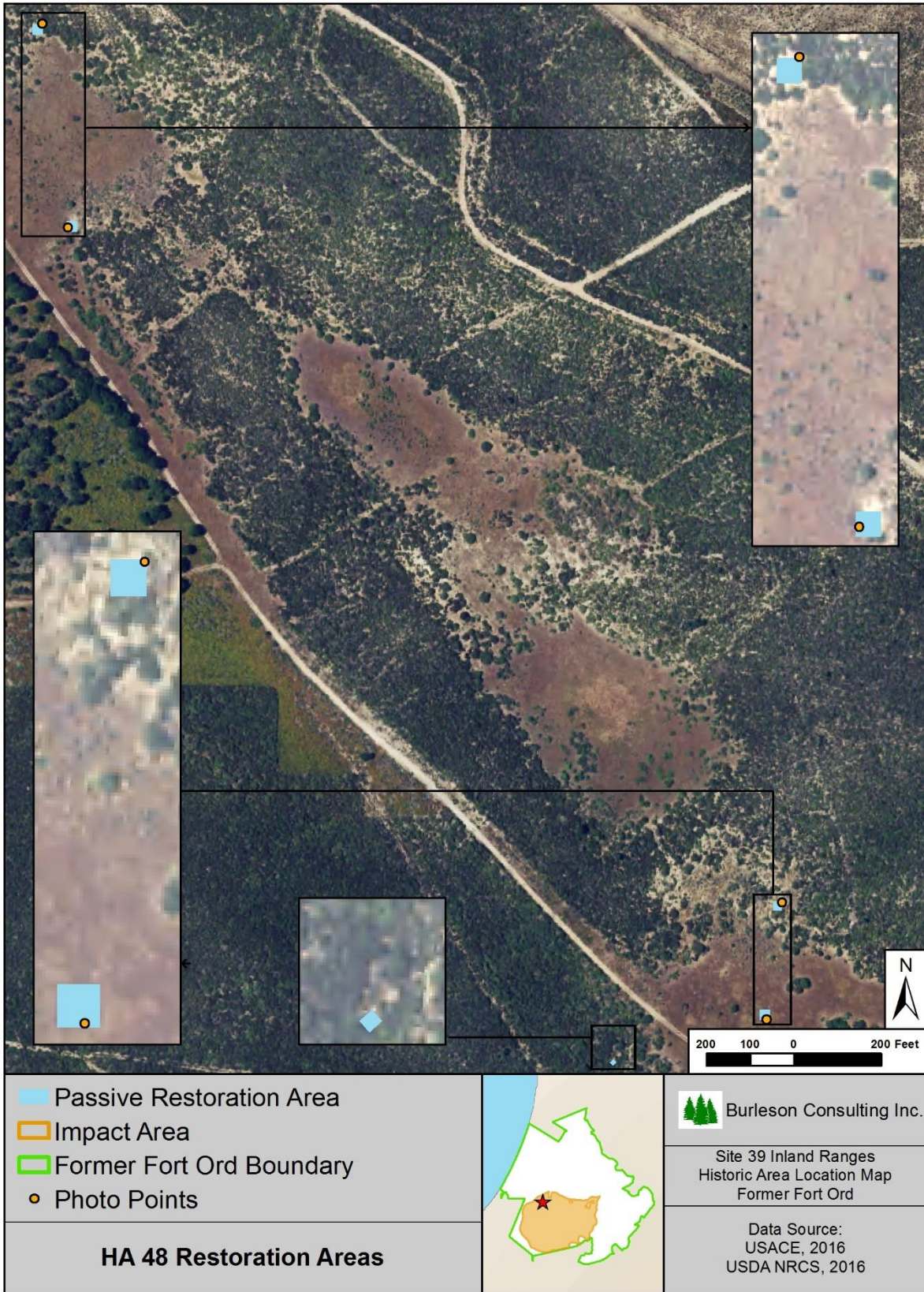


Figure 8-66. HA 48 Restoration Areas and Monitoring Locations Map

**Table 8-122.** Success Criteria and Acceptable Limits for Restoration of HA 48

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise
			sandmat manzanita <sup>2</sup>
			shaggy-bark manzanita
			Monterey ceanothus <sup>2</sup>
			horkelia
			black sage
			silver bush lupine
			peak rush rose
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate presence of non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
<b>Objective 3<sup>1</sup></b>			
<b>4</b>	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must	Sandmat manzanita percent cover, as an average of transect data, must be equal or less than 1 percent.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 4 percent is acceptable

**Table 8-122.** Success Criteria and Acceptable Limits for Restoration of HA 48

	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
			Sand gilia percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.18.1 Restoration Activities**

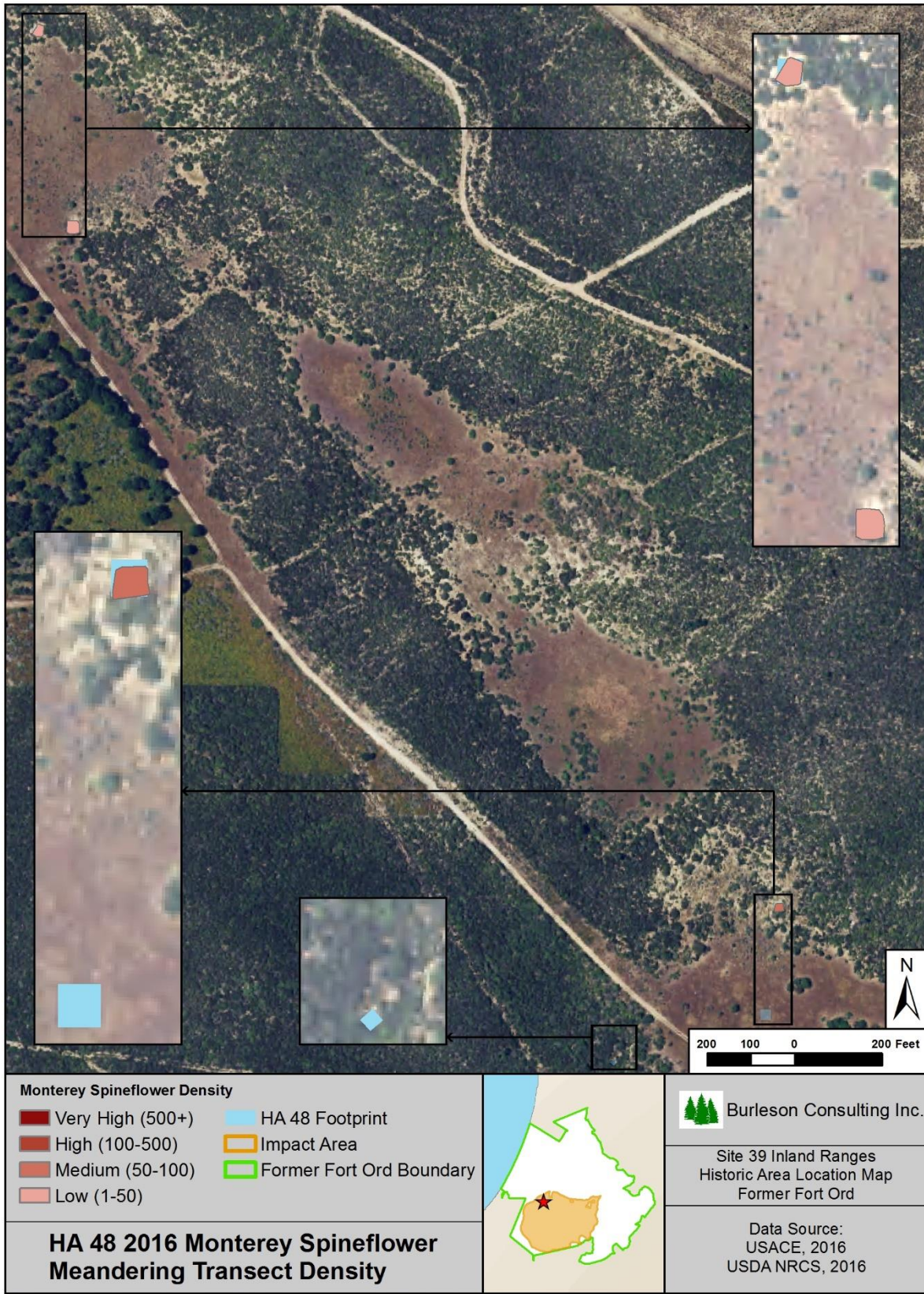
No passive or active restoration activities have occurred at HA 48 as of 2016.

**8.18.2 Monitoring Results**

8.18.2.1 HMP Annual Density

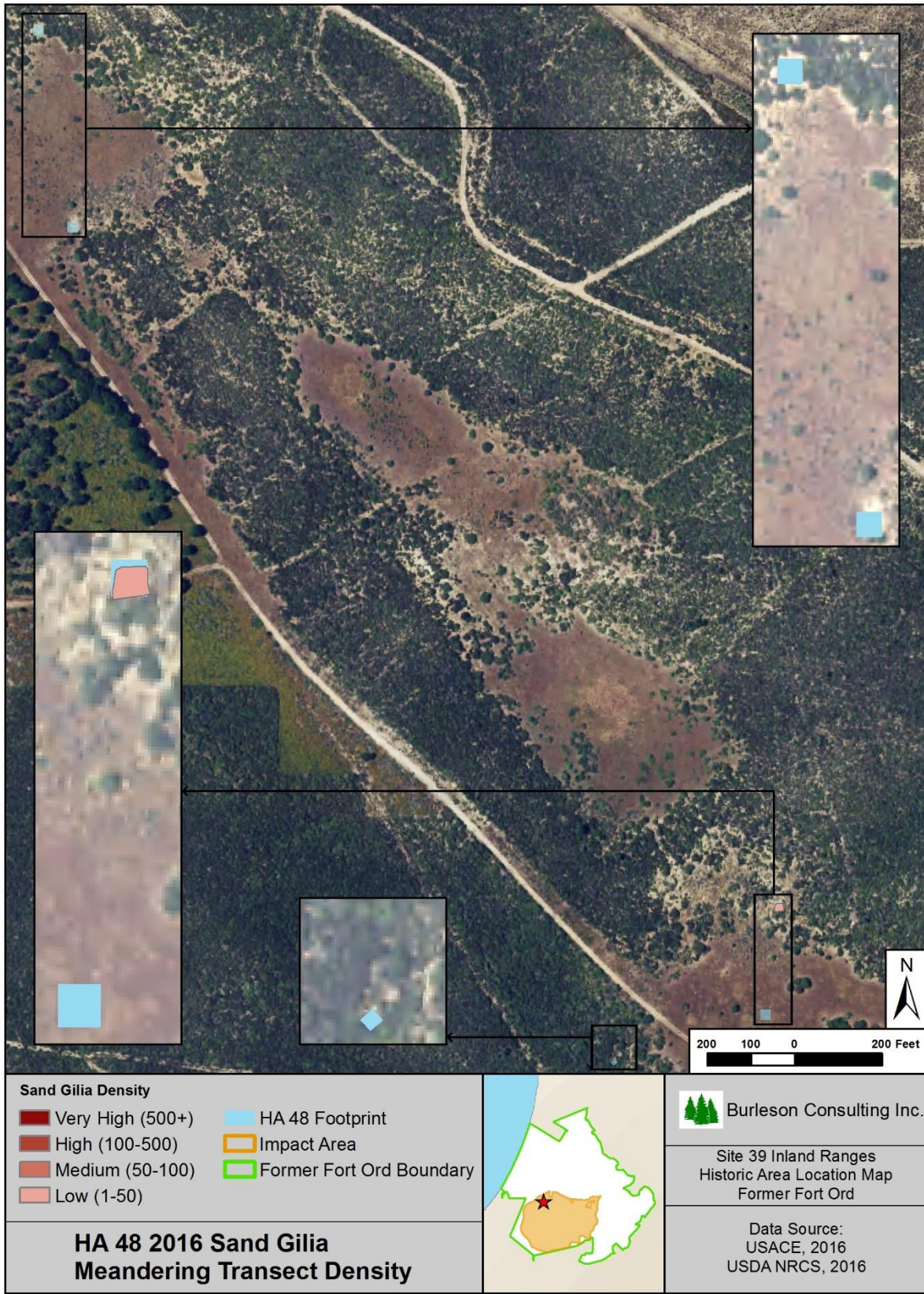
No restoration plots have been established for HMP annuals at HA 48. However, HMP annuals were mapped as a part of the meandering transect survey. Three discrete patches of Monterey spineflower were mapped and individuals counted within each patch. The densities ranged from low to medium. The total acreage of Monterey spineflower patches with a density above the SSRP baseline was 0.04 acre. One discrete patch of sand gilia was mapped and individuals counted within the patch. The density was low. The total acreage of sand gilia patches with a density above the SSRP baseline was 0.008 acre. Figures 8-67 and 8-68 show the meandering transect locations and densities.





**Figure 8-67.** HA 48 Monterey Spineflower Meandering Transect Density Map (south plot not monitored)





**Figure 8-68.** HA 48 Sand Gilia Meandering Transect Density Map (south plot not monitored)

## 8.18.2.2 Plant Survivorship Monitoring

No active restoration was prescribed, therefore, no survivorship data were collected.

## 8.18.2.3 Species Richness

A total of 43 species were observed at HA 48. Of those, 18 were native shrubs or perennials, 13 were native annual herbaceous species, and 12 were non-native species. Table 8-123 shows the species present in HA 48.

**Table 8-123.** Species observed on HA 48, 2016

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Achillea millefolium</i>	common yarrow	ACMI
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Avena</i> sp.	oat	AV
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMA
<i>Briza maxima</i>	rattlesnake weed	BRMA
<i>Briza minor</i>	little quaking grass	BRMI
<i>Carex</i> sp.		CA
<i>Castilleja densiflora</i>	owl's clover	CADE
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	CERI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Deinandra corymbosa</i>	coast tarweed	DECO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's golden fleece	ERFA
<i>Eschscholzia californica</i>	California poppy	ESCA
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Filago</i> sp.	filago	FI
<i>Frangula californica</i>	California coffeeberry	FRCA
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> <sup>1</sup>	sand gilia	GITEA
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU
<i>Layia platyglossa</i>	tidy tips	LAPL
<i>Lessingia pectinata</i>	common lessingia	LEPE
<i>Lomatium parviflorum</i>	lomatium	LOPA
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lupinus nanus</i>	sky lupine	LUNA
<i>Navarretia hamata</i>	hooked navarretia	NAHA
<i>Petrorhagia dubia</i>	hairy pink	PEDU
<i>Plagiobothrys</i> sp.	popcorn flower	PL
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO

**Table 8-123.** Species observed on HA 48, 2016

Scientific Name	Common Name	Code
<i>Plantago erecta</i>	California plantain	PLER
<i>Rumex acetosella</i>	sheep sorrel	RUAC
<i>Salvia mellifera</i>	black sage	SAME

<sup>1</sup>HMP species

#### 8.18.2.4 Vegetative Cover Transects and Quadrats

No transects or quadrat surveys have been completed at HA 48.

### 8.18.3 Discussion

#### 8.18.3.1 HMP Annual Density

No restoration plots have been established for HMP annuals at HA 48. However, HMP annuals were mapped as a part of the meandering transect survey and all three HMP annuals met the density success criteria.

#### 8.18.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.18.3.3 Species Richness

Sandmat manzanita, shaggy-barked manzanita, Monterey ceanothus, wedge-leaved horkelia, silver bush lupine, black sage, and peak rush rose were all present. Chamise was not present. HA 48 does not meet the success criterion for objective 1.

#### 8.18.3.4 Vegetative Cover Transects and Quadrats

No transects or quadrat surveys have been completed at HA 48.

#### 8.18.3.5 Recommendations

HA 48 has not had restoration efforts completed as of 2016. A qualitative overview of the site can be observed in the photo point (see Appendix D). Restoration activities will occur in the future. However, HA 48 has met the success criterion for HMP annual density. We do not recommend that the SSRP prescription for HMP annuals be applied to the HA because they are already thriving. It is recommended to install three chamise plants to support the species richness criterion.

Additionally, it is recommended that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower and sand gilia. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy; this will be captured by objective 3 success criteria number 3.

As restoration efforts progress in the future, HA 48 will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.



Table 8-124 summarizes the current status of HA 48 including which success criteria have been met and which have not as well as our recommendation to move towards meeting all of the success criteria at HA 48.

**Table 8-124.** Status and Recommendations for Achieving the Success Criteria at HA 48

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant chamise
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects when appropriate
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP annual density	Yes	Establishment of restoration plots is not necessary
Objective 3 – No. 4	HMP annual cover	Cannot assess	Reconsider success criteria

### 8.19 Austin Road Stockpile

The Austin Road Stockpile encompasses about 0.45 acre and was used by the Army as a stockpile for soil remediation in the area and the site has been used by the Presidio of Monterey Fire Department to provide water to helicopters. The top six inches of soil at the Austin Road Stockpile were already removed. The Austin Road Stockpile rests within maritime chaparral with mean annual temperatures ranging between 56° and 58° F, and regular fog typical with similar maritime climates (USDA Forest Service, 2007). The Austin Road Stockpile is relatively flat. The adjacent lands are not developed and contain substantial amounts of intact native vegetation that will promote natural recruitment at the restoration areas.

The Austin Road Stockpile is located on the western portion of Site 39, occurring within sand hill formation maritime chaparral containing the Baywood soils series (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USDA Forest Service, 2007).

No restoration efforts have occurred at Austin Road Stockpile as of 2016.

The prescription for passive restoration at the Austin Road Stockpile consisted of hand broadcast non-irrigated seed and annual weed management activities. Austin Road Stockpile is relatively flat with little potential for erosion. Broadcast seed has greater success if completed during the rainy season, November through March. Figure 8-69 shows the site footprint and passive restoration area and photo point monitoring locations.

The success criteria for Austin Road Stockpile are summarized in Table 8-125.

#### 8.19.1 Restoration Activities

No passive or active restoration activities have occurred at Austin Road Stockpile as of 2016.



Figure 8-69. Austin Road Stockpile Restoration Areas and Monitoring Locations Map



**Table 8-125.** Success Criteria and Acceptable Limits for Restoration of Austin Road Stockpile

<b>Objective 1<sup>1</sup></b>			
<b>No.</b>	<b>Success Element</b>	<b>Decision Rule</b>	<b>Acceptable Limits</b>
<b>1</b>	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			white yarrow
			chamise
			Hooker's manzanita <sup>2</sup>
			shaggy-bark manzanita
			sandmat manzanita <sup>2</sup>
			coyote brush
			Monterey ceanothus <sup>2</sup>
			Monterey spineflower <sup>2</sup>
			mock heather
			golden yarrow
			peak rush rose
			horkelia
			deerweed
silver bush lupine			
sticky monkey flower			
			black sage
<b>2</b>	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2
<b>Objective 2<sup>1</sup></b>			
<b>3</b>	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.

**Table 8-125.** Success Criteria and Acceptable Limits for Restoration of Austin Road Stockpile

Objective 3 <sup>1</sup>			
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 25.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 4.
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Low
		No net-loss of HMP annuals, percent cover and abundance [density class] must equal baseline HMP data	Monterey spineflower percent cover, as an average of transect data, must be equal or greater than 1 <sup>3</sup>
Notes:	<sup>1</sup> Objectives presented in HRP (Shaw, 2009b)		
	<sup>2</sup> HMP Species		
	<sup>3</sup> HMP annual results will be analyzed based on succession trends. Shrub cover and lack of bare ground over time will reduce HMP annuals since the seed bank will have been replaced during the early successional stages.		

**8.19.2 Monitoring Results**

**8.19.2.1 HMP Annual Density**

No restoration plots have been established for HMP annuals at Austin Road Stockpile. However, HMP annuals were mapped as a part of the meandering transect survey. Three discrete patches of Monterey spineflower were mapped and individuals counted within each patch. The densities ranged from low to medium. The total acreage of Monterey spineflower patches with a density above the SSRP baseline was 0.009 acre. Figure 8-70 shows the Monterey spineflower meandering transect locations and densities.



**Figure 8-70.** Austin Road Stockpile Monterey Spineflower Meandering Transect Density Map

### 8.19.2.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

### 8.19.2.3 Species Richness

A total of 33 species were observed at Austin Road Stockpile. Of those, 15 were native shrubs or perennials, seven were native annual herbaceous species and 11 were non-native species. Table 8-126 shows the observed species in Austin Road Stockpile.

**Table 8-126.** Species observed at Austin Road Stockpile, 2016

Scientific Name	Common Name	Code
<i>Acmispon glaber</i>	deerweed	ACGL
<i>Acmispon heermannii</i>	Heermann's lotus	ACHE
<i>Acmispon strigosus</i>	Bishop's lotus	ACST
<i>Adenostoma fasciculatum</i>	chamise	ADFA
<i>Aira caryophyllea</i>	silvery hair-grass	AICA
<i>Arctostaphylos pumila</i> <sup>1</sup>	sandmat manzanita	ARPU
<i>Arctostaphylos tomentosa</i>	shaggy-barked manzanita	ARTO
<i>Avena barbata</i>	slender wild oat	AVBA
<i>Baccharis pilularis</i>	coyote brush	BAPI
<i>Bromus diandrus</i>	ripgut brome	BRDI
<i>Bromus madritensis</i> ssp. <i>rubens</i>	red brome	BRMAR
<i>Cardionema ramosissimum</i>	sand mat	CARA
<i>Carpobrotus edulis</i>	Hottentot fig	CAED
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE
<i>Chorizanthe diffusa</i>	diffuse chorizanthe	CHDI
<i>Chorizanthe pungens</i> var. <i>pungens</i> <sup>1</sup>	Monterey spineflower	CHPUP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC
<i>Deinandra corymbosa</i>	coast tarweed	DECO
<i>Ericameria ericoides</i>	mock heather	ERER
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO
<i>Erodium botrys</i>	long-beaked filaree	ERBO
<i>Festuca myuros</i>	rattail fescue	FEMY
<i>Horkelia cuneata</i>	wedge leaved horkelia	HOUC
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL
<i>Hypochaeris radicata</i>	hairy cat's ear	HYRA
<i>Logfia gallica</i>	narrow-leaved filago	LOGA
<i>Lupinus albifrons</i>	silver bush lupine	LUAL
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR
<i>Plantago erecta</i>	California plantain	PLER
<i>Pseudognaphalium</i> sp.		PS
<i>Salvia mellifera</i>	black sage	SAME
<i>Silene gallica</i>	windmill pink	SIGA

<sup>1</sup>HMP species

### 8.19.2.4 Vegetative Cover Transects and Quadrats

No transects or quadrat surveys have been completed at Austin Road Stockpile.

### 8.19.3 Discussion

#### 8.19.3.1 HMP Annual Density

No restoration plots have been established for HMP annuals at Austin Road Stockpile. However, HMP annuals were mapped as a part of the meandering transect survey and Monterey spineflower has met the density success criteria.

#### 8.19.3.2 Plant Survivorship

No active restoration was prescribed, therefore, no survivorship data were collected.

#### 8.19.3.3 Species Richness

Chamise, sandmat manzanita, shaggy-barked manzanita, coyote brush, Monterey spineflower, mock heather, golden yarrow, peak rush rose, wedge-leaved horkelia, deerweed, silver bush lupine, and black sage were all present. Common yarrow, Hooker's manzanita, Monterey ceanothus, and sticky monkey flower were not present. Austin Road Stockpile did not meet the success criterion for objective 1.

#### 8.19.3.4 Vegetative Cover Transects and Quadrats

No transects or quadrat surveys have been completed at Austin Road Stockpile.

#### 8.19.3.5 Recommendations

Austin Road Stockpile has not had restoration efforts completed as of 2016. A qualitative overview of the site can be observed in the photo points from 2016 (see Appendix D). Restoration activities will occur in the future. During restoration activities, we recommend to install three of each species: common yarrow, Hooker's manzanita, Monterey ceanothus, and sticky monkey flower plants to support the species richness criterion.

At this time, the only recommendation is that objective 3, success criterion 4 be reconsidered. Currently the success criterion requires greater than or equal to 1% transect cover for Monterey spineflower. However, transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. HMP annuals are best measured by density classes and areas they occupy; this will be captured by objective 3 success criteria number 3.

Austin Road Stockpile will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects.

Table 8-127 summarizes the current status of Austin Road Stockpile including which success criteria have been met and which have not as well as our recommendation to move towards meeting all of the success criteria at Austin Road Stockpile.



**Table 8-127. Status and Recommendations for Achieving the Success Criteria at Austin Road Stockpile**

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant common yarrow, Hooker’s manzanita, Monterey ceanothus and sticky monkey flower
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects when appropriate
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP annual density	Yes	Establishment of restoration plots is not necessary
Objective 3 – No. 4	HMP annual cover	No	Reconsider success criteria

## 8.20 Summary of Former Fort Ord Inland Ranges Site 39

Historic areas are in the early stages of restoration and monitoring. Passive and/or active restoration has been implemented in all but HAs 44, 48, and the Austin Road Stockpile. Restoration is now complete in HAs 18, 19, 22, 23, 27, 27A, 29, 33, 36, 38, 39/40, and 43. All HAs are in the various stages of the monitoring phase, which range from year 1 to year 4, depending on when the restoration effort took place. With this in mind, it is not surprising that the HAs are not yet meeting the success criteria. As more monitoring is conducted, following prescribed restoration activities, additional analysis and recommendations will be made in future years.

Overall, none of the 19 HAs have yet met the complete success criteria. Of the 19, eight have met the species richness criterion, one has met the native vegetation cover criterion, 10 have met the non-native target weed cover criterion, none have met the HMP shrub cover class criterion, and none have met the HMP shrub cover by species criterion. Out of the thirteen sites that have HMP annual criteria, twelve have met the HMP annual density criterion but none have met the HMP annual cover criterion. Table 8-128 summarizes the status of Site 39 in meeting the success criteria.

Although the HMP shrub cover class criterion and HMP shrub cover by species criterion have not been met at any of the HAs, it is important to note that many of the HMP shrubs are slow growing and it may take several years of monitoring, along with possible corrective measures, to meet these goals. Monitoring results showed HMP annuals Monterey spineflower, sand gilia, and seaside bird’s beak were found in density classes at or above baseline levels with the exception of sand gilia at HA 43. Additionally, HMP annuals were present in locations where they were not seeded, including at HAs 44, 48 and Austin Road Stockpile where no restoration activities occurred. These results indicate that HMP annuals are on the path of successful recovery at the Site 39 restoration areas, even though none of the HAs met the HMP annual cover success criterion. This criterion sets a high threshold requirement for HMP annuals as measured by the percentage of cover under 50-m transects. Transect sampling is not the most suitable method to quantify HMP annual species cover. Transects are designed to capture shrub and perennial plants greater than 0.1 meter of transect length. Patches of HMP annuals are often

less than 0.1 meter across and have variable peak bloom times, which can result in underrepresentation. This success criteria should be reassessed.

**Table 8-128.** 2016 Status for Achieving Success Criteria at HAs in Former Fort Ord  
Inland Ranges Site 39

HA	Success Criteria						
	Species Richness	Native Vegetation Cover	Non-native Target Weed Cover	HMP Shrub Cover Class	HMP Shrub Cover by Species	HMP Annual Density	HMP Annual Cover
18	No	No	Yes	No	No	Yes	No
19	No	No	Yes	No	No	Yes	No
22	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes	Cannot assess*
23	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes	Cannot assess*
26	Yes	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes	Cannot assess*
27	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	NA	NA
27A	Yes	No	Yes	No	No	NA	NA
28	Yes	No	Yes	No	No	Yes	No
29	No	No	Yes	No	No	NA	NA
33	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes	Cannot assess*
34	Yes	No	Yes	No	No	NA	NA
36	Yes	No	No	No	No	NA	NA
37	Yes	No	Yes	No	No	Yes	No
38	Yes	Yes	Yes	No	No	No	No
39/40	No	No	Yes	NA	NA	Yes	No
43	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	No	Cannot assess*
44	Yes	No	Yes	No	No	Yes	No
48	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes	Cannot assess*
Austin Rd Stockpile	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes	Cannot assess*

\*HAs where transect monitoring has not been complete cannot be compared to the success criterion. Transect monitoring will be performed in the future.

NA - the success criterion does not apply.

## **9. COMMUNITY INVOLVEMENT WORKSHOP / OPEN HOUSE BUS TOUR**

In addition to general restoration activities, Burleson participated in the former Fort Ord Clean-Up Open House at the Kemron Building and Bus Tour of Site 39 Inland Range held on February 26, 2016 and July 16, 2016. The Open House provided an opportunity to inform members of the community about the cleanup efforts happening at former Fort Ord.

Burleson personnel prepared a poster highlighting the restoration efforts within Site 39, along with a display of native seeds and plants (see Photo C-47, Appendix C). Burleson biologists interpreted the poster and provided community engagement during the open house and bus tour.

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## **10. SIXTH ANNUAL SITE 39 HABITAT RESTORATION MEETING**

In accordance with the HRP, annual meetings are held with regulatory agencies and USACE to review and discuss restoration site data, restoration activities, annual monitoring results, and proposed adaptive management strategies for improving restoration success. These meetings also evaluate weed management, sampling protocols, passive versus active restoration approaches, the need to implement corrective measures, and assessment of the 13-year monitoring end point proposed in the HRP.

The Sixth Annual Site 39 Habitat Restoration and Habitat Monitoring Meeting was held at the Base Realignment and Closure conference room on February 17, 2016, at former Fort Ord, California. Participants included Burleson, USACE, CDFW, Bureau of Land Management, USFWS, HydroGeologic Inc., Ahtna, Arcadis, EcoSystems West, Tetra Tech, and Kemron/Gilbane.

Burleson presented information on Site 39 habitat restoration activities for the 2015 calendar year and the overall status of restoration progress.



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## 11. REFERENCES

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**APPENDIX A**

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**Seed and Plant Tables**

**Table A-1.** HA 19 Seed Collection Inventory

Scientific Name	Common Name	Collected (lb)
<i>Adenostoma fasciculatum</i>	chamise	4
<i>Artemisia californica</i>	California sagebrush	8
<i>Baccharis pilularis</i>	coyote brush	4
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	4
<i>Ceanothus dentatus</i>	dwarf ceanothus	4
<i>Crocanthemum scoparium</i>	peak rush-rose	4
<i>Diplacus aurantiacus</i>	sticky monkey flower	0.4
<i>Ericameria fasciculata</i> <sup>1</sup>	Eastwood's goldenbush	0.4
<i>Eriophyllum confertiflorum</i>	golden yarrow	5.2
<i>Lupinus arboreus</i>	yellow bush lupine	3
<i>Lupinus nanus</i>	sky lupine	1
<i>Salvia mellifera</i>	black sage	4
<i>Stipa pulchra</i>	purple needle grass	1
<b>Total</b>		<b>43</b>

<sup>1</sup>HMP species**Table A-2.** Production Seed Tests Results

Scientific Name	Common Name	Test Date	Pure Seed (%)	Germination (%)	Live seeds per lb
<i>Achillea millefolium</i>	common yarrow	8/24/2016	73.5	45.00	N/A
<i>Acmispon glaber</i>	deerweed	9/8/2016	74.75	68.00	N/A
<i>Elymus glaucus</i>	blue wild-rye	6/30/2016	99.17	93.00	114,063
<i>Stipa pulchra</i>	purple needle grass	9/8/2016	99.03	70.00	N/A



**Table A-3. Plant Propagation Inventory**

Scientific Name	Common Name	HA 34 Inventory	HA 37 Inventory
<i>Achillea millefolium</i>	white yarrow	154	171
<i>Acmispon glaber</i>	deerweed	500	329
<i>Adenostoma fasciculatum</i> <sup>2</sup>	chamise	372	276
<i>Arctostaphylos hookeri</i> <sup>1,2</sup>	Hooker's manzanita	286	128
<i>Arctostaphylos montereyensis</i> <sup>1,2</sup>	Toro manzanita	277	107
<i>Arctostaphylos pumila</i> <sup>1,2</sup>	sandmat manzanita	0	237
<i>Arctostaphylos tomentosa</i> ssp. <i>Tom</i> <sup>2</sup>	shaggy-barked manzanita	118	267
<i>Artemisia californica</i>	California sagebrush	208	155
<i>Baccharis pilularis</i>	coyote brush	270	314
<i>Ceanothus rigidus</i> <sup>1</sup>	Monterey ceanothus	556	140
<i>Crocanthemum scoparium</i>	peak rush-rose	534	237
<i>Diplacus aurantiacus</i>	sticky monkey flower	392	288
<i>Eriophyllum confertiflorum</i>	golden yarrow	320	216
<i>Garrya elliptica</i> <sup>2</sup>	coast silk tassel	0	2
<i>Horkelia cuneata</i>	wedge-leaved horkelia	91	250
<i>Lupinus albifrons</i>	silver bush lupine	108	242
<i>Lupinus arboreus</i>	yellow bush lupine	236	262
<i>Salvia mellifera</i>	black sage	330	258
<b>Total</b>		<b>4,752</b>	<b>3,879</b>

Notes:

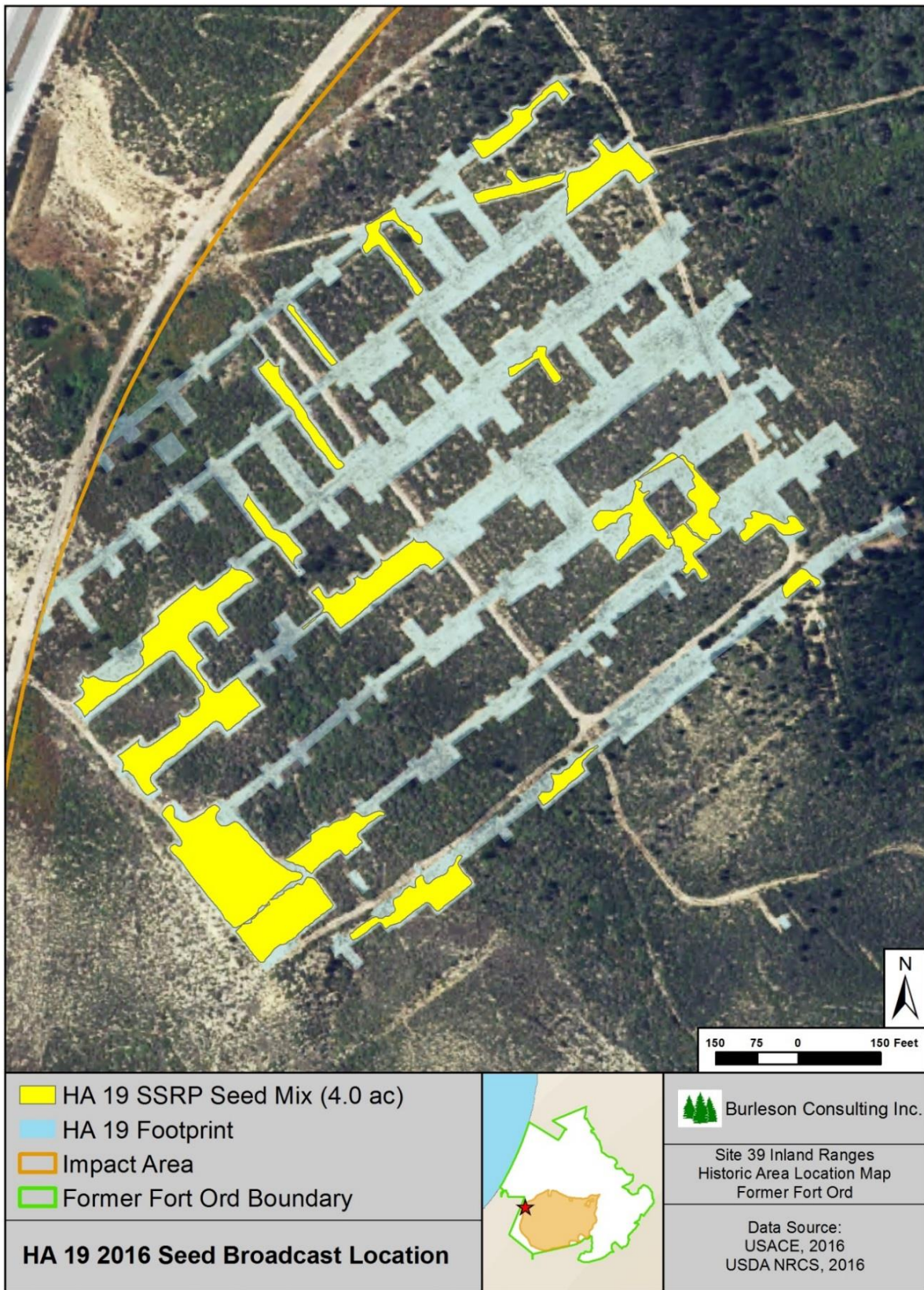
<sup>1</sup> HMP species<sup>2</sup> Plant species propagated via cuttings

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**APPENDIX B**

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**Restoration Activities**



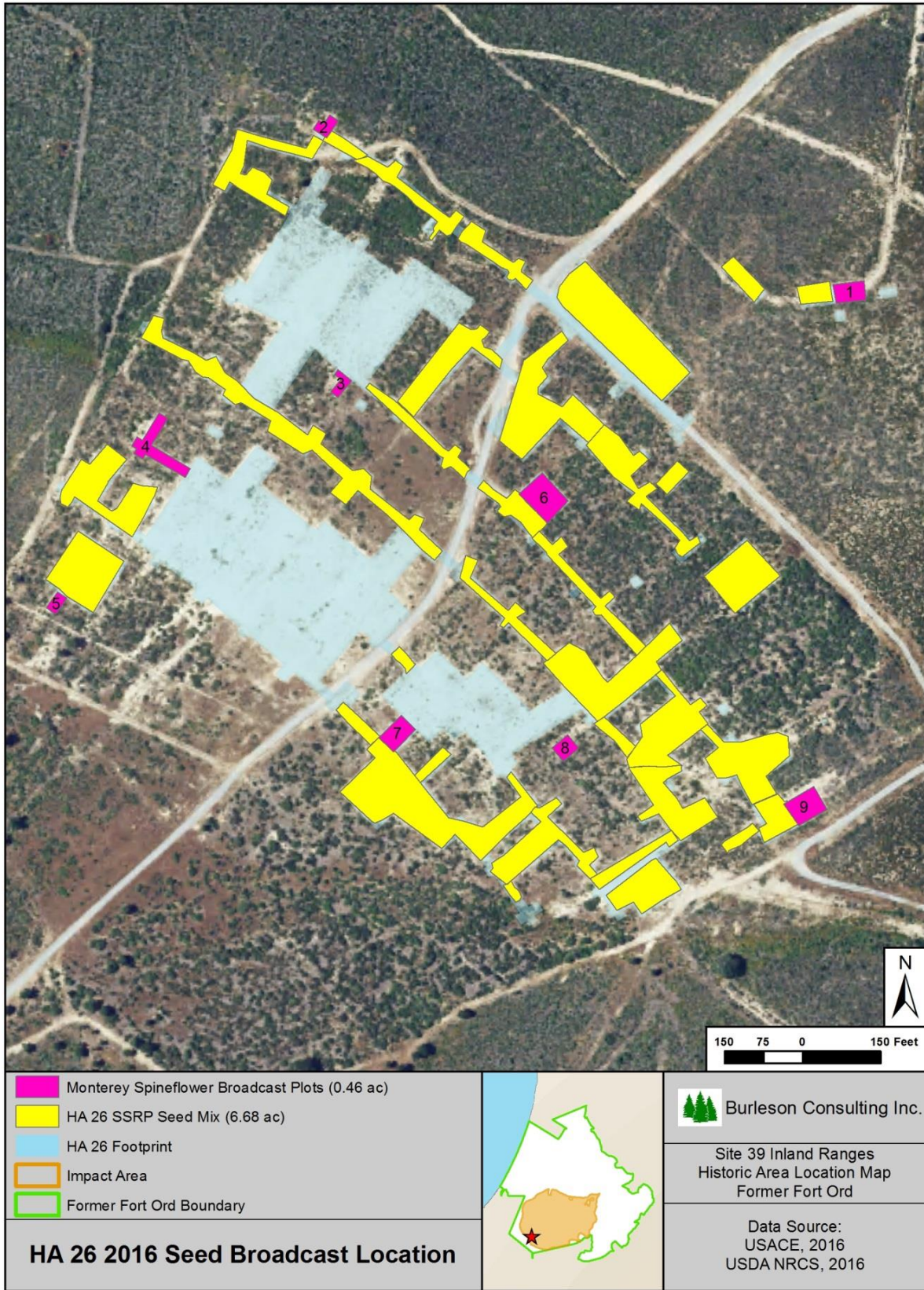
**Figure B-1.** HA 19 Seed Broadcast Location, Former Fort Ord

**Table B-1.** HA 19 SSRP Seed Mix (Enhanced With Production Seed)

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	8.0
<i>Acmispon glaber</i> <b>(deerweed)</b>	16.0
<i>Adenostoma fasciculatum</i> <b>(chamise)</b>	4.0
<i>Artemisia californica</i> <b>(California sagebrush)</b>	4.0
<i>Baccharis pilularis</i> <b>(coyote brush)</b>	4.0
<i>Ceanothus rigidus</i> <sup>1</sup> <b>(Monterey ceanothus)</b>	4.0
<i>Ceanothus dentatus</i> <b>(dwarf ceanothus)</b>	4.0
<i>Crocanthemum scoparium</i> <b>(peak rush-rose)</b>	4.0
<i>Diplacus aurantiacus</i> <b>(sticky monkey flower)</b>	0.4
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	36.0
<i>Eriophyllum confertiflorum</i> <b>(golden yarrow)</b>	5.2
<i>Ericameria fasciculatum</i> <sup>1</sup> <b>(Eastwood's goldenbush)</b>	0.4
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	16.0
<i>Lupinus arboreus</i> <b>(yellow bush lupine)</b>	3.0
<i>Lupinus nanus</i> <b>(sky lupine)</b>	1.0
<i>Salvia mellifera</i> <b>(black sage)</b>	4.0
<b>TOTAL</b>	<b>114.0</b>

<sup>1</sup>HMP species





**Figure B-2.** HA 26 Seed Broadcast Location, Former Fort Ord

**Table B-2. HA 26 SSRP Seed Mix**

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	5.2
<i>Acemison glaber</i> <b>(deerweed)</b>	10.5
<i>Baccharis pilularis</i> <b>(coyote brush)</b>	1.1
<i>Ceanothus rigidus</i> <sup>1</sup> <b>(Monterey ceanothus)</b>	5.2
<i>Crocianthemum scoparium</i> <b>(peak rush-rose)</b>	4.2
<i>Diplacus aurantiacus</i> <b>(sticky monkey flower)</b>	2.6
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	15.7
<i>Ericameria fasciculata</i> <sup>1</sup> <b>(Eastwood's goldenbush)</b>	0.5
<i>Eriophyllum confertiflorum</i> <b>(golden yarrow)</b>	5.2
<i>Hordeum sp.</i> <b>(common barley)</b>	47.2
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	10.5
<i>Salvia mellifera</i> <b>(black sage)</b>	5.2
<b>TOTAL</b>	<b>113.1</b>

<sup>1</sup>HMP species

**Table B-3.** HA 26 Monterey Spineflower Seed Broadcast

<b>Plot Name</b>	<b>Date</b>	<b>Amount (g)</b>	<b>Plot ID</b>	<b>Area (ft<sup>2</sup>)</b>
1	Jan 2015	40.0	HA26_CHPUP_01	2,137
2	Jan 2015	19.0	HA26_CHPUP_02	1,030
3	Jan 2015	16.9	HA26_CHPUP_03	900
4	Jan 2015	71.0	HA26_CHPUP_04	3,798
5	Jan 2015	15.2	HA26_CHPUP_05	816
6	Jan 2015	83.4	HA26_CHPUP_06	4,482
7	Jan 2015	44.1	HA26_CHPUP_07	2,367
8	Jan 2015	30.4	HA26_CHPUP_08	1,302
9	Jan 2015	61.0	HA26_CHPUP_09	3,267
<b>TOTAL</b>		<b>381.0</b>		





**Figure B-3.** HA 27A Seed Broadcast Location, Former Fort Ord

**Table B-4.** HA 27A Erosion Control Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	3.0
<i>Hordeum</i> sp. <b>(sterile barley)</b>	2.0
<b>TOTAL</b>	<b>5.0</b>

**Table B-5.** HA 27A Production Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	0.4
<i>Acmispon glaber</i> <b>(deerweed)</b>	0.8
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	11.4
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	11.4
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	7.0
<b>TOTAL</b>	<b>31.0</b>





Figure B-4. HA 28 Seed Broadcast Location, Former Fort Ord

**Table B-6. HA 28 Erosion Control Seed Mix**

<b>Species</b>	<b>Amount (lb)</b>
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	1.2
<i>Hordeum</i> sp. <b>(sterile barley)</b>	0.8
<b>TOTAL</b>	<b>2.0</b>



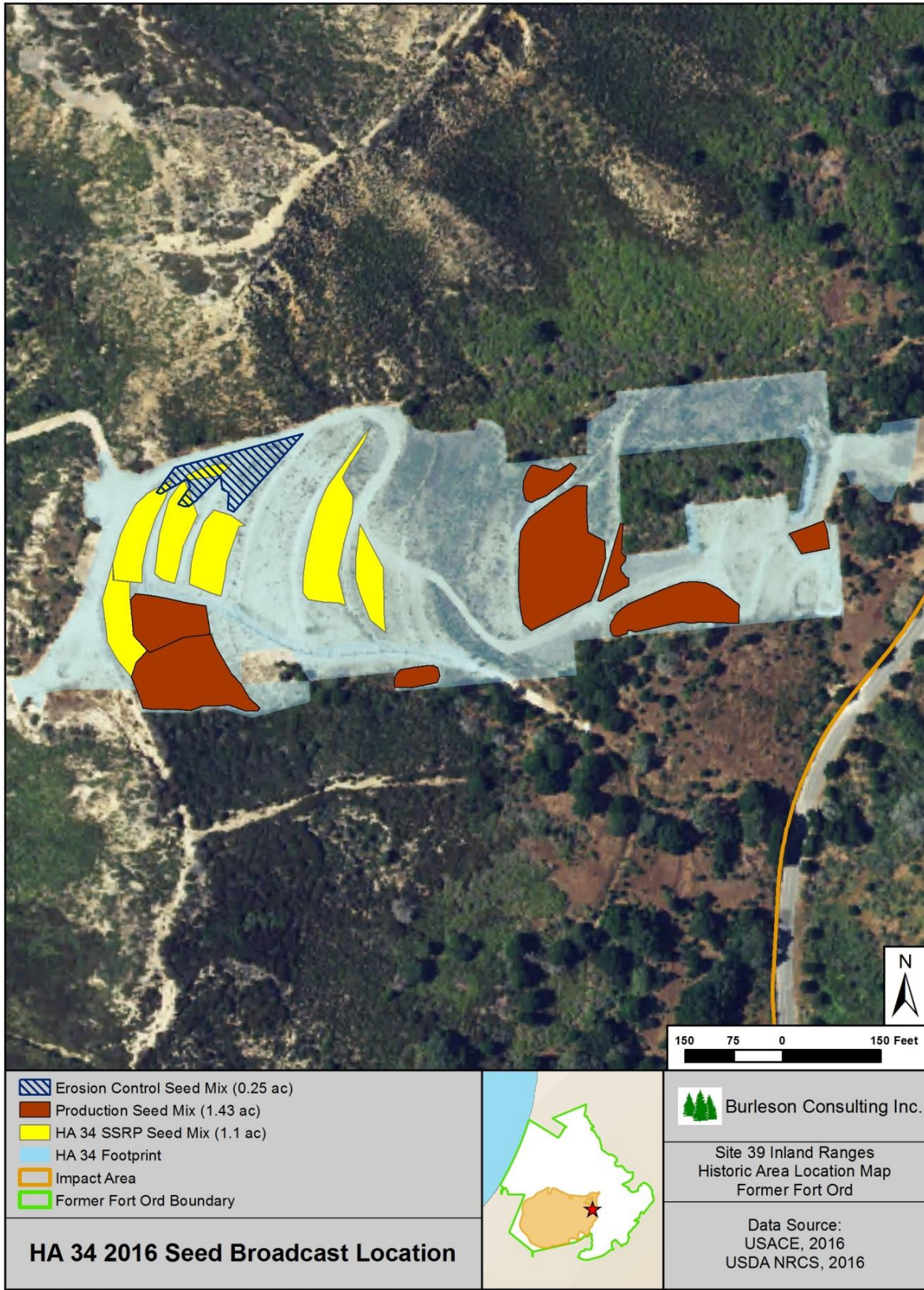


**Figure B-5.** HA 29 Seed Broadcast Location, Former Fort Ord

**Table B-7. HA 29 Production Seed Mix**

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	0.8
<i>Acmispon glaber</i> <b>(deerweed)</b>	1.6
<i>Elymus glaucus</i> <b>(blue wild rye)</b>	1.6
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	1.6
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	1.0
<b>TOTAL</b>	<b>6.6</b>





**Figure B-6.** HA 34 Seed Broadcast Location, Former Fort Ord



**Table B-8. HA 34 SSRP Seed Mix**

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	1.0
<i>Acmispon glaber</i> <b>(deerweed)</b>	2.0
<i>Artemisia californica</i> <b>(California sagebrush)</b>	1.0
<i>Baccharis pilularis</i> <b>(coyote brush)</b>	0.2
<i>Ceanothus rigidus</i> <sup>1</sup> <b>(Monterey ceanothus)</b>	1.0
<i>Crocanthemum scoparium</i> <b>(peak rush-rose)</b>	1.0
<i>Diplacus aurantiacus</i> <b>(sticky monkey flower)</b>	0.1
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	9.0
<i>Eriophyllum confertiflorum</i> <b>(golden yarrow)</b>	0.3
<i>Hordeum</i> sp. <b>(sterile barley)</b>	9.0
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	2.0
<i>Lupinus arboreus</i> <b>(yellow bush lupine)</b>	1.0
<i>Salvia mellifera</i> <b>(black sage)</b>	1.0
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	2.0
<b>TOTAL</b>	<b>30.6</b>

<sup>1</sup>HMP species

**Table B-9.** HA 34 Erosion Control Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	3.0
<i>Hordeum</i> sp. <b>(sterile barley)</b>	2.0
<b>TOTAL</b>	<b>5.0</b>

**Table B-10.** HA 34 Production Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	5.7
<i>Acmispon glaber</i> <b>(deerweed)</b>	11.4
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	11.4
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	11.4
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	7.0
<b>TOTAL</b>	<b>46.9</b>



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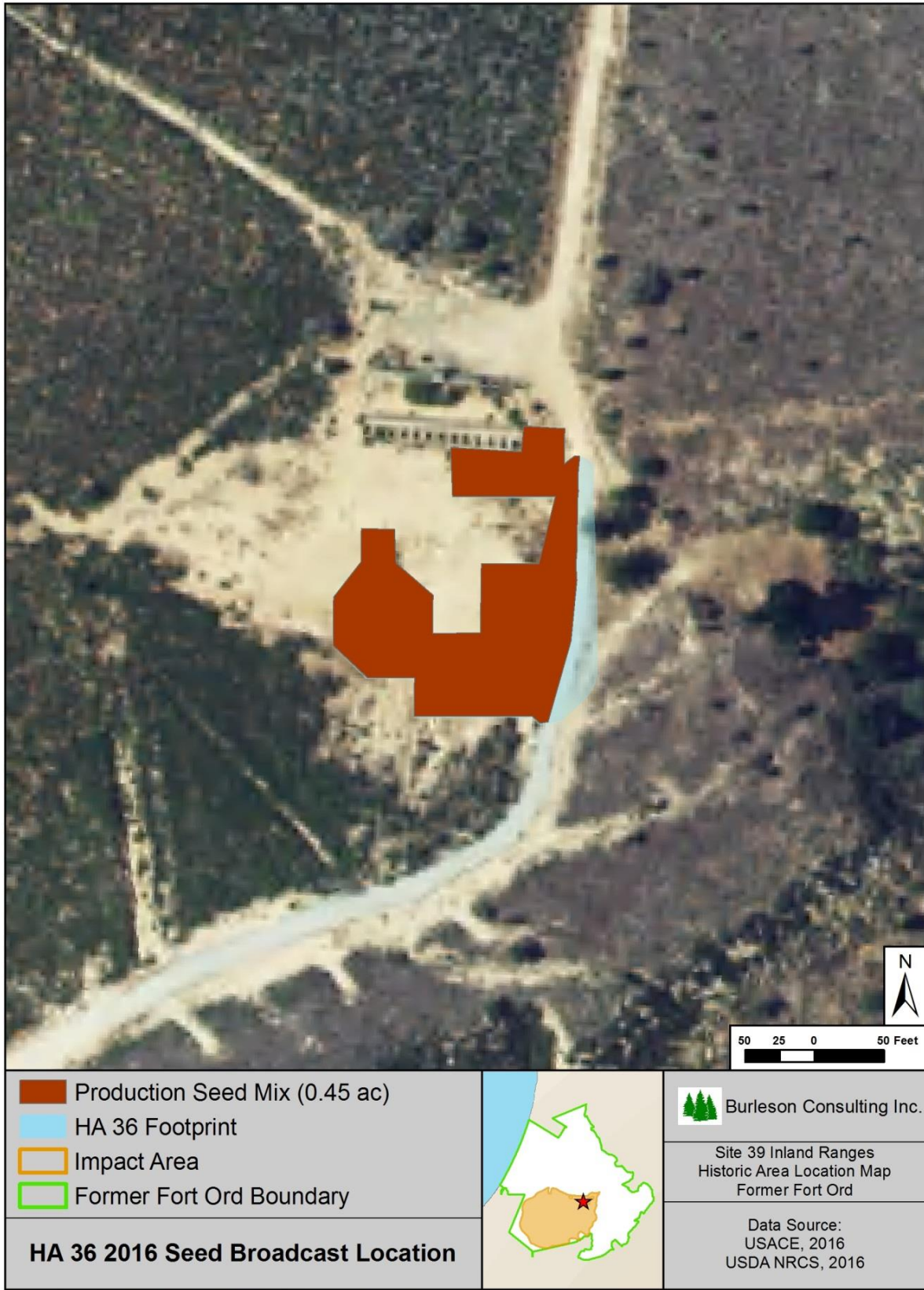
**Figure B-7.** HA 34 Planting Location, Former Fort Ord

**Table B-11.** HA 34 Plant Installation, January 2016

<b>Species</b>	<b>Amount (#)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	54
<i>Acmispon glaber</i> <b>(deerweed)</b>	350
<i>Adenostoma fasciculata</i> <b>(chamise)</b>	158
<i>Arctostaphylos hookeri</i> <sup>1</sup> <b>(Hooker's manzanita)</b>	76
<i>Arctostaphylos montereyensis</i> <sup>1</sup> <b>(Monterey manzanita)</b>	76
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i> <b>(shaggy-bark manzanita)</b>	76
<i>Artemisia californica</i> <b>(California sagebrush)</b>	135
<i>Baccharis pilularis</i> <b>(coyote brush)</b>	95
<i>Ceanothus rigidus</i> <sup>1</sup> <b>(Monterey ceanothus)</b>	132
<i>Crocanthemum scoparium</i> <b>(peak rush-rose)</b>	228
<i>Diplacus aurantiacus</i> <b>(sticky monkey flower)</b>	246
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	17
<i>Lupinus arboreus</i> <b>(yellow bush lupine)</b>	95
<i>Salvia mellifera</i> <b>(black sage)</b>	45
<b>TOTAL</b>	<b>1,783</b>

<sup>1</sup>HMP Species



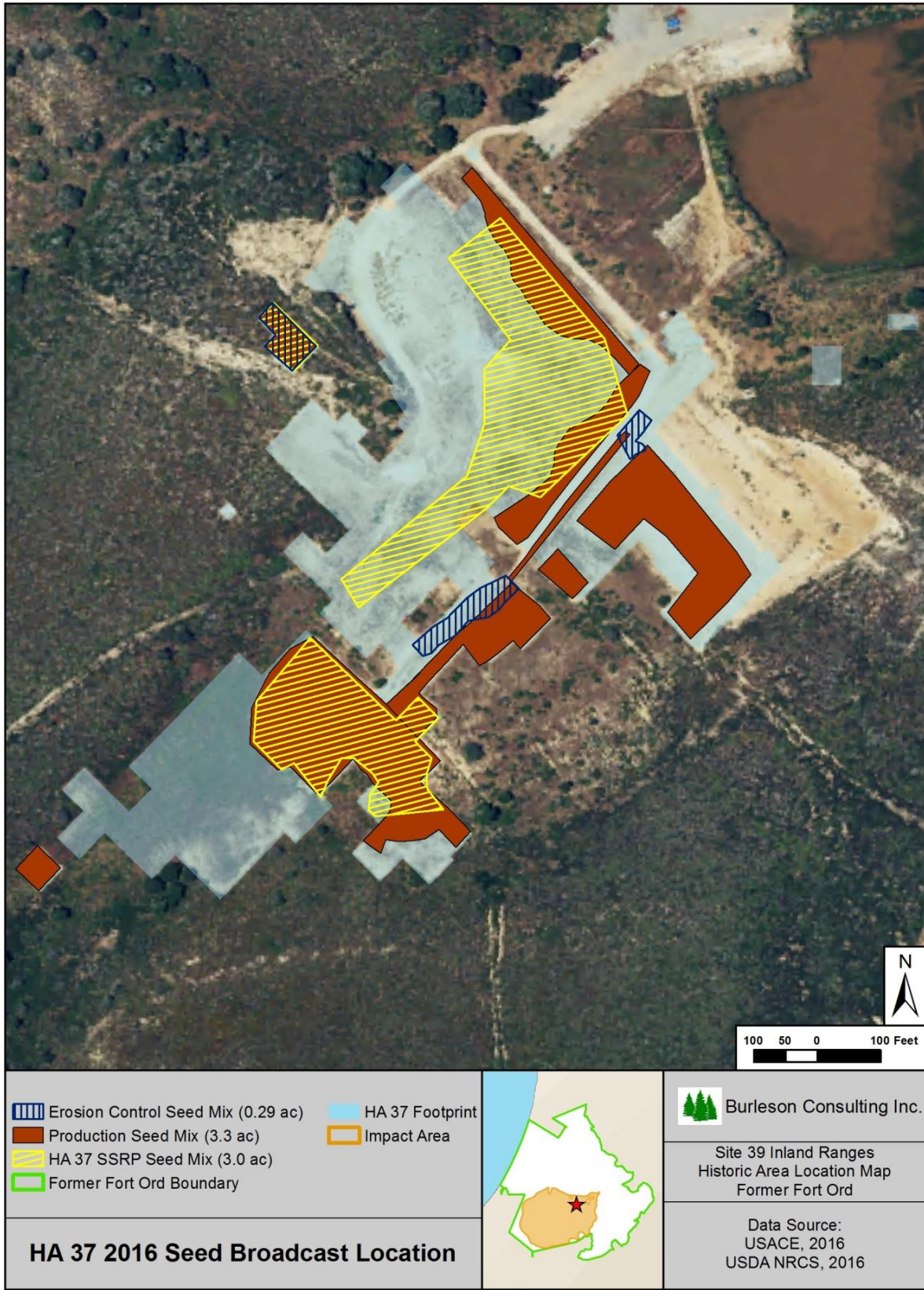


**Figure B-8.** HA 36 Seed Broadcast Location, Former Fort Ord



**Table B-12.** HA 36 Production Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	0.9
<i>Acmispon glaber</i> <b>(deerweed)</b>	1.8
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	1.8
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	1.8
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	1.1
<b>TOTAL</b>	<b>7.4</b>



**Figure B-9.** HA 37 Seed Broadcast Location, Former Fort Ord

**Table B-13. HA 37 SSRP Seed Mix**

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	4.80
<i>Acmispon glaber</i> <b>(deerweed)</b>	4.80
<i>Artemisia californica</i> <b>(California sagebrush)</b>	2.40
<i>Baccharis pilularis</i> <b>(coyote brush)</b>	0.48
<i>Ceanothus rigidus</i> <sup>1</sup> <b>(Monterey ceanothus)</b>	2.40
<i>Crocanthemum scoparium</i> <b>(peak rush-rose)</b>	2.40
<i>Diplacus aurantiacus</i> <b>(sticky monkey flower)</b>	0.24
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	43.20
<i>Eriophyllum confertiflorum</i> <b>(golden yarrow)</b>	0.72
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	4.80
<i>Lupinus arboreus</i> <b>(yellow bush lupine)</b>	2.40
<i>Salvia mellifera</i> <b>(black sage)</b>	2.40
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	4.80
<b>TOTAL</b>	<b>75.84</b>

<sup>1</sup>HMP species

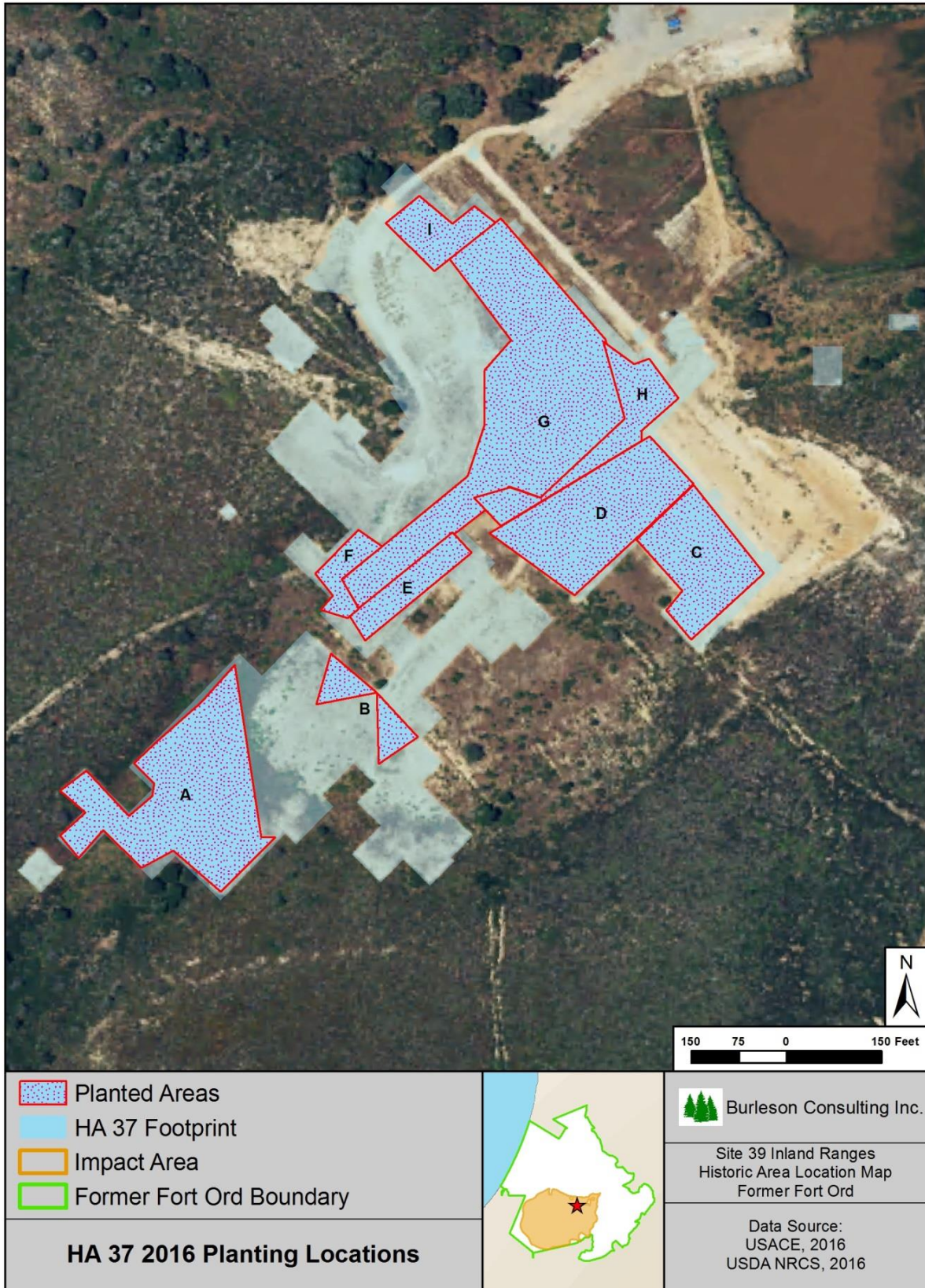
**Table B-14.** HA 37 Erosion Control Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	3.48
<i>Hordeum</i> sp. <b>(sterile barley)</b>	2.32
<b>TOTAL</b>	<b>5.80</b>

**Table B-15.** HA 37 Production Seed Mix

<b>Species</b>	<b>Amount (lb)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	8.1
<i>Acmispon glaber</i> <b>(deerweed)</b>	16.1
<i>Elymus glaucus</i> <b>(blue wild-rye)</b>	16.1
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	16.1
<i>Stipa pulchra</i> <b>(purple needle grass)</b>	10.1
<b>TOTAL</b>	<b>66.5</b>





**Figure B-10.** HA 37 Planting Location, Former Fort Ord



**Table B-16. HA 37 Plant Installation, February-March 2016**

<b>Species</b>	<b>Species Code</b>	<b>Amount (#)</b>
<i>Achillea millefolium</i> <b>(common yarrow)</b>	ACMI	244
<i>Acmispon glaber</i> <b>(deerweed)</b>	ACGL	213
<i>Adenostoma fasciculatum</i> <b>(chamise)</b>	ADFA	316
<i>Arctostaphylos hookeri</i> <sup>1</sup> <b>(Hooker's manzanita)</b>	ARHO	270
<i>Arctostaphylos montereyensis</i> <sup>1</sup> <b>(Monterey manzanita)</b>	ARMO	141
<i>Arctostaphylos pumila</i> <sup>1</sup> <b>(sandmat manzanita)</b>	ARPU	220
<i>Arctostaphylos tomentosa</i> <b>(shaggy-bark manzanita)</b>	ARTO	497
<i>Baccharis pilularis</i> <b>(coyote brush)</b>	BAPI	431
<i>Ceanothus rigidus</i> <sup>1</sup> <b>(Monterey ceanothus)</b>	CERI	239
<i>Crocانthemum scoparium</i> <b>(peak rush-rose)</b>	CRSC	22
<i>Diplacus aurantiacus</i> <b>(sticky monkey flower)</b>	DIAU	437
<i>Garrya elliptica</i> <b>(coast silk tassel)</b>	GAEL	17
<i>Horkelia cuneata</i> <b>(wedge-leaved horkelia)</b>	HOCU	32
<i>Lupinus albifrons</i> <b>(silver bush lupine)</b>	LUAL	146
<i>Lupinus arboreus</i> <b>(yellow bush lupine)</b>	LUAR	175
<i>Salvia mellifera</i> <b>(black sage)</b>	SAME	15
<b>TOTAL</b>		<b>3,415</b>

**Table B-17. HA 37 Plant Installations by Sub-Area, February-March 2016**

HA 37 Sub-Area	Species Code	Amount (lb)
A	ADFA	49
	ARPU	148
	ARHO	92
	LUCH	98
B	ACMI	40
	BAPI	40
	DIAU	11
C	ACGL	60
	ACMI	59
	ADFA	70
	ARHO	72
	ARMO	41
	BAPI	86
	CERI	20
	DIAU	3
	GAEL	3
	LUAL	33
	LUAR	65
D	ACGL	39
	ACMI	63
	ARTO	235
	BAPI	64
	CERI	71
	LUAR	78
	SAME	15
E	ADFA	18
	ARTO	44
	CERI	18

**Table B-17. HA 37 Plant Installations by Sub-Area, February-March 2016**

HA 37 Sub-Area	Species Code	Amount (#)
F	ACGL	19
	ACMI	15
	ADFA	31
	ARPU	19
	ARHO	39
	ARMO	19
	ARTO	46
	BAPI	43
	CERI	29
	DIAU	62
	LUAR	19
G	DIAU	197
	LUAL	15
H	ACGL	68
	ACMI	32
	ADFA	102
	ARPU	26
	ARHO	48
	ARMO	54
	ARTO	104
	BAPI	118
	CERI	47
	DIAU	113
	HOCU	15
I	ACGL	27
	ACMI	35
	ADFA	46
	ARPU	27
	ARHO	19
	ARMO	27
	ARTO	68
	BAPI	80
	CERI	54
	DIAU	51
	GAEL	14
	HESC	22
	HOCU	17
	LUAR	13

**APPENDIX C**

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**Photo Log**

Photo Description	Photo
<p><b>Plant Salvage</b></p> <p>Burleson biologist collecting <i>Lupinus arboreus</i> near HA 39/40.</p> <p><b>C-1</b></p>	 A biologist wearing an orange long-sleeved shirt, a grey baseball cap, and sunglasses is standing in a field of green and brown shrubs. He is holding a bright orange bucket in his left hand and reaching out with his right hand towards a plant. The background shows a line of trees under a clear sky.
<p><b>Plant Salvage</b></p> <p>Burleson biologists collecting <i>Salvia mellifera</i> on BLM land.</p> <p><b>C-2</b></p>	 A biologist wearing an orange long-sleeved shirt with red sleeves, a green headwrap, and a watch is standing in a field of tall, dry grass and green shrubs. He is holding a bright orange bucket with the text "LET'S DO THIS." printed on it in his left hand and reaching out with his right hand towards a plant. The background shows a line of trees under a clear sky.





Photo Description	Photo
<p><b>Plant Salvage</b></p> <p><i>Lupinus arboreus</i> seed during collection.</p> <p><b>C-3</b></p>	
<p><b>Plant Salvage</b></p> <p><i>Salvia mellifera</i> seed collected in the field.</p> <p><b>C-4</b></p>	



Photo Description	Photo
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p>Seed stored in drying racks at Burleson's native plant nursery.</p> <p><b>C-5</b></p>	
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p>Additional seed was stored in a storage facility in Marina.</p> <p><b>C-6</b></p>	





Photo Description	Photo
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p><i>Arctostaphylos montereyensis</i> cuttings propagating in the greenhouse.</p> <p><b>C-7</b></p>	
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p><i>Arctostaphylos montereyensis</i> cuttings with robust roots during transplanting.</p> <p><b>C-8</b></p>	





Photo Description	Photo
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p><i>Arctostaphylos montereyensis</i> propagating in the shade area.</p> <p><b>C-9</b></p>	
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p><i>Horkelia cuneata</i> propagating in the sun area.</p> <p><b>C-10</b></p>	





Photo Description	Photo
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p><i>Diplacus aurantiacus</i> propagating in the sun area.</p> <p><b>C-11</b></p>	
<p><b>Plant Material Storage, Processing and Propagation</b></p> <p>Burleson greenhouse manager watering plants at the nursery.</p> <p><b>C-12</b></p>	





Photo Description	Photo
<p><b>Seed Production</b></p> <p><i>Achillea millefolium</i> growing in the seed production plot.</p> <p><b>C-13</b></p>	
<p><b>Seed Production</b></p> <p><i>Stipa pulchra</i> seed production plot.</p> <p><b>C-14</b></p>	







Photo Description	Photo
<p><b>Seed Production</b></p> <p><i>Stipa pulchra</i> growing in the seed production plot.</p> <p><b>C-15</b></p>	
<p><b>Seed Production</b></p> <p><i>Acmispon glaber</i> seed production plot.</p> <p><b>C-16</b></p>	



Photo Description	Photo
<p><b>Seed Production</b></p> <p><i>Acmispon glaber</i> growing in the seed production plot.</p> <p><b>C-17</b></p>	
<p><b>Seed Production</b></p> <p><i>Achillea millefolium</i> seed from the production plot being stored at the Burleson office.</p> <p><b>C-18</b></p>	



Photo Description	Photo
<p><b>Restoration Activities</b></p> <p>Restoration team applying seed to HA 37.</p> <p><b>C-19</b></p>	
<p><b>Restoration Activities</b></p> <p>Restoration team raking in broadcast seed to establish good seed-soil contact at HA 37.</p> <p><b>C-20</b></p>	



<b>Photo Description</b>	<b>Photo</b>
<p><b>Restoration Activities</b></p> <p>Restoration team applying fresh straw over broadcast seed at HA 37.</p> <p><b>C-21</b></p>	
<p><b>Restoration Activities</b></p> <p>Burleson biologist applying seed to HA 19.</p> <p><b>C-22</b></p>	





Photo Description	Photo
<p><b>Restoration Activities</b></p> <p>Burleson biologist casting straw over seeded area at HA 19.</p> <p><b>C-23</b></p>	 <p>A photograph showing a person in a bright yellow jacket and grey pants standing in a field of sandy soil with sparse, low-lying vegetation. The person is holding a bundle of straw and appears to be casting it over the ground. The background shows a clear blue sky and a line of trees in the distance.</p>
<p><b>Restoration Activities</b></p> <p>Passive area at HA 19 after seed and straw broadcast.</p> <p><b>C-24</b></p>	 <p>A wide-angle photograph of a sandy, open area with scattered, small, dark green shrubs. The ground is light-colored sand. In the background, there are rolling hills, a body of water, and some buildings under a clear blue sky.</p>





Photo Description	Photo
<p><b>Restoration Activities</b></p> <p>Plants being staged along the access road at HA 37.</p> <p><b>C-25</b></p>	
<p><b>Restoration Activities</b></p> <p>Plants staged at HA 37 and ready to be installed.</p> <p><b>C-26</b></p>	





Photo Description	Photo
<p><b>Restoration Activities</b></p> <p>Plants staged and being installed at HA 37.</p> <p><b>C-27</b></p>	
<p><b>Restoration Activities</b></p> <p>Plant installation at HA 34.</p> <p><b>C-28</b></p>	





Photo Description	Photo
<p><b>Restoration Activities</b></p> <p>Staging plants on the steep hill at HA 34.</p> <p><b>C-29</b></p>	
<p><b>Restoration Activities</b></p> <p>Installing cones with a dibbler at HA 34.</p> <p><b>C-30</b></p>	



Photo Description	Photo
<p><b>Restoration Activities</b></p> <p>Installing <i>Adenostoma fasciculatum</i> at HA 34.</p> <p><b>C-31</b></p>	
<p><b>Erosion Control Activities</b></p> <p>Measuring out coir fabric footprint on swale along access road at HA 37.</p> <p><b>C-32</b></p>	





Photo Description	Photo
<p><b>Erosion Control Activities</b></p> <p>Coir fabric installed on swale along access road at HA 37.</p> <p><b>C-33</b></p>	
<p><b>Erosion Control Activities</b></p> <p>Erosion feature at the top of HA 37.</p> <p><b>C-34</b></p>	





Photo Description	Photo
<p><b>Erosion Control Activities</b></p> <p>Collapsing rills in erosion area at top of HA 37.</p> <p><b>C-35</b></p>	
<p><b>Erosion Control Activities</b></p> <p>Laying out coir fabric after straw wattle trenches have been dug at the top of HA 37.</p> <p><b>C-36</b></p>	





Photo Description	Photo
<p><b>Erosion Control Activities</b></p> <p>Hammering stakes into straw wattles at the top of HA 37.</p> <p><b>C-37</b></p>	
<p><b>Erosion Control Activities</b></p> <p>Erosion features to be fixed at HA 27A.</p> <p><b>C-38</b></p>	





Photo Description	Photo
<p><b>Erosion Control Activities</b></p> <p>Collapsing and filling in rills with bark at HA 27A.</p> <p><b>C-39</b></p>	
<p><b>Erosion Control Activities</b></p> <p>Coir fabric and straw wattles installed at HA 27A.</p> <p><b>C-40</b></p>	





Photo Description	Photo
<p><b>Monitoring Activities.</b></p> <p>Burleson biologist conducting HMP forb density surveys at HA 43.</p> <p><b>C-41</b></p>	
<p><b>Monitoring Activities.</b></p> <p>Burleson biologists conducting HMP forb density surveys at HA 37.</p> <p><b>C-42</b></p>	





Photo Description	Photo
<p><b>Monitoring Activities</b></p> <p><i>Chorizanthe pungens</i> var. <i>pungens</i> growing in restoration plot HA 37 during HMP forb density surveys.</p> <p><b>C-43</b></p>	
<p><b>Monitoring Activities</b></p> <p><i>Gilia tenuiflora</i> ssp. <i>arenaria</i> growing in restoration plot at HA 19 during HMP forb density surveys.</p> <p><b>C-44</b></p>	







Photo Description	Photo
<p><b>Monitoring Activities</b></p> <p>Burleson biologists conducting meandering transects at HA 37.</p> <p><b>C-45</b></p>	
<p><b>Monitoring Activities</b></p> <p>Burleson biologist conducting line-intercept transect surveys at HA 38.</p> <p><b>C-46</b></p>	



Photo Description	Photo
<p><b>Monitoring Activities</b></p> <p>Survivorship monitoring established at HA 34.</p> <p><b>C-47</b></p>	
<p><b>BRAC Open House</b></p> <p>Burleson biologists showing the public native plants at the BRAC Open House.</p> <p><b>C-48</b></p>	

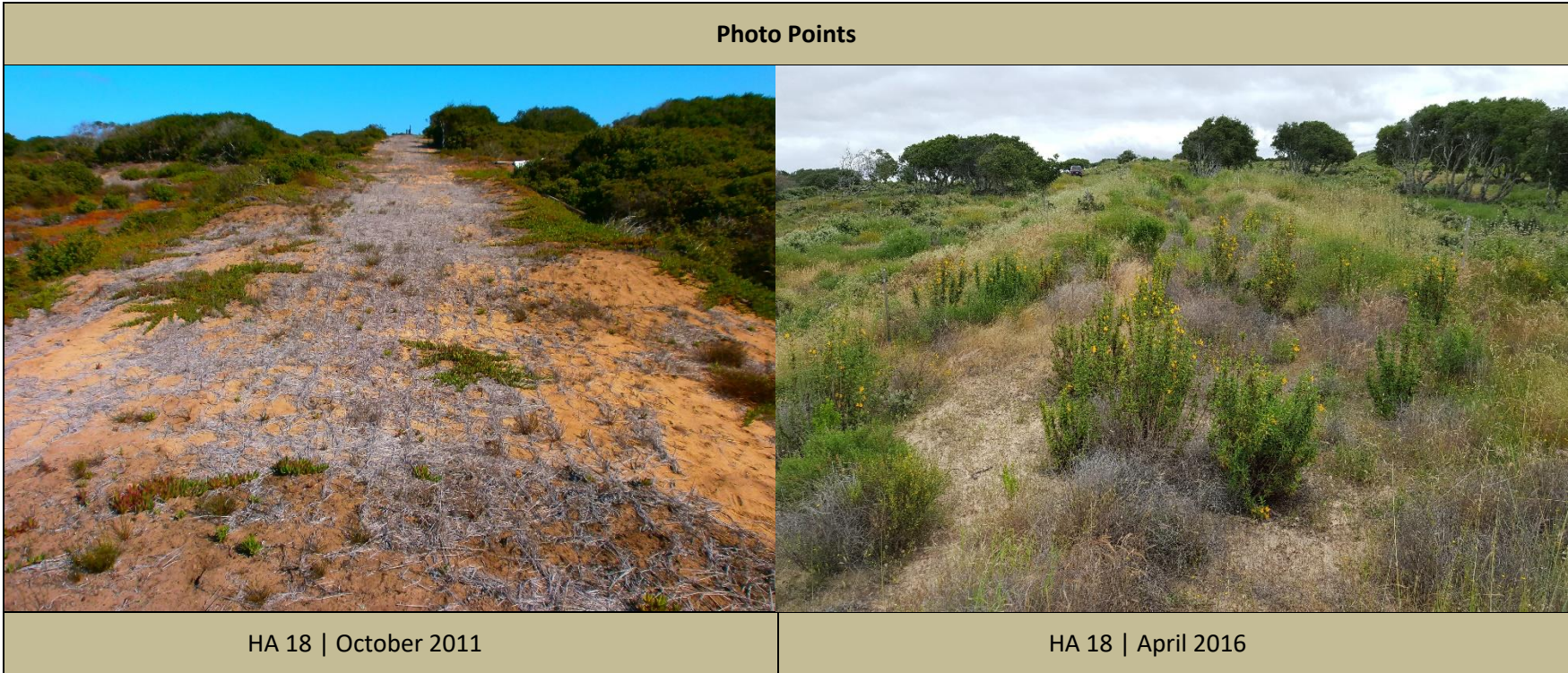
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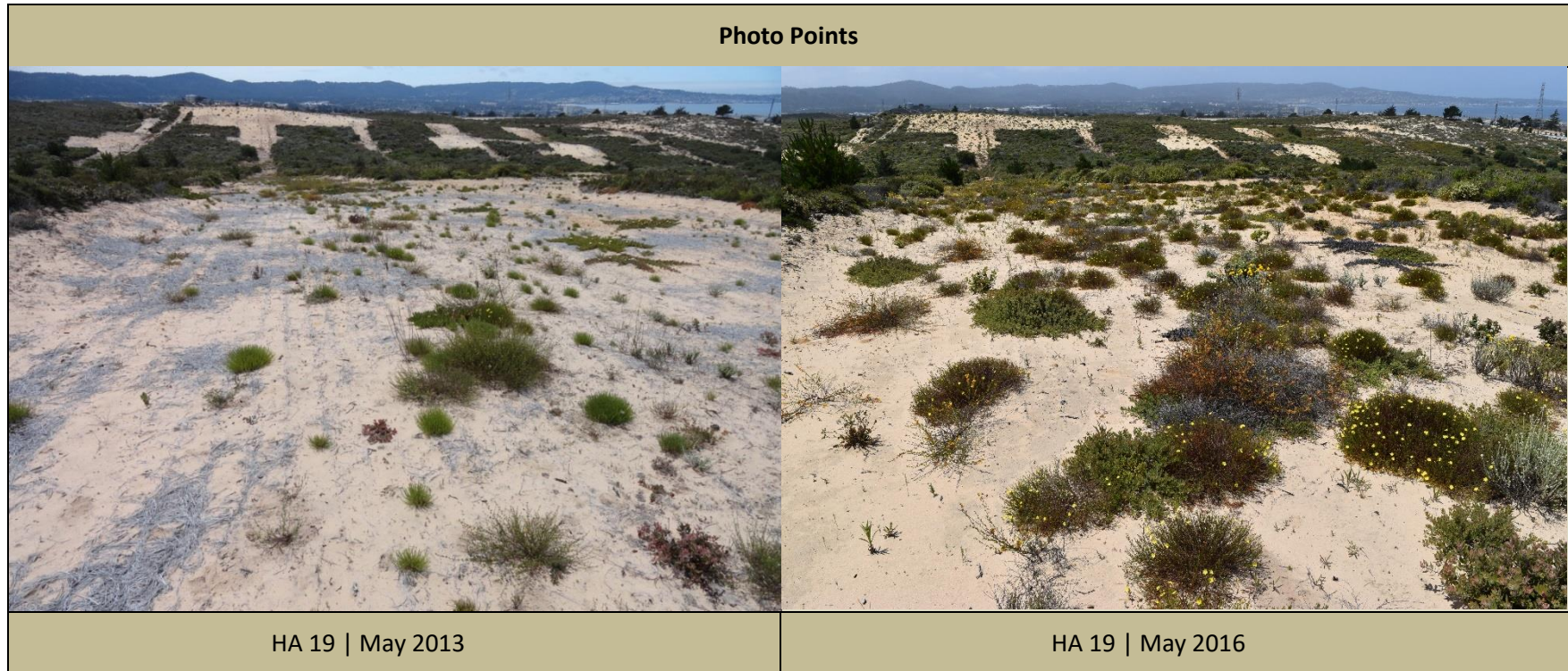
**APPENDIX D**

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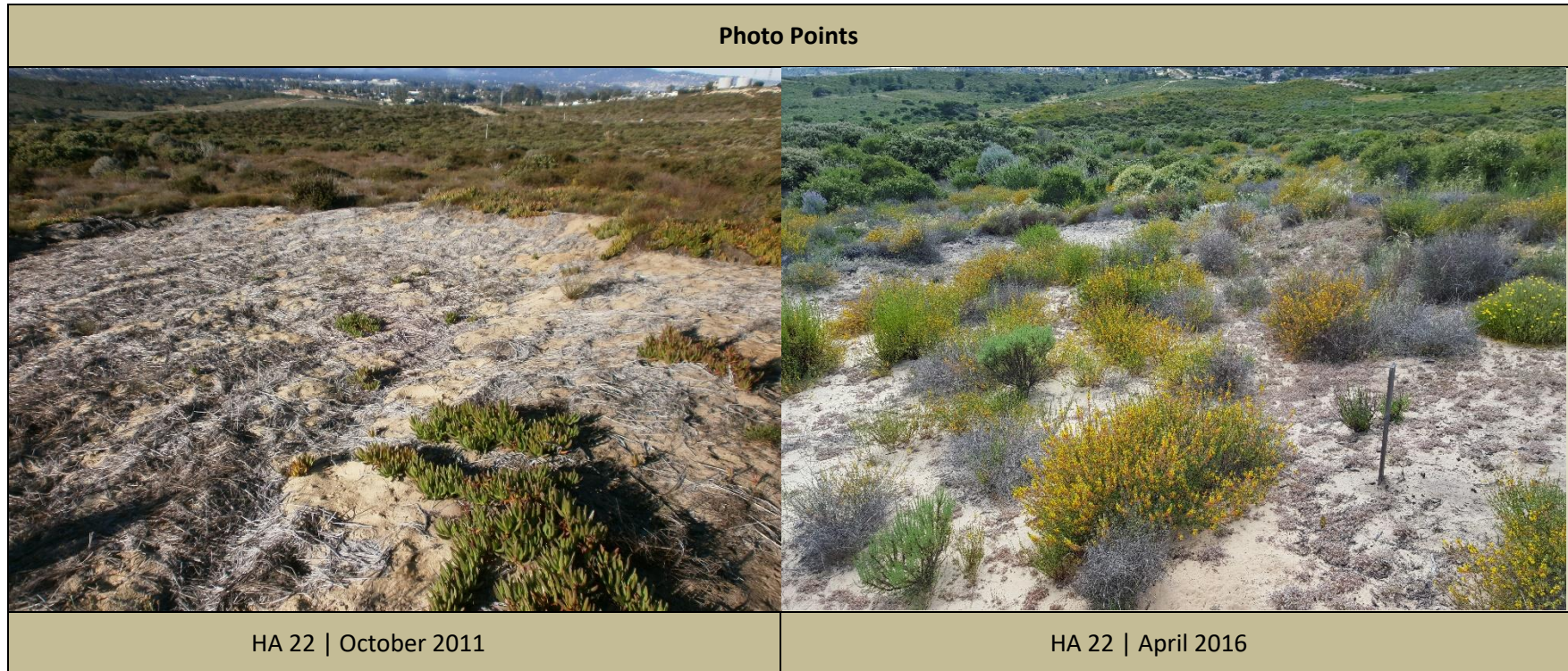
**Photo Points**













**Photo Points**

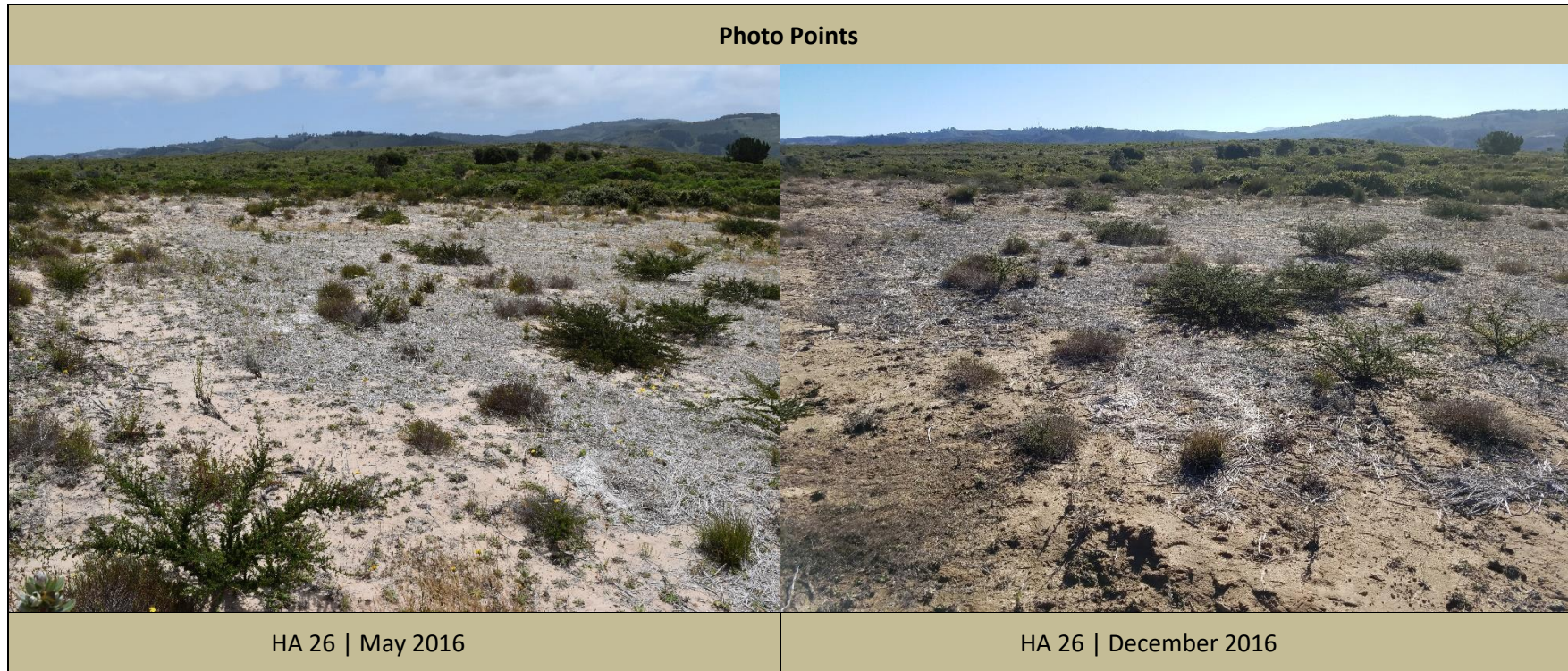


HA 23 | October 2011



HA 23 | April 2016







**Photo Points**

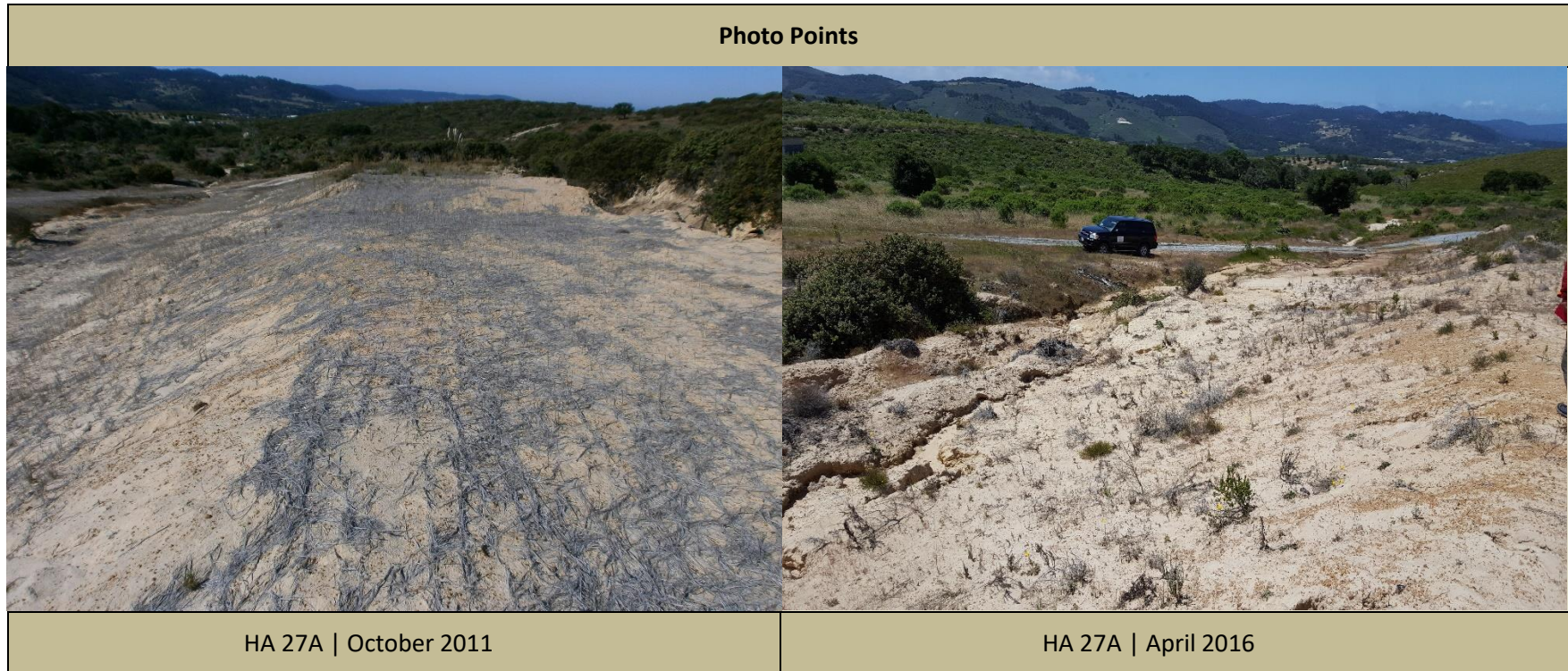


HA 27 | October 2011

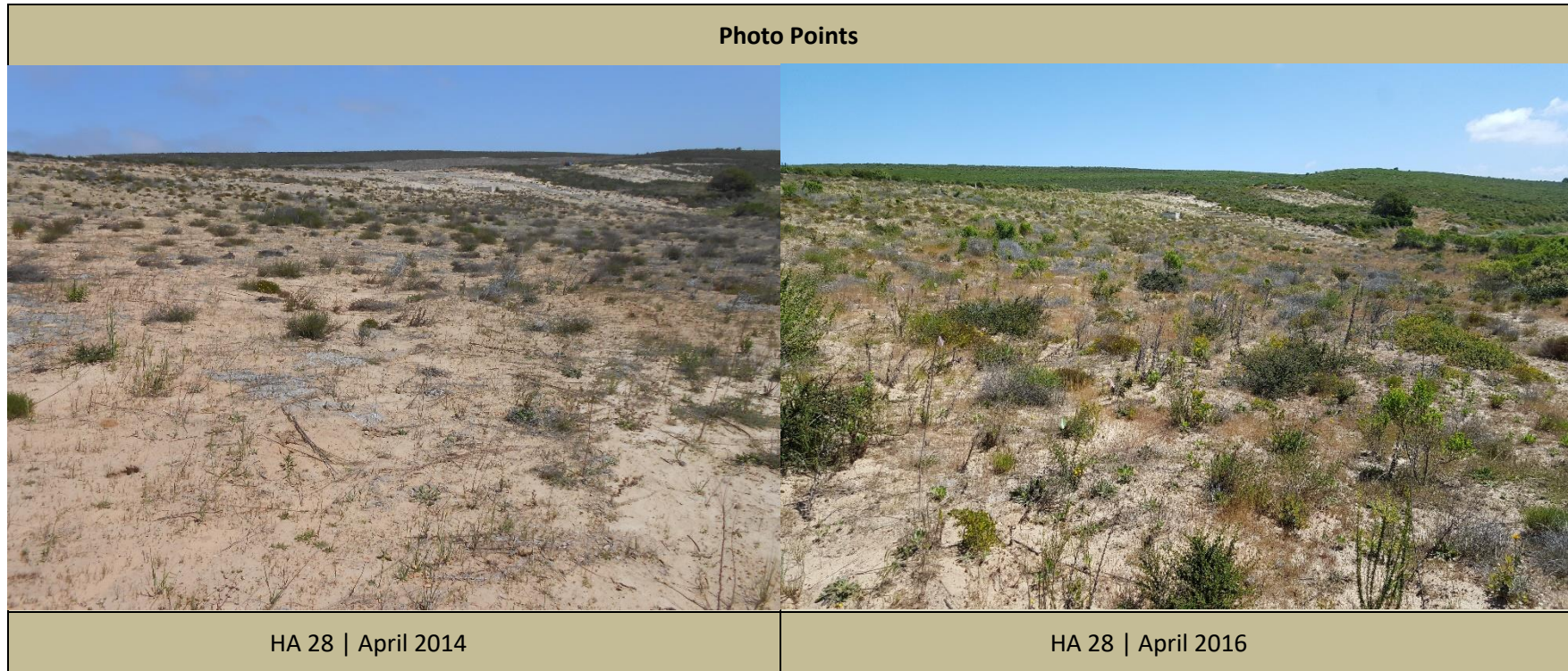


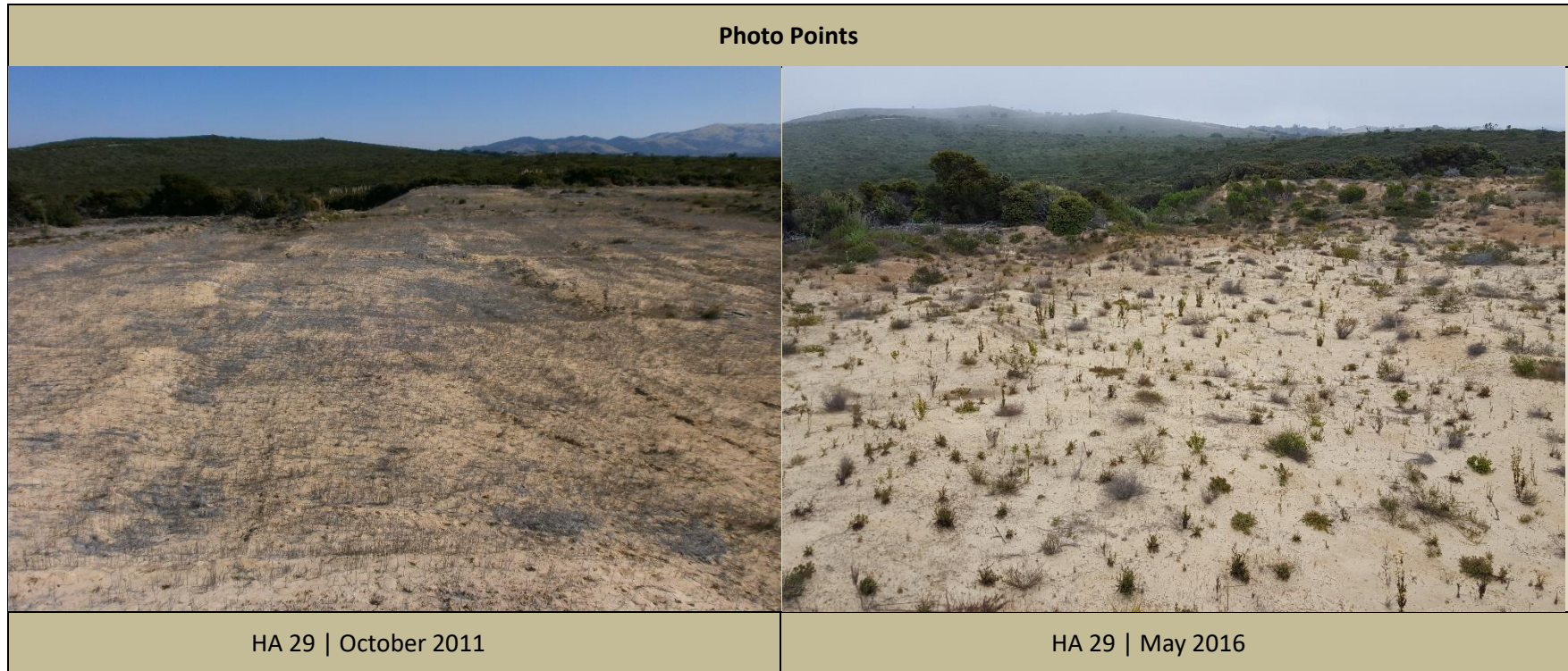
HA 27 | May 2016



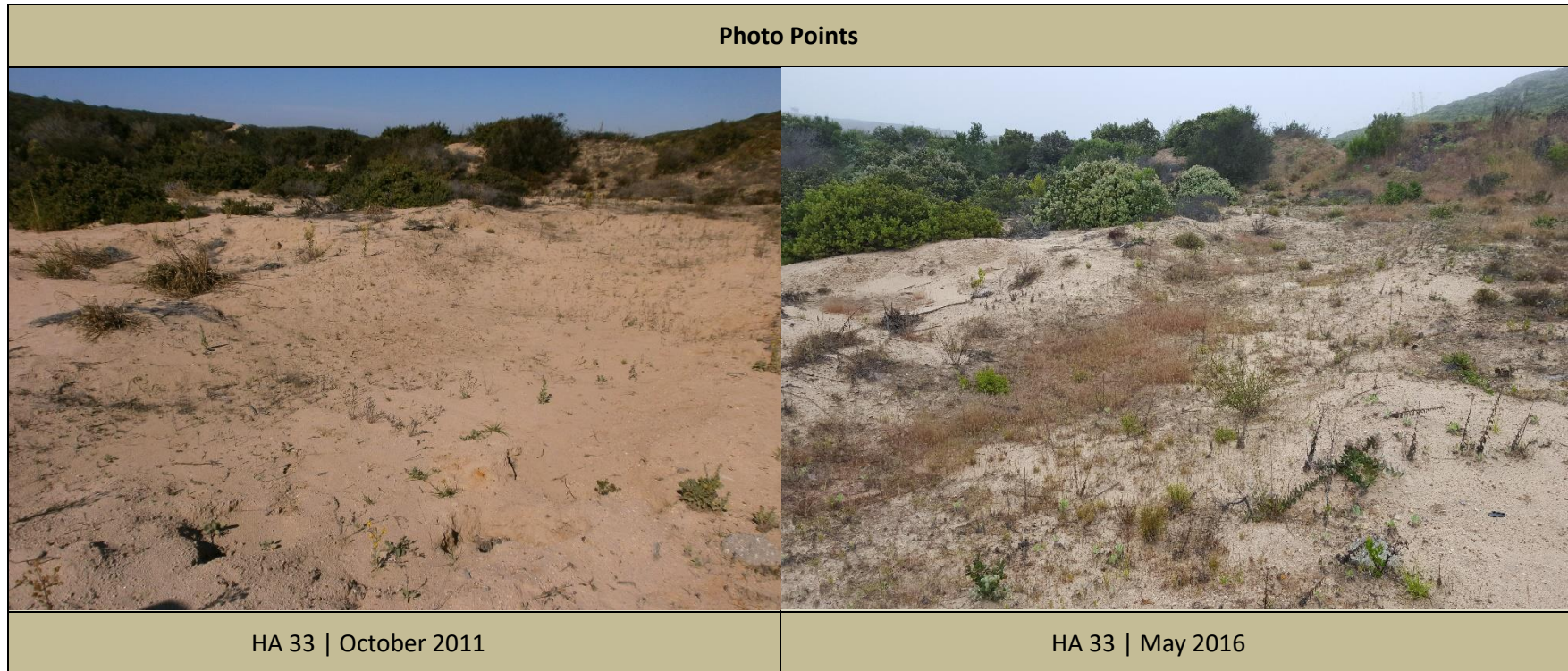












**Photo Points**



HA 34 | April 2016



HA 34 | December 2016



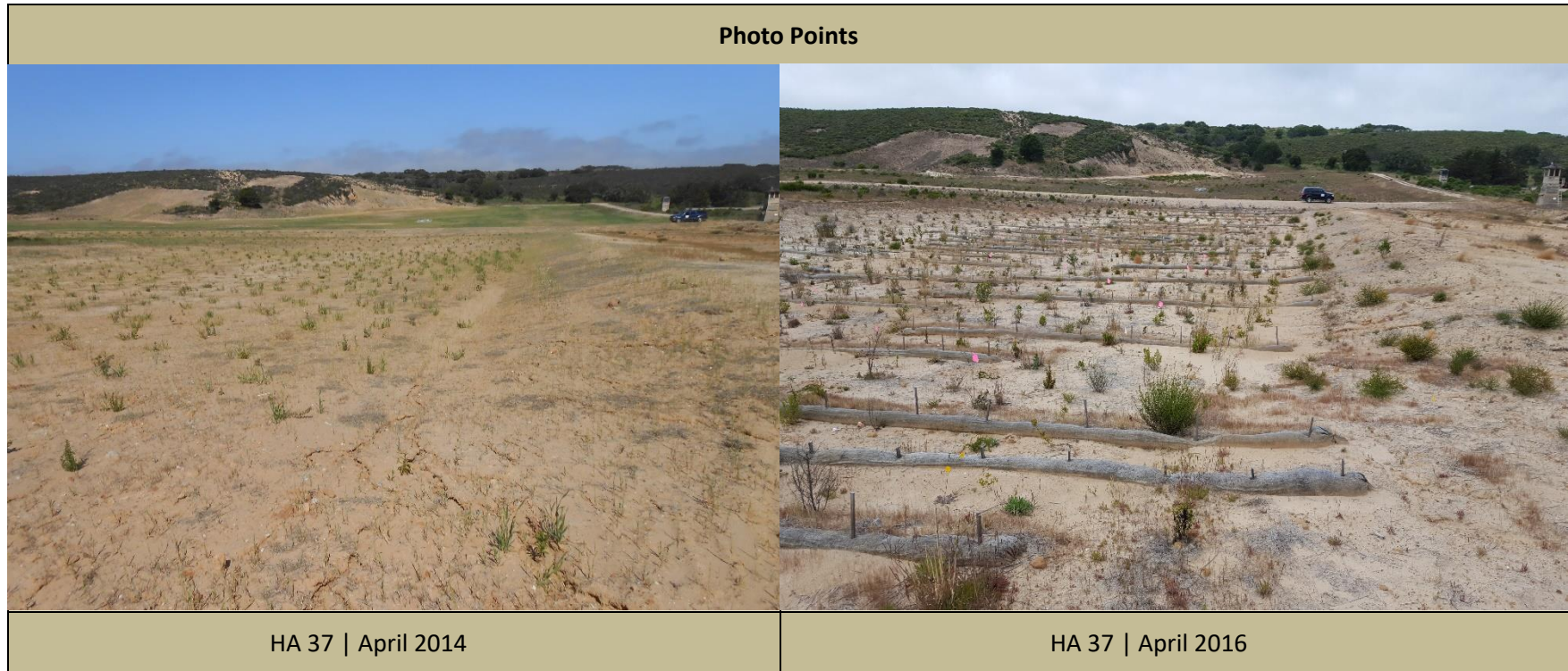
**Photo Points**





HA 36 | October 2011

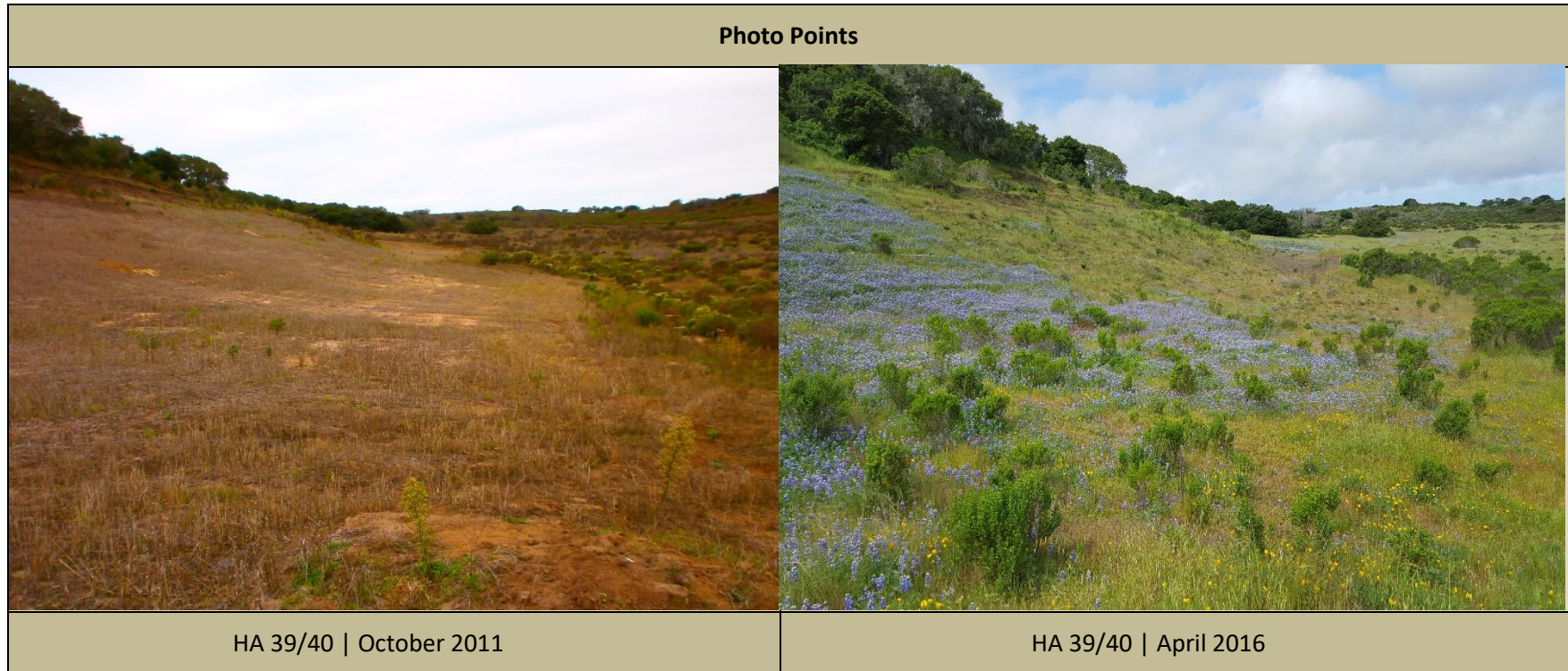


HA 36 | April 2016





<b>Photo Points</b>	
	
HA 38   April 2014	HA 38   April 2016





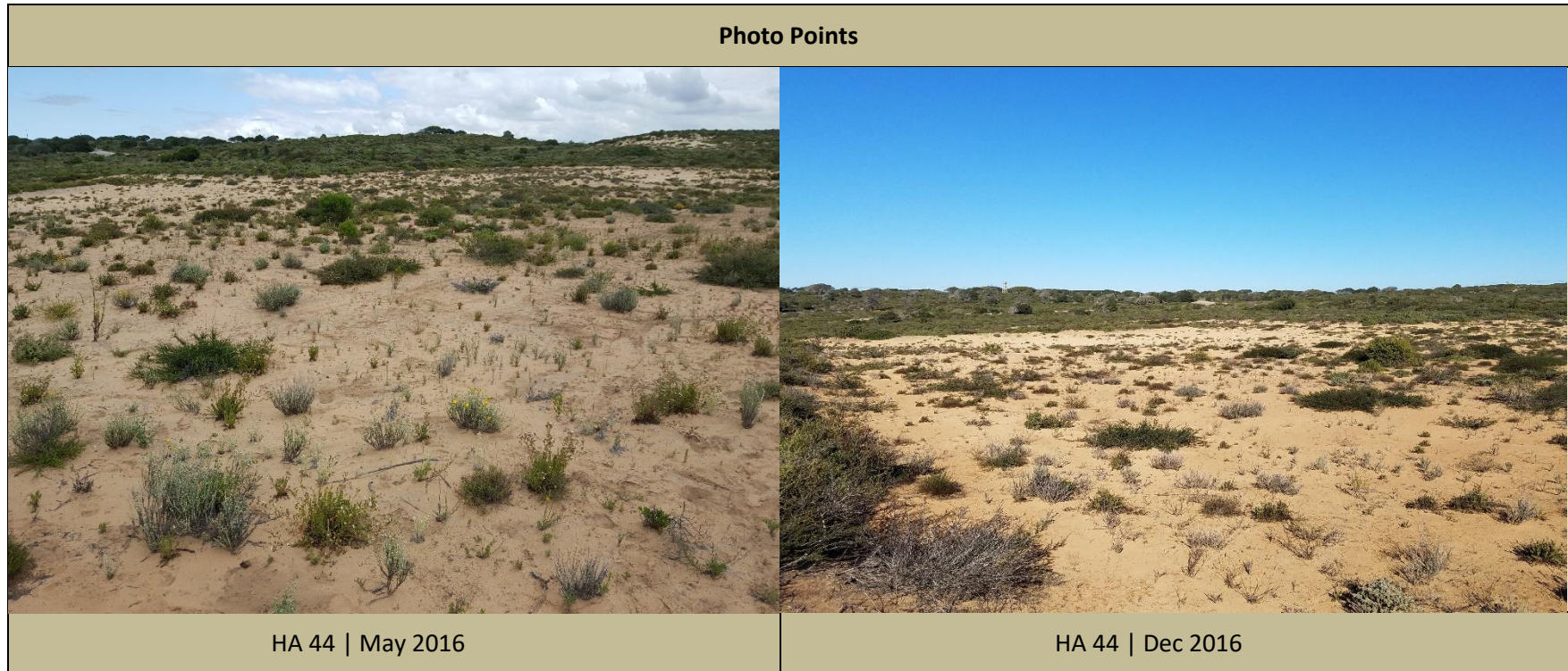
**Photo Points**




HA 43 | October 2011



HA 43 | April 2016





<b>Photo Points</b>	
	<p><b>NO PHOTO AVAILABLE DUE TO PROLONGED UXO PRESENCE AT HA 48</b></p>
<p>HA 48   April 2016</p>	<p>HA 48   N/A</p>

**Photo Points**



Austin Rd Stockpile | May 2016



Austin Rd Stockpile | December 2016