Final South Boundary Road Biological Monitoring Report Former Fort Ord

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Acronyms

BLM.....Bureau of Land Management

BO.....Biological Opinion

CNPS.....California Native Plant Society

GPS .....Global Positioning System

HMP.....Habitat Management Plan

MEC.....Munitions and Explosives of Concern

MSD.....Minimum Safe Distance

SBR.....South Boundary Road

USFWS .....U.S. Fish and Wildlife Service

VMP .....vegetation monitoring protocol

1.0 INTRODUCTION

This 2007 biological monitoring study was conducted as a requirement of the *Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord* (HMP) [United States Army Corps of Engineers 1997] and biological opinions (BO) issued by the United States Fish and Wildlife Service (USFWS) [1999, 2002, and 2005]. The HMP specifies mitigation measures including monitoring regeneration of special-status species following cleanup activities. Cleanup activities that have potential to affect biological resources include excavation of contaminated soil, landfill remediation, removal of lead and other heavy metals, and munitions and explosives of concern (MEC) removal. The vegetation monitoring protocol (VMP) (Burleson 2006) recommends that in habitat reserve areas where cleanup activities have been conducted, monitoring be performed for several years to determine success of habitat recovery. Monitoring results may be used for comparison with a site's baseline survey data to assess whether recovery and regeneration of the protected habitat and its associated rare plant species are proceeding toward baseline conditions (Parsons 2005).

The South Boundary Road (SBR) Vegetation Clearance Project conducted in 2006 was necessary to expand the existing fuel break to 200 feet wide (Shaw 2007). The widened fuel break allows the Presidio of Monterey firefighters to operate safely from SBR to protect communities to the south of former Fort Ord without the threat of explosive hazards in the event of a wildfire within the former Fort Ord Impact Area. A 200-foot minimum safe distance (MSD) measured from the north shoulder of SBR was cleared using a combination of mechanical and manual methods.

After vegetation cutting, the ground surface was inspected for the presence of MEC to ensure the fuel break is free of surface MEC. Cutting occurred next to an existing fuel break (40 - 50 foot wide) that is maintained annually by mowing to reduce vegetation. Baseline monitoring for this project was conducted in 2005. The VMP recommends monitoring of HMP annuals beginning at year 1, and monitoring of shrubs and annuals at years 3, 5, 8 and 13.

In April 2007, Burleson Consulting, Inc. (Burleson) conducted the first year of biological monitoring for the vegetation clearance project area north of SBR. This report presents the results of biological monitoring conducted along SBR at former Fort Ord, California. The project involved monitoring for HMP annuals, grasses, and exotic plants. Monitoring was completed using methodology presented in the VMP and the Baseline Biological Monitoring South Boundary Road Vegetation Clearance Project (MACTEC 2005).

1.1. Site Description

The biological monitoring site is located within a fuel break north of SBR on Fort Ord, about eight miles north of Monterey, California (Figure 1). The primary habitat cut during the clearance project was Central Maritime Chaparral, which is protected under the HMP because of its association with many rare, threatened, and endangered species.

The area monitored was about 11,500 feet long with an approximate area of 52.9 acres (Figure 2).

1.2. 2005 Baseline Biological Monitoring Conducted on the Site

Baseline biological monitoring was conducted prior to the one-time cut of maritime chaparral for the Vegetation Clearance Project. Shrub species composition and cover within maritime chaparral was monitored using ten individual 50-meter transects within the 200-foot wide MSD. Walking surveys were used to determine the presence, extent, and density of non-native grasses as well as other exotic, non-native plant species within open areas in the MSD. A Global Positioning System (GPS) was used to note the locations and extent of the non-native species to document their potential immigration and extent of invasion into newly opened areas in succeeding years.

Invasive weeds occupy pockets of land that would otherwise be available for a variety of native maritime chaparral and grassland species, many of which are considered rare. Control of invasive weeds is conducted under an Inter-Service Agreement between the United States Army and the Bureau of Land Management (BLM). Exotic species of interest during the Baseline Biological Monitoring include pampas grass (*Cortaderia jubata*), iceplant (*Carpobrotus edulis*), French broom (*Genista monspessulana*), and cut-leaved fireweed (*Erechtites glomerata*). Pampas grass is notorious for rapidly colonizing disturbed areas like SBR, and was the only exotic non-native species to have abundance data recorded in the baseline biological monitoring report (MACTEC 2005).

Shrub species observed in the chaparral habitat along or adjacent to the line-intercept transects included: shaggy-barked manzanita (*Arctostaphylos* ssp. *tomentosa*), sandmat manzanita (*A. pumila*), Hooker's manzanita (*A. hookeri* ssp. *hookeri*), toro manzanita (*A. montereyensis*), coyote brush (*Baccharis pilularis*), Monterey ceanothus (*Ceanothus cuneatus* var. *rigidus*), black sage (*Salvia mellifera*), chamise (*Adenostoma fasciculatum*), California coffeeberry (*Rhamnus california* ssp. *california*), sticky monkeyflower (*Mimulus aurantiacus*), and coast live oak (*Quercus agrifolia*).

1.3. 2007 HMP Species Monitoring at South Boundary Road

Monitoring the recovery of habitat reserve areas that contain maritime chaparral and wetlands is required by the HMP and the BO issued by the USFWS. Burleson conducted Central Maritime Chaparral monitoring April 19 and 20, 2007. Six rare annual species [sand gilia (*Gilia tenuiflora* ssp. *arenaria*), Monterey spineflower (*Chorizanthe pungens* var. *pungens*), Seaside bird's-beak (*Cordylanthis rigidus* ssp. *littoralis*), coast wallflower (*Erysimum ammophilum*), and Contra Costa goldfields (*Lasthenia conjugens*)], non-native grasses, and exotic non-native plants were monitored. Table 1 lists HMP annual plants, preferred habitat, and Federal, State, and California Native Plant Society (CNPS) status. Exotic, non-native plant species recorded during the monitoring include pampas grass (*Cortaderia jubata*), iceplant (*Carpobrotus edulis*), French broom (*Genista monspessulana*), and cut-leaved fireweed (*Erechtites glomerata*).

Table 1. Special-status Annual Species with Monitoring Requirements in the Fort Ord Multi-species Habitat Management Plan

Species Name	Preferred Habitat	Status Federal/State/CNPS
Chorizanthe pungens var. *pungens* Monterey spineflower	Annual herb from the buckwheat family (Polygonaceae), found in coastal strand, coastal scrub, and maritime chaparral habitat below 1476 feet. Blooms from April to June, sometimes July.	T/—/1B
Cordylanthus rigidus littoralis Seaside bird's-beak	Annual hemiparasitic herb from the figwort family (Scrophulariaceae), found in coastal strand, coastal scrub, maritime chaparral, cismontane woodland, and closed-cone coniferous forest habitats below 1394 feet. Blooms from April to October.	—/E/1B
Erysimum ammophilum Coast wallflower	Annual or biennial herb from the mustard family (Brassicaceae), found in coastal strand, coastal scrub, and maritime chaparral habitat below 197 feet. Blooms from February to June.	—/—/1B
Gilia tenuiflora arenaria Sand gilia	Annual herb from the phlox family (Polemoniaceae), endemic to Monterey Bay and Peninsula dune complexes below 100 feet in elevation. Blooms from April to June.	E/T/1B
Lasthenia conjugens Contra Costa goldfields	Annual herb from the aster family (Asteraceae), endemic to vernal pools below 328 feet in elevation. Blooms from March through June.	E/E/1B

Sources: California Natural Diversity Database 2007, U.S. Fish and Wildlife Service 2007
CNPS: California Native Plant Society 2007

Federal Status
E: Endangered
T: Threatened

State/CDFG Status
E: Endangered
T: Threatened

CNPS Status
1B: Rare and endangered in California and elsewhere

HMP annual plants and non-native grass density was examined within 61 circular plots located in the SBR fuel break area (Figures 3 through 5). Exotic, non-native plants were visually surveyed by walking the project area and recording species locations with GPS (Figures 6 through 14). Year 2007 was the first season for vegetation monitoring at the area north of SBR.

1.3.1. Effect of Work-related Disturbances to Maritime Chaparral Species

One of the goals of annual monitoring within former Fort Ord is to examine trends in the recovery, health, and diversity of rare habitats, such as maritime chaparral, following vegetation removal activities such as that on the north area of SBR. Annual monitoring results may be used for comparison with a site's baseline survey data to assess whether recovery and regeneration of the protected habitat and its associated rare plant species are proceeding toward baseline conditions. This site received vegetation clearance treatment using manual and mechanical means to cut down maritime chaparral and limb trees. Cut vegetation was then shredded and spread along the ground in the newly cleared area (see site photographs in Appendix A).

1.3.2. Effect of Disturbance on Vegetation Growth

Assuring that self-sustaining stands of maritime chaparral are present requires time and understanding of natural succession after disturbance in this habitat. In the early years following fire, obligate seeders predominate (Monterey carpet manzanita (*Arctostaphylos hookeri*), Monterey manzanita (*A. montereyensis*), dune manzanita (*A. pumila*), California lilacs (*Ceanothus sp.*), sun rose (*Helianthemum scoparium*), California pitcher plant (*Lepechinia calycina*), gooseberries (*Ribes sp.*), and black sage (*Salvia mellifera*). As the vegetation matures, over several decades, these species give way to the stump-sprouters including chamise (*Adenostoma fasciculatum*), woolyleaf manzanita (*Arctostaphylos tomentosa*), silk-tassel bush (*Garrya elliptica*), Christmas berry (*Heteromeles arbutifolia*), sticky monkey flower (*Mimulus aurantiacus*), chaparral pea (*Pickeringia montana*), coffeeberry (*Rhamnus californica*), and poison oak (*Toxicodendron diversilobum*). Sites that are physically disturbed, such as the SBR Vegetation Clearance Project, are prone to colonization by wind-dispersed weedy taxa normally seen in nearby coastal sage scrub habitats such as California sagebrush (*Artemisia californica*), coyotebrush (*Baccharis pilularis*), and mock heather (*Ericameria ericoides*), or by introduced weeds such as iceplant (*Carpobrotus edulis*), pampas grass (*Cortaderia jubata*), or cut-leaved fireweed (*Erechtites glomerata*).

2.0 METHODS

2.1. Methods for Monitoring Annual HMP Plants

The HMP plant monitoring survey was performed using 61 circular plots located throughout the project area. The objective in surveying the circular plots was to determine presence and density of rare annual plants. The procedure used for surveying circular plots is as follows:

1. A grid (10 x 10 feet) was laid over aerial maps of the project area. Sixty-one points were selected systematically to ensure an even distribution of circular plots across the project site. Each point on the grid represents the center of a circular plot by scribing a 2.5-meter radius around that point.
2. One surveyor stood at the center of each circular plot and recorded the location using a GPS unit. The surveyor in the center of the circle held one end of a

2.5-meter rope, while the second surveyor at the opposite end marked a starting point on the circumference of the circular plot.
3. The surveyor looked for herbaceous HMP species by walking around the entire circular plot and recording each occurrence of an HMP annual in the Density Survey Form. Plants rooted within the area and on the border were counted.
4. Recording stopped once the surveyor returned to the marked starting point.
5. Steps 2 through 5 were repeated for all 61 points.

2.2. Methods for Monitoring Non-native Grasses

Open areas generally occur in maritime chaparral habitat as gaps; however, because of the Vegetation Clearance Project in 2006 the entire project area was relatively open. The same sampling procedure that was employed for the HMP annual plant monitoring was utilized for grasses. Grass species were not identified since surveys occurred outside their blooming period.

1. Steps 1 and 2 from the methods for monitoring HMP annuals were followed.
2. The surveyor visually estimated and recorded the density of non-native grasses within the circle plot. Density within each circle plot was ranked as "low" (contains zero to 25 percent non-native annual grasses); "medium" (contains 25 to 50 percent non-native annual grasses); and "high" (50 to 100 percent non-native grasses).

2.3. Methods for Monitoring Non-native Plants

Systematic pedestrian surveys were conducted for exotic non-native plant species across the Project Area. The locations of noxious weeds and invasive species were recorded using a GPS unit to document points (2 x 2 feet or less) or polygons (greater than 2 x 2 feet).

3.0 RESULTS

Vegetation at the project site is in the early successional stages of maritime chaparral, and much of the new fuel break ground is covered by dry woody vegetation that was cut, shredded, and dispersed during the clearing project.

3.1. Results of Monitoring Annual HMP Plants

There were no HMP annual plants observed within the 61 circle plots surveyed, nor were any observed during the pedestrian surveys across the project site.

3.2. Results of Monitoring Non-native Grasses

Non-native grass density was visually estimated within each circle plot. Thirty of the 61 circle plots contained "low" non-native grass density (zero to 25 percent non-native grasses); 12 of the 61 circle plots contained "medium" non-native grass density (25 to 50 percent non-native annual grasses); and 19 of the 61 circle plots contained

"high" non-native grass density (50 to 100 percent non-native grasses). The estimated density of non-native grasses is presented in Table 2. The circle plots sampled and the estimated density of non-native grasses are shown in Figures 3 through 5.

Table 2. Circle Plot and Estimated Non-native Grass Density

Plot #	Density	Plot #	Density	Plot #	Density	Plot #	Density	Plot #	Density	Plot #	Density
1	low	11	low	21	high	31	high	41	high	51	low
2	low	12	low	22	low	32	low	42	med	52	high
3	high	13	low	23	low	33	low	43	low	53	high
4	high	14	low	24	low	34	high	44	high	54	med
5	low	15	high	25	med	35	med	45	med	55	low
6	high	16	high	26	low	36	low	46	high	56	low
7	med	17	low	27	med	37	med	47	high	57	low
8	low	18	high	28	low	38	med	48	low	58	high
9	low	19	low	29	low	39	high	49	high	59	low
10	low	20	med	30	med	40	med	50	high	60	low
										61	low

3.3. Results of Monitoring Non-native Plants

The locations and number of exotic, non-native plant species at the project site were recorded using a GPS unit. Individual non-native plants were counted and recorded and polygons were used to record dense areas of individual plants; however, because multiple ice plants grow together in dense mats, individual plants could not be discerned. The numbers of non-native plants observed are presented in Table 3 and the locations of points and polygons are presented in Figures 6 through 15.

Table 3. Non-native Plant Species Observed

Common Name	Scientific Name	Individual Points Recorded	Individuals in Polygons	Total Plants
Iceplant	*Carpobrotus edulis*	103	106+	209+
Cut-leaved fireweed	*Erechtites glomerata*	95	503	598
French broom	*Genista monspessulana*	17	0	17
Pampas grass	*Cortaderia jubata*	85	170	255

4.0 CONCLUSIONS

4.1. Annual HMP Plant Survey

There were no HMP annual plants observed within circle plots surveyed, nor were any observed during the pedestrian surveys across the project site. Given the decadal-scale dynamism known in maritime chaparral succession, a sample provided by a single season snapshot may not be representative. It is desirable to revisit sites deemed to be recovering and add new data to the existing data.

4.2. Grass Survey

Open areas generally occur in maritime chaparral habitat as gaps; however, because of the 2006 vegetation clearance the project area was devoid of most vegetation. Recording the grass densities according to the methods provided in the VMP (Burleson 2006) was problematic. Burleson adjusted the monitoring protocol by monitoring the circle plots that were surveyed for HMP annuals. The southern portion of the project site had been regularly mowed for a fuel break and contained scattered shrub species and medium to high grass density. Vehicle traffic through the middle of the project site had compacted the soil and vegetation in this area was sparse. The northern portion of project site had been cleared in 2006; the ground was covered in shredded woody debris and contained scattered shrubs with low grass density.

4.3. Non-native Plant Survey

The 2007 biological monitoring recorded numerous iceplant (*Carpobrotus edulis*), cut-leaved fireweed (*Erechtites glomerata*), and French broom (*Genista monspessulana*) in addition to pampas grass (*Cortaderia jubata*) throughout the project site. Data for iceplant (*Carpobrotus edulis*), cut-leaved fireweed (*Erechtites glomerata*), and French broom (*Genista monspessulana*) were not recorded during the baseline monitoring. For this reason, the 2007 monitoring data are not directly comparable to the baseline data. Pampas grass (*Cortaderia jubata*) data was recorded during the 2005 baseline monitoring and 2007 monitoring. The 2005 baseline monitoring recorded 43 isolated individuals and 13 polygons containing 444 individuals for a total of 487 pampas grass (*Cortaderia jubata*) plants. The 2007 monitoring counted 85 isolated individuals and 21 polygons containing 170 for a total of 255 pampas grass (*Cortaderia jubata*) plants. Dead pampas grasses (*Cortaderia jubata*) that appeared to have been treated with herbicide prior to the 2007 monitoring were not recorded. Although the total number of plants was lower in 2007 than in 2005, the increase in the number of isolated individuals and polygons suggests that pampas grass (*Cortaderia jubata*) is spreading throughout the cleared MSD.

5.0 RECOMMENDATIONS

The HMP states that self-sustaining populations resulting in a mosaic of maritime chaparral habitat in different stages of succession will be considered successful after five years. However, to assure that sustained stands of maritime chaparral are present, a longer monitoring period with less frequent monitoring intervals should be conducted. This will provide data on the natural succession that takes place after remedial activities in this habitat. Sites that are physically disturbed, such as SBR, are prone to colonization by wind-dispersed weedy taxa normally seen in nearby coastal sage scrub, or by introduced weeds. To facilitate a self-sustaining maritime chaparral habitat it is recommended that the strategies and actions described in Table 4 be utilized.

Table 4. Abatement of Weed Species in the South Boundary Road Project Area

Non-native Plant Action Areas (Polygons)[1]	Acres	Management Strategy	Time of Year	Frequency	Recommended Action
Iceplant	0.50	1) hand spraying of dense mats and large infestations 2) manual removal	1) year round 2) year round	1) 1-2 times per year 2) multiple times as appropriate	Treat
Fireweed	0.24	1) manual removal	1) spring	1) multiple times as appropriate	Monitor
Pampas	1.15	1) spot spraying 2) manual removal 3) cutting of plumes before seed dispersal	1) year round 2) year round 3) late summer/early fall	1) 1-2 times per year 2) multiple times as appropriate 3) multiple times as appropriate	Treat
Iceplant and Pampas Mixed	1.25	1) spot spraying 2) manual removal 3) cutting of pampas grass plumes before seed dispersal	1) year round 2) year round 3) late summer/early fall	1) 1-2 times per year 2) multiple times as appropriate 3) multiple times as appropriate	Treat
Iceplant, Fireweed, and Pampas Mixed	0.55	1) spot spraying 2) manual removal 3) cutting of pampas grass plumes before seed dispersal	1) year round 2) year round 3) late summer/early fall	1) 1-2 times per year 2) multiple times as appropriate 3) multiple times as appropriate	Treat
Non-native Grasses	NA	1) mechanical with weed whacker 2) manual removal 3) spot spraying 4) sheep grazing	1) spring 2) spring-summer 3) spring-summer 4) spring-summer	1, 2, 3, and 4) multiple times as appropriate	Monitor

[1] Non-native plant action areas refer to the polygons in Figures 6-15.
NA – Not Applicable

Species composition data provide an accurate picture of which species are recovering and if there is a significant herbaceous component. Trends in recovery should continue to be evaluated until 50 percent of the baseline conditions are achieved and an evaluation of species composition yields a healthy and diverse habitat of HMP species. Monitoring of HMP shrubs should be conducted at years 2, 5, 8 and 13 (Burleson 2006). If the extended SBR fuel break is to be retained, maintenance activities would be required annually in conjunction with the existing fuel break. Within the newly cut area it is possible with regular monitoring to detect the re-establishment of HMP annual plant species and the immigration of non-native plant species in succeeding years. Treatment and monitoring for invasive species should continue.

6.0 REFERENCES

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FIGURES

APPENDIX A
SITE PHOTOGRAPHS