Shaw® Shaw Environmental, Inc.

Memorandum

To: Distribution

Date: May 3, 2011

DCN #: ACE11-2018-S

Subject: Annual Biological Monitoring Report, 2010, Former Fort Ord, California, Revision 0

Enclosed for your information is: *2010 Annual Biological Monitoring Report, Former Fort Ord, California*. This report presents the results for all biological support activities conducted by Shaw in 2010.

Should you have any questions, please contact Shirley Tudor, Shaw Biologist, at (831) 212-4123 or e-mail at shirley.tudor@shawgrp.com.

DISTRIBUTION LIST: **Annual Biological Monitoring Report, 2010, Former Fort Ord, California, Revision 0**

No of Copies								
CD	Paper & CD	Paper	Name	Company	Address	City and State	Zip Code	Controlled Yes or No
		1	Bill Nevius	Department of the Army, USACE - Contracting Division (CESPK-CT-B)	1325 "J" Street	Sacramento, CA	95814-2922	No
		1*	Sabrina Daniels	Department of the Army, USACE - Contracting Division (CESPK-CT-B)	1325 "J" Street	Sacramento, CA	95814-2922	No
1		7	Bill Collins	Department of the Army, USACE	BRAC, Bldg. #4463 Gigling Road	Seaside, CA	93955	No
1		1	Shirley Tudor	Shaw Environmental, Inc.	PO Box 1698	Marina, CA	93933	No
1		1	Project File	Shaw Environmental, Inc.	PO Box 1698	Marina, CA	93933	No
1			Program File (Kathy Grider)	Shaw Environmental, Inc.	4005 Port Chicago Highway	Concord, CA	94520-1120	No

4 0 9

Approved: EISEN.DAVID.E.1231985146

Digitally signed by EISEN.DAVID.E.1231985146
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=EISEN.DAVID.E.1231985146
Date: 2011.04.28 08:13:02 -07'00'

David Eisen,
USACE Project Manager

* Cover letter and distribution list only

2010 ANNUAL BIOLOGICAL MONITORING REPORT
FORMER FORT ORD, CALIFORNIA

TOTAL ENVIRONMENTAL RESTORATION CONTRACT
CONTRACT NO. DACW05-96-D-0011

Submitted to:

U.S. Department of the Army
Corps of Engineers
1325 "J" Street
Sacramento, California 95814-2922

Submitted by:

Shaw Environmental, Inc.
PO Box 1698
Marina, California 93933

May 2011

Issued to:_____ Date:_____

2010 ANNUAL BIOLOGICAL MONITORING REPORT
FORMER FORT ORD, CALIFORNIA

TOTAL ENVIRONMENTAL RESTORATION CONTRACT
CONTRACT NO. DACW05-96-D-0011

May 2010

Approved by: _____ Date: 5/3/11
Shirley Tudor
Biologist

Approved by: _____ Date: _____
Tom Ghigliotto
Contractor Quality Control Systems Manager

Approved by: _____ Date: _____
Peter Kelsall
Project Manager

Table of Contents

Table of Contents (continued)

List of Tables

List of Figures

List of Appendices

List of Photographs

List of Photographs (continued)

List of Photographs (continued)

List of Acronyms and Abbreviations

Army	U.S. Department of the Army
BLL	Black Legless Lizard
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
CMC	Central Maritime Chaparral
CTP	Carbon Tetrachloride Plume
CTS	California Tiger Salamander
FONR	Fort Ord Natural Reserve
ft	foot or feet
HA	Historical Area
HMP	Habitat Management Plan
MBEST	Monterey Bay Education, Science and Technology Center of the University of California, Santa Cruz
OU-1	Operable Unit 1
OUCTP	Operable Unit Carbon Tetrachloride Plume
Shaw	Shaw Environmental, Inc.
sq ft	square feet
sqm	square meter
TERC	Total Environmental Restoration Contract
U/L	Upper and Lower
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

This report contains results of the 2010 biological monitoring surveys, which are required as part of the *Installation-Wide Multispecies Habitat Management Plan* (HMP) *for Former Fort Ord, California* (U.S. Army Corps of Engineers [USACE], 1997). Shaw Environmental, Inc. (Shaw) prepared this report under the Total Environmental Restoration Contract II (TERC) No. DACW05-96-D-0011.

The HMP identifies rare, threatened, or endangered species and habitats occurring on former Fort Ord, which are designated for protection and future management. The habitat types requiring biological surveys for monitoring of protected species are: central maritime chaparral (CMC), wetlands and vernal ponds, and other habitats where listed species are known or suspected to occur, including coastal scrub, coast live oak woodlands, and grasslands with a significant native component of grasses or forbs.

The following special status species are listed in the HMP and are addressed in these surveys. There are three special status annual plants that may occur within maritime chaparral, coastal scrub, or grasslands or disturbed areas: sand gilia (*Gilia tenuiflora arenaria*), Monterey spineflower (*Chorizanthe p. pungens*), and Seaside bird's beak (*Cordylanthus rigidus littoralis*). Five special status shrub species may occur within maritime chaparral: Hooker's manzanita (*Arctostaphylos h. hookeri*), sandmat manzanita (*Arctostaphylos pumila*), Monterey manzanita (*Arctostaphylos montereyensis*), Monterey Ceanothus (*Ceanothus cuneatus rigidus*), and Eastwood's golden bush (*Ericameria fasciculata*). The California Black Legless Lizard (BLL) (*Anniella pulchra nigra*) is an HMP-recognized rare variety of California legless lizard that inhabits dune sand type habitats on Fort Ord.

Wetland species considered in these surveys were California tiger salamander (CTS, *Ambystoma californiense*), California linderiella (*Linderiella occidentalis*), and Contra-Costa goldfields (*Lasthenia conjugens*). These species are typically found in vernal or seasonal ponds.

Before and after the completion of munitions removal, soil remediation, groundwater remediation, and other related environmental cleanup operations within Fort Ord lands designated as Habitat Reserve, baseline biological and follow-up surveys are conducted to establish whether protected species are present prior to work operations; map the locations and quantify abundance; and monitor the protected species and habitat after work completion. Follow-up monitoring helps determine whether work activities have significantly impacted rare species or habitat. The HMP also outlines avoidance measures, and mitigation measures such as habitat restoration, which would be necessary if U.S. Department of the Army (Army)'s cleanup activities significantly impacted protected species or habitats.

To determine whether mitigation measures would be needed to restore populations of affected HMP-listed special-status species, a baseline biological survey is conducted within a proposed cleanup site, and three to five monitoring events are conducted for rare species following completion of the cleanup operations. Monitoring data are compared relative to a site's baseline data to assess whether there have been significant impacts related to the cleanup operations, and whether recovery or restoration of the protected habitat (maritime chaparral, wetlands, etc.) and associated species is proceeding toward baseline conditions.

In addition to the HMP, three Biological Opinions have been issued by the U.S. Fish and Wildlife Service ([USFWS], 1999, 2002, and 2005) as a result of consultation with the Army, which contain additional mitigation measures and recommendations relating to biological monitoring at former Fort Ord cleanup sites.

For the 2010 monitoring season, Shaw was tasked by USACE to conduct the following biological baseline and follow-up surveys for various former Fort Ord sites where work related to the environmental cleanup has either already begun, or will begin in the future. Biological surveys were conducted between April and July of 2010.

List of 2010 Biological Monitoring Sites included in this Annual Report

- **Site 39 Soil Remediation and Non-Burn Sites** – Pond monitoring. Baseline faunal surveys were conducted in ponds associated with soil remediation and Non-Burn sites.
- **Carbon Tetrachloride Plume (CTP) Pilot Project** – Third (final) year of follow-up biological monitoring following completion of work at CTP Pilot Study site on the University of California's Fort Ord Natural Reserve (FONR)-North.
- **Operable Unit (OU) CTP System 2B** – First year of follow-up monitoring after well installation and groundwater remediation activities on the University of California's FONR-North.
- **OUCTP Upper and Lower (U/L) 180-foot (ft) Aquifers** – Baseline vegetation survey in areas of four wells, surface pipeline, underground pipeline, and associated staging areas on the University of California's FONR-South.

Other Activities in 2010

In addition to annual monitoring, this report describes mitigation and avoidance measures that were implemented with work conducted by Shaw in 2010.

2.0 Site 39 – Remediation Sites and Non-Burn Areas Baseline Pond Monitoring

2.1 Site 39 Remediation Sites and Non-Burn Areas Baseline Pond Monitoring – Introduction

Since 2007, Shaw has been collecting baseline data on 10 vernal ponds in the vicinity of sites that will be subject to either soil remediation or munitions removal work in the future. There are also three reference ponds for comparison.

To protect wetland habitats, and rare, threatened, or endangered species that could be impacted by remediation activity, the HMP requires baseline monitoring surveys before work begins.

The baseline data are used to ascertain that if pond habitats are impacted by the work, recovery would meet the HMP requirements for ensuring conservation of HMP species and habitat. Follow-up surveys will be conducted in years 1, 3, 5, and 8 after completion of munitions removal at each site that has HMP forb species present in the baseline survey.

Soil remediation has been scheduled for three ranges where vernal ponds are present.

Munitions removal in the Non-Burn Areas has been scheduled for seven sites where vernal ponds are present. The Non-Burn Areas have been identified by the Army as sites where munitions removal can proceed without requiring a vegetation burn beforehand. The Non-Burn Areas consist predominantly of grasslands, wetlands, coastal scrub, and other non-chaparral vegetation types. The HMP requires burning, instead of mowing or other vegetation removal methods, in areas of maritime chaparral. Burning enhances the recovery of the maritime chaparral community and enhances recovery of protected species and habitat.

Seven ponds were identified for sampling in 2010, and are listed in Table 2-1 below. Locations of the ponds are shown in the attached Aquatic Sampling Survey Report in Appendix A. These have been unsuccessfully sampled in the past 3 years because of low rainfall and an absence of ponding in these areas. However, all seven ponds were successfully sampled during the 2009/2010 rainy season. Each of the ponds was subject to a faunal baseline survey to establish baseline data on the HMP wetland species, CTS and California linderiella. The *Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord* (USACE, 2006a) requires baseline and follow-up monitoring of ponds, where feasible, to identify any potential impacts to these habitats during and after munitions removal. The monitoring for HMP faunal species, CTS and California linderiella, was conducted by Denise Duffy and Associates. The survey report is included as Appendix A of this monitoring report. Ponds identified for survey and results are summarized in Section 2.3.

The 2009/2010 dataset in this report completes the baseline pond monitoring required for all soil remediation and Non-Burn Areas.

2.2 Site 39 Remediation Sites and Non-Burn Areas Baseline Pond Monitoring – Methods

Methods for faunal sampling followed the *Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord*, referenced in Section 2.1 above.

2.3 Pond Monitoring – Results

Ponds identified for survey and results are summarized in Table 2-1 below. Details are provided in the report in Appendix A. Photographs of the sampled ponds are shown in Photographs 2-1 through 2-7.

Table 2-1
Ponds Identified for Sampling in 2010

Pond Number	Non-Burn Area or Remediation Site (Historical Area [HA])	Sampled for CTS and California Linderiella in 2010	CTS Found	Linderiella Found
5	Reference pond	Yes	Yes, eggs and larvae	No
8	HA-39/40	Yes	No	Yes (low abundance)
11	21A	Yes	No	Yes (moderate abundance)
30	4B and 4C HA-28	Yes	No	No
46	6A	Yes	No	No
101	Reference Pond	Yes	Yes, eggs only	No
No ID	8B	Yes	Yes, eggs only	No

3.0 CTP Pilot Project Biological Monitoring Survey – Year 3 (Final)

3.1 Introduction

The final (third) year of follow-up monitoring was completed at the University of California's FONR, at the site of the 2007-2008 phase of remediation of a groundwater CTP within Operable Unit 1 (OU-1). The project was conducted from June 2007 through February 2008. All aboveground equipment was removed from the site by July 2008. The project involved installing 25 wells for injection of remediation media, and extracting and monitoring water samples via an above-ground pipeline system. Location of the wells and access routes within the study area is shown in Figure 3-1. Views of the site in 2010, showing features discussed in the following sections, are shown in Photographs 3-1 through 3-8.

Results of the baseline vegetation survey conducted in the spring and summer of 2007 were published in the *2007 Annual Biological Monitoring Report* (USACE, 2008). Results of the first and second years of the monitoring survey were published in the *2008 Annual Biological Monitoring Report* (USACE, 2009a), and *2009 Annual Biological Monitoring Report* (USACE, 2010a), respectively. HMP species found on site during the baseline survey included two annual plant species, the Federally Endangered sand gilia (*Gilia tenuiflora arenaria*), and Federally Threatened Monterey spineflower (*Chorizanthe pungens pungens*); and two HMP-listed shrub species, sandmat manzanita (*Arctostaphylos pumila*) and Monterey Ceanothus (*Ceanothus cuneatus rigidus*).

This section summarizes results of the third and final year of follow-up monitoring of HMP annual plant populations within this project area. The 2010 results are discussed in the Results and Discussion section, comparing all previous years of baseline and monitoring data to assess the project impacts on HMP populations and species.

3.2 CTP Pilot Project Vegetation Monitoring Survey – Methods

For consistency with past surveys, the methods used for the current survey were the same as those used for vegetation surveys at FONR completed previously by Hydrologic, Inc. with Denise Duffy and Associates and Shaw (USACE, 2008, 2009a, 2010a).

Sand gilia populations were surveyed between late April through early May to capture the peak bloom. Sand gilia patches were mapped using a Global Positioning System, and the total number of plants recorded for each patch.

The Monterey spineflower survey was conducted between mid-May and mid-June to capture peak densities, as measured by percent ground cover. Monterey spineflower areas were mapped

to show both overall distribution over the study site, and also distribution of the patches in the higher density classes, those greater than "Very Sparse."

Monterey spineflower density classes (consistent with previous FONR surveys) were as follows:

Very Sparse = <3 percent
Sparse = 3-25 percent
Medium Low = 26-50 percent
Medium = 51-75 percent
Medium-High = 76-97 percent
High = 98-100 percent

Seaside bird's beak was searched for during Monterey spineflower surveys when plants are visible but not yet in bloom. Peak bloom for census is in late August.

Non-native annual grass areas were mapped by hand onto aerial photo maps in the field, and later digitized into a Geographic Information System. The following density cover classes were used for annual grasses:

Very Low = <3 percent
Low = 3-25 percent
Medium = 26-50 percent
High = 51-75 percent
Very High = >75 percent

Areas of sandmat manzanita (*Arctostaphylos pumila)* impacted by access to wells (initially reported in the *2007 Annual Biological Monitoring Report* [USACE, 2008]) were re-visited and assessed for their condition.

3.3 CTP Pilot Project Vegetation Monitoring Survey – Results and Discussion

3.3.1 Sand Gilia Survey – Results

Sand gilia surveyed in spring 2010 are shown in Figure 3-2. This map shows location and area of gilia patches, and total number of plants per patch. The term "patch" refers to the location of a close grouping of plants, which are likely to be germinating from local seed bank. Numbers per patch ranged from 1 to 1,620 plants.

Total area of sand gilia in 2010 (2009, 2008, 2007) = **0.18 acre** (0.07, 0.01, 0.075)

Total number of plants in 2010 (2009, 2008, 2007) = **4,426** (1650, 61, 528)

Total area occupied by sand gilia in 2010 was 0.18 acre. Total number of plants observed in the survey area (4,426) is the highest of all previous years of data collection. Numbers were much higher in each of the largest sand gilia patches.

3.3.2 Sand Gilia Survey – Discussion and Conclusions

Table 3-1 below summarizes the sand gilia survey results from the baseline year (2007) and all three monitoring years (2008-2010).

Table 3-1
Pilot Study Site - Sand Gilia Summary Data

Monitoring Year	Total # Plants	Total Acres Occupied	Total # Plants in Graded Area	Northeast Reference Area 5 # Plants	Southeast Reference Area 4 # Plants	Rainfall (inches) (July-July average is 19.4)
2007	528	0.075	138	52	103	13.6
2008	61	0.01	0	33	20	14.8
2009	1,650	0.07	78	1,200	253	17.1
2010	4,426	0.18	450	1,737	599	24.2

The 3 years of monitoring data show no decline from the original total abundance in the survey area. Total abundance was higher in 2010 by more than seven times than the baseline year, and total occupied area was more than double. There was also no overall decrease in abundance observed in an impacted area, and in two non-impacted sand gilia areas that are reference areas for the site (Figure 3-2, Reference Areas 4 and 5).

None of the wells or access routes was in areas occupied by sand gilia. Most project impacts were confined to the well locations and access routes shown in Figure 3-1. Project impacts included well drilling, vehicle driving on access routes to wells, walking on the site, and set up and removal of aboveground plastic pipeline. The pipelines were laid down by hand during the dry season, when sand gilia plants had finished setting seed. As a result, almost none of the sand gilia patches were impacted by work activities.

The one exception is the largest gilia patch closest to Well IW-07. This area has been monitored for gilia abundance to assess its recovery following a work-related incident resulting in accidental soil disturbance. A vehicle turned around in the area and left tire ruts, which were subsequently removed by grading in December 2006. The sand gilia location in 2010 is shown in Photograph 3-1. Sand gilia abundance in this spot varied widely from 2007 through 2010 (138, 0, 78, and 450 respectively). There was an overall increase in the patch abundance at the end of the

monitoring period, suggesting there were no lasting adverse effect on the patch over the 3-year period. The trend in abundance from 2007 to 2010 in this disturbed area (column 4) matched that seen in undisturbed sand gilia patches (column 5 and 6), shown in the table above.

Since most of the sand gilia areas were outside the actual work zones, the overall trends in abundance of sand gilia are probably most influenced by the variation and the timing in rainfall and temperature patterns over the monitoring period. The 2009-2010 rain season received a higher-than-normal 24.2 inches compared to the 19.4 inches average value for the Monterey Peninsula recorded by the National Weather Service Climatologically Station at the Naval Post Graduate School in Monterey, California. This is higher than for any of the past 3 years of survey and monitoring (13.6, 14.8, and 17.1 inches for years 2006-2007, 2007-2008, and 2008-2009, respectively).

3.3.3 Monterey Spineflower Survey – Results

Total Monterey spineflower area in 2010 was 2.3 acres, and the total distribution is shown in Figure 3-3. Areas with cover greater than "Very Sparse" (>3 percent cover) are shown in Figure 3-4.

Almost 92 percent of the mapped spineflower area was in the "Very Sparse" (0-3 percent) cover category. The other 7 percent of the area consisted of small patches of cover exceeding 3 percent. As in previous years of monitoring, no areas were surveyed that had greater than medium-high (97 percent) cover.

3.3.4 Monterey Spineflower Survey – Discussion and Conclusions

Table 3-2 shows the total area (and percent of total area in parentheses) of Monterey spineflower in each cover class, for the baseline year and all monitoring survey years shown for comparison. This is displayed graphically in Figure 3-6a.

The 3 years of monitoring data show no decline in total occupied area, or in abundance of plants as represented by cover classes. In 2010, there was an overall increase of 0.17 acre of Monterey spineflower-occupied area over the 2007 baseline data. Abundance data showed there was a slight overall increase in the higher cover classes in 2010 from the baseline abundance.

Eleven well locations were in occupied Monterey spineflower habitat. These were all in the lowest cover class (<3 percent), except for wells IW-03 and MW-01, which were located in "Sparse" (3-25 percent) cover areas in the baseline year (USACE, 2008).

Table 3-2
Pilot Study Site Summary of Monterey Spineflower Data for Years 2007 through 2010

Monitoring Year	Total Acres Occupied	Total Acres (%) Very Sparse (<3)	Total Acres (%) Sparse (3-25)	Total Acres (%) Medium -Low (26-50)	Total Acres (%) Medium (51-75)	Total Acres (%) Medium -High (76-97)	Rainfall (inches) (July-July average is 19.4)
2007	2.17	1.94 (89.4)	0.15 (6.9)	0.05 (2.3)	0.03 (1.4)	0 (0)	13.6
2008	1.75	1.66 (94.9)	0.05 (2.9)	0.04 (2.3)	0 (0)	0 (0)	14.8
2009	1.7	1.6 (94.1)	0.05 (2.9)	0.03 (1.8)	0.02 (1.2)	0.004 (0.2)	17.1
2010	2.3	2.11 (91.7)	0.05 (2.2)	0.07 (3.0)	0.05 (2.2)	0.02 (0.9)	24.2

Numbers in parentheses are percent of total area.

In 2010, Monterey spineflower was still present at all eleven well locations where there was originally occupied habitat in 2007. Wells IW-03 and MW-01, as well as IW-02, and their access route showed an increase in spineflower cover to "Medium-Low" (26-50 percent). Well EW-11, which originally had "Very Sparse" cover, had increased to "Medium-High" (76-97 percent) cover in 2010.

Most project impacts were confined to the well locations and access routes shown in Figure 3-1. Project impacts included well drilling, vehicle driving on access routes to wells, walking on the site, and set up and removal of aboveground plastic pipeline.

The data trends do not indicate there was a decline in Monterey spineflower population where work was conducted, either in area or in abundance (measured as distribution of cover classes). Ground disturbance during well installation may explain the some of the observed increases in cover.

3.3.5 *Annual Grass Survey – Results and Discussion*

Non-native annual grass location and densities are shown in Figure 3-5, and select locations of interest are shown in Photographs 3-2 through 3-6. The following numbers show the 2010 total acreage of annual grasses for each cover class (with the 2009, 2008, and 2007 acreages in parentheses for comparison):

Total Acreage of Annual Grasses in 2010 (2009, 2008, 2007) = **7.5 acres** (6.7, 7.21, 6.7)

Area at Very Low density (0-5 percent) in 2010 (2009, 2008, 2007) = **2.6 acres** (1.5, 1.38, 0.35)

Area at Low density (6-25 percent) in 2010 (2009, 2008, 2007) = **1.6 acres** (0.9, 0.57, 0.6)

Area at Medium density (26-50 percent) in 2010 (2009, 2008, 2007) = **1.1 acres** (1.6, 1.19, 1.41)

Area at High density (>50 percent) in 2010 (2009, 2008, 2007) = **2.2 acres** (2.7, 4.07, 4.34)

The trend is shown graphically in Figure 3-6b. Total acreage of annual grasses in 2010 was 0.8 acre higher than in the baseline year. In 2010, more of the area was mapped in the lower cover classes, and less in the higher cover classes. Much of this difference was explained by lower densities of grasses in the northeast section of the fuel break shown in Figure 3-5 and in Photograph 3-5. In addition, the access routes, particularly around the fenced perimeter on the southwest and northwest sides of the site, had decreased annual grass cover that was associated with soil compaction from repeated vehicle usage.

Consistent with previous years, most of the site (more than 40 percent) was occupied by annual grasses at High density.

While there were shifts in distribution of annual grass cover related to some of the well locations and access routes, there were no areas observed where there was a decrease in HMP annual plant populations (either sand gilia or Monterey spineflower) from the baseline survey (2007) through the final year (2010) coincident with an increase in annual grass cover.

The well locations and access routes in 2010 were compared to the baseline year 2007 (USACE, 2008) to determine whether annual grasses had encroached or increased in areas associated with work activity. Well IW-01 was the only well where there was an increase in annual grass cover compared to the baseline year. This 24- by 42-ft area, occupied by coastal scrub, was mowed for access and well installation. In 2010, a small patch of High density grass was mapped at the well, where in 2007 it was shrub-covered with no grasses. However, no HMP forb species have been identified during surveys of this area in any of the past 4 years, so the grass encroachment has

not impacted habitat for HMP forbs. Other than this well location, there were no other areas where remediation work activity was associated with an increase in annual grasses.

Areas of interest with annual grass cover are described here. Photograph 3-3 shows a view of a burned chaparral area (from a small 2006 burn), where non-native annual grasses invaded following the burn. In 2010, the cover has decreased from Medium to Low cover in much of this area. The south perimeter road along the fence line has begun to recover from soil compaction due to heavy use as an access road. The year following its use as a major access route to wells along the FONR boundary fence line, soil compaction inhibited germination of either native or non-native species for the following years. Grasses and forbs are recovering along this route, and cover is increasing compared to previous years. This impacted route is in an area where there were originally primarily High density of non-native grasses and forbs, mixed with native forbs, but no populations of HMP plant species. While non-native grasses and forbs are not desirable species, the increase in vegetation growth is beneficial for reducing the vehicle-induced soil compaction and to improve soil conditions for native forbs as well.

3.3.6 Monitoring of Other HMP Species

Sandmat manzanita (*Arctostaphylos pumila*) – Sandmat manzanita, an HMP-protected species, occurred in stands in several areas of the site. There were two wells (IW-02 and MW-01) that had to be accessed through low-growing stands of sandmat manzanita. In 2007, heavy-duty synthetic matting was laid down on the vehicle access routes to these areas to reduce excessive damage to shrub root systems, and to minimize the soil disturbance and burial of the seed bank. Several sandmat manzanita plants were flattened near the road entrance to the aisle where matting was placed on the ground, comprising an estimated 74 square feet (sq ft). In 2008, no new growth was observed, but by May 2009, new growth of existing sandmat plants was observed at the entrance to the access route. In May 2010, sandmat plants had continued growing at a steady rate. Sandmat manzanita is a slow growing species and it may take several years before regrowth reaches the cover of the baseline survey. Photograph 3-7 shows a view of this area in 2010.

Other Site Impacts – In 2006, an area approximately 24 ft by 42 ft (1,008 sq ft) of coastal sage scrub was cut near IW-01 and IW-07 to access wells that were located within a stand of shrubs. Shrubs were cut to a height of about 4 inches. Shrubs cut were California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), coffee berry (*Rhamnus californica*), monkey flower (*Mimulus aurantiacus*), and poison oak (*Toxicodendron diversilobum*). Since none of these are HMP special-status species, no special measures are required for monitoring of these species. In 2010, all of these plants species continued crown-sprouting, and several native perennial and annual species germinated. Continued regrowth is anticipated toward the initial 2007 baseline shrub cover. Photograph 3-8 shows a view of this area in 2010.

3.3.7 CTP Pilot Study Site – Summary of Mitigation Measures for Protection of HMP Species and Habitat

In 2010, all work had been completed, and there were no additional impacts to any HMP-protected species. A summary of the mitigation and avoidance measures implemented during the period of work activity on the site are summarized below:

Summary of Avoidance and Mitigation Measures to Reduce Impacts:

- Work was planned during the dry season as much as possible. Well installation was completed in the dry season. Aboveground pipeline installation phase, and subsequent removal, occurred in the dry seasons.
- Work zones, access routes, and all staging of equipment were all planned to avoid sensitive maritime chaparral habitat and HMP species areas as much as possible.
- Work zones were clearly marked by fencing and flagging.
- Heavy-duty synthetic matting was placed on the ground on access routes into all wells in areas considered sensitive because of the known presence of HMP annuals, or with a significant percentage of native plants and low cover of weedy annual grasses. Nine well locations were accessed with matting.
- Employee training was conducted for recognition and protection measures for all protected species and habitat, including maritime chaparral and HMP forb species, CTS, and BLL.
- A biologist was present on site on a regular basis to monitor site activity, coordinate work to reduce excess impact to the habitat, report a BLL encounter, and provide general help with implementing mitigation measures.

4.0 CTP System 2B (Groundwater) – Baseline Biological Monitoring Survey

4.1 CTP System 2B- First Year Follow-up Vegetation Monitoring Survey – Introduction

The first year of follow-up vegetation monitoring was conducted at the University of California's FONR at the site where 16 new wells were installed between January and March 2010 as part of the ongoing groundwater remediation of the CTP within the Lower 180-ft Aquifer (CTP, System 2B). The survey was conducted in April through July, at the appropriate peak bloom times for sand gilia and Monterey spineflower, and when Seaside bird's beak can be identified if present. Location of the biological survey area with wells and access routes is shown in Figure 4-1. Installation of aboveground pipelines and groundwater remediation activity and sampling will take place in 2011.

Views of the locations of some of the well sites taken during the monitoring survey are shown in Photographs 4-1 through 4-8. The description of the project is in the *Final Operable Unit Carbon Tetrachloride Plume Remedial Action Work Plan, Former Fort Ord, California* (USACE, 2009b). Three years of follow-up monitoring after completion of the project is required for sites in HMP-designated habitat areas where groundwater remediation takes place.

HMP species found on site during the follow-up survey included two annual plant species, the Federally Endangered sand gilia (*Gilia tenuiflora arenaria*) and the Federally Threatened Monterey spineflower (*Chorizanthe pungens*). Seaside bird's beak (*Cordylanthus rigidus littoralis*) was not found. Two HMP-listed shrub species, sandmat manzanita (*Arctostaphylos pumila*) and Monterey Ceanothus (*Ceanothus cuneatus rigidus*), are both present on site.

4.2 CTP System 2B- Baseline Vegetation Monitoring Survey – Methods

Methods used were the same as those described in Section 3.2 above. For consistency with past surveys, the methods used for the current survey were the same as those used for vegetation surveys at FONR completed previously by Hydrologic, Inc. with Denise Duffy and Associates and Shaw (USACE, 2008, 2009a, and 2010a).

4.3 CTP System 2B- Baseline Vegetation Monitoring Survey – Results and Discussion

4.3.1 Sand Gilia Survey – Results and Discussion

The first year of follow-up monitoring in 2010 was conducted to determine the location and population size of sand gilia within the project area. Location and total area of sand gilia are shown in Figure 4-2, with total number of plants per patch. The term "patch" refers to the

location of a close grouping of plants, which are likely to be germinating from a local seed bank. Numbers per patch ranged from 1 to 1,210 plants.

Total area of sand gilia in 2010 (2009) within biological survey area = 0.1 acre (0.06)

Total number of sand gilia plants in 2010 (2009) within biological survey area = 1,836 (213)

The overall number of plants was much greater in 2010 by more than seven times, mostly because of the large increase in one undisturbed patch in the southeast-most part of the survey area. Three of the proposed wells (BW-150A, BW-148A, and BW-152A) and their access routes are located in, or near areas with sand gilia. The well (BW-150A) with the largest sand gilia patch in the vicinity numbered 280 in 2010 (100 in 2009). The access route to this well was clearly flagged in the field to ensure that disturbance to sand gilia areas was avoided or minimized. Two small patches close to wells BW-148A and BW-152A consisting of 10 plants or less were probably affected in 2010, since work was conducted at the time when plants were growing.

This report summarizes results of the first follow-up monitoring baseline monitoring for the CTP System 2B area. Two more years of monitoring will be conducted to assess the condition of HMP annual plant populations within this study area, relative to the baseline data.

4.3.2 Monterey Spineflower Survey – Results and Discussion

The total distribution of Monterey spineflower is shown in Figure 4-3, with a total acreage of 1.8 acres. Areas with cover greater than "Very Sparse" (>3 percent cover) are shown in Figure 4-4.

Almost 92 percent of occupied spineflower habitat was in the "Very Sparse" (0-3 percent) cover category. The other 7.5 percent and 0.5 percent of the mapped area consisted of patches of "Sparse" (4-25 percent) and "Medium Low" (26-50 percent).

2010 Total acreage, and acreage by cover class, is shown below, with 2009 data in parentheses.

Total area occupied by Monterey spineflower in 2010 (2009) = 1.8 acres (1.74)

Area at Very Sparse cover (0-3 percent) in 2010 (2009) = 1.56 acres (1.6)

Area at Sparse cover (3-25 percent) in 2010 (2009) = 0.05 acre (0.13)

Area at Medium-Low cover (26-50 percent) in 2010 (2009) = 0.12 acre (0.01)

Area at Medium cover (51-75 percent) in 2010 (2009) = 0.05 acre (0)

Area at Medium-High cover (76-97 percent) in 2010 (2009) = 0.02 acre (0)

There were no areas mapped that had greater than Medium High cover.

Distribution of Monterey spineflower was concentrated within 2 to 5 ft of shrub edges, where non-native grass cover tended to be low. In these areas, cover was very often in the higher classes. Spineflower was mostly absent on the mowed fuel breaks greater than 4 to 6 ft from the shrub edges.

Twelve wells or their access routes were located in occupied Monterey spineflower areas. Of these, four were located in or very near patches of spineflower at greater than Very Sparse (>3 percent) cover that could be impacted by the work activity.

4.3.3 Seaside Bird's Beak Survey – Results and Discussion

No Seaside bird's beak plants were encountered in this baseline survey.

4.3.4 Annual Grass Survey – Results and Discussion

Grass location and densities are shown in Figure 4-5.

2010 Total acreage and acreage by cover class is shown below, with 2009 data in parentheses.

Area at Very Low cover (0-5 percent) in 2010 (2009) = 7.8 acres (7.7)

Area at Low cover (6-25 percent) in 2010 (2009) = 0.3 acre (0)

Area at Medium cover (26-50 percent) in 2010 (2009) = 1.7 acres (1.9)

No areas were mapped with greater than 50 percent cover of annual grasses.

Total annual grass cover was distributed mainly in the same two classes, and in the same general location, as last year's baseline data. Most of the perimeter fuel break had grass at Medium (26-50 percent) cover. Within the shrub line and along a swathe about 2 to 5 ft from the shrub line, annual grasses occurred at "Very Low" (0-5 percent) cover. As a result of well development activity last year, some small sections of the access routes had annual grass cover decrease from "Medium" to "Low" cover. This appeared to be due to ground compaction and general disturbance. Examples are access routes to wells BW-145A, BW-147A, and BW-149A. There were increases in grass cover "Very Low" to "Low" along the access route (BW-132A), or in the vicinity of the well installation BW-143A.

These locations, particularly those that were originally in the "Very Low" cover class will continue to be monitored in the future to determine whether there is significant encroachment of non-native annual grasses in these areas, particularly where sand gilia or Monterey spineflower are present. Annual grass encroachment, if persistent, can obscure available habitat for these sensitive HMP annual species.

Annual Fusilade® treatment or seasonally timed mechanical vegetation clearance are possible methods that will be considered for well locations and access routes, if it is determined through continued monitoring that there is a significant increase in grass densities in previously low cover areas where HMP species abundance is reduced.

4.4 CTP System 2B – HMP Species Mitigation and Avoidance

Black Legless Lizard (*Anniella pulchra nigra*) – No BLLs were encountered during the work conducted in 2010. The type of sandy soils and vegetation type at the site are known to be potential habitat for the BLL, a Fort Ord HMP-listed species, and are historically known to be present on the FONR. Site personnel were briefed on identification of this species, and the protocol to be followed if found. The Shaw biologist was the contact person in case of BLL encounters.

California Tiger Salamander (*Ambystoma californiense*) – No CTS were encountered during work at the site. While there are no vernal ponds on the FONR property, CTS could potentially be encountered on site during migration periods. Site personnel were briefed on identification of this species, and the protocol to be followed if found. Any CTS individuals encountered are required to be reported immediately to both the Shaw biologist and the Base Realignment and Closure (BRAC) Natural Resource Manager. Proper handling and relocation, if necessary, is permitted by USFWS for these persons only on Shaw's projects.

Sandmat manzanita (*Arctostaphylos pumila)* - Sandmat manzanita stands occur in several areas of the work site. There were two well locations where wider access required mowing 1 to 2 ft on each side of an existing pathway in sandmat manzanita stands. These were wells BW-150A and BW-148A. Photographs 4-1 and 4-3 show a view of this mowed path. Shrub regrowth will be monitored during follow-up surveys for the 3 years following work completion. While many species of chaparral shrubs crown-sprout after cutting, sandmat manzanita, a Fort Ord HMP-listed species, does not resprout from branches cut to the ground. Typically, mowed sandmat will regrow slowly from the remaining leafy plant branches if in a healthy condition.

Other Site Impacts – Well placement was modified to minimize the impact within stands of intact CMC as much as possible, with the preferred location being along the disturbed mowed fuel break of the Perimeter Road in the FONR. Some of the wells had to be located within vegetation for most effective sampling of the groundwater CTP plume. Widening of access routes by mowing shrub cover was required in some areas where well locations were set back within the shrub line. A cleared width of 8 ft was needed to access the following wells: BW-132A, BW-143A, BW-148A, BW-149A, BW-150A, and BW-152A. A bobcat with a mower head was used. Total distance mowed (including the sandmat areas) was approximately 820 ft by 4 ft on average of shrub cover. Vegetation within these areas, other than the sandmat manzanita areas (discussed above) consisted of shaggy bark manzanita (*Arctostaphylos tomentosa*),

chamise (*Adenostoma fasciculata*), and California sagebrush (*Artemisia californica*). Some small coast live oak trees were also pruned to gain access to some well locations.

5.0 OUCTP Upper/Lower 180-ft Aquifer (Groundwater) – Baseline Biological Monitoring Survey

5.1 OUCTP U/L 180-ft Aquifer – Baseline Vegetation Survey – Introduction

A baseline vegetation survey was conducted at the University of California's FONR in the area where there were four new proposed wells, in the south portion of the FONR (Figure 5-1). The biological survey area covered all proposed well locations, and potential access routes, including a 50-ft swathe on either side of the potential routes. At the time of the survey, the final locations for the wells and access routes had not been established, so the survey area covered a much larger acreage than will actually be impacted by the work activities. Future monitoring events will focus on the areas that were specifically impacted.

As of this report, all of these wells have been installed between July 2010 and early January 2011. The description of this phase of the ongoing groundwater CTP remediation is contained in the *Final Operable Unit Carbon Tetrachloride Plume Upper 180-foot Aquifer Remedial Design, Former Fort Ord, California* (USACE, 2010b) and *Final Operable Unit Carbon Tetrachloride Plume Lower 180-foot Aquifer Remedial Design, Former Fort Ord, California* (USACE, 2010c).

The vegetation survey was conducted from April to July, at the respective peak bloom times for sand gilia and Monterey spineflower, and when Seaside bird's beak can be identified. The biological survey area showing well locations and proposed access routes and pipeline routes is shown in Figure 5-1. An underground pipe will be installed to the extraction well (EW-OU2-09-180) along the route shown on the map. Installation of below-ground pipeline and continued groundwater remediation activity and sampling will take place in early 2011. The entire groundwater monitoring process will continue through 2011. In accordance with the HMP and Biological Opinions, 3 years of follow-up monitoring after completion of the project will be required for areas impacted by work activities within the FONR, as for all habitat reserve areas. Photographs of the well locations and main access routes are shown in Photographs 5-1 through 5-8.

HMP species found within the total survey area included two annual plant species, the Federally Endangered sand gilia (*Gilia tenuiflora arenaria*) and the Federally Threatened Monterey spineflower (*Chorizanthe pungens*). No Seaside bird's beak plants were encountered in this baseline survey. Two HMP-listed shrubs, sandmat manzanita (*Arctostaphylos pumila*) and Monterey Ceanothus (*Ceanothus cuneatus rigidus*), are both present within the maritime chaparral plant community on the site.

5.2 OUCTP U/L 180-ft Aquifer – Baseline Vegetation Survey – Methods

Methods used were the same as those described in Section 3.2 and 4.2 above. For consistency with past surveys, the methods used for this survey were the same as those used for vegetation surveys at FONR completed previously by Hydrologic, Inc. with Denise Duffy and Associates and Shaw (USACE, 2007, 2008, 2009a, and 2010a).

5.3 OUCTP U/L 180-ft Aquifer – Baseline Vegetation Survey – Results and Discussion

5.3.1 Sand Gilia Survey – Results and Discussion

An April 2010 survey was conducted to determine the location and population size of sand gilia within the biological survey area. The locations and abundance of sand gilia found are shown in Figures 5-2a and 5-2b.

Total area of sand gilia in 2010 within biological survey area = 0.6 acre

Total number of sand gilia plants in 2010 within biological survey area = 4,932

Monitoring well BW-50 was re-located from its original proposed location from FONR property to property of the University of California's Monterey Bay Education, Science and Technology Center (MBEST), which is designated in the HMP for future development. This move avoided impacts to large sand gilia population along a walking path in the northeast portion of the surveyed area. Since the HMP does not require baseline survey of HMP species within lands categorized for development, no rare species data were collected on MBEST property.

None of the well locations are within sand gilia areas, but the access and pipeline routes for the EW-OU2-09-180 extraction well are close to two small sand gilia patches (numbering 3 and 14 plants), which could be impacted by the work.

To prevent excessive impact to potential sand gilia and other rare plant habitat, access routes and staging areas were clearly flagged in the field to contain vehicle disturbance to roads and pre-disturbed areas close to roads as much as possible.

The areas impacted by well installation and other activity will be subject to follow-up monitoring for another 3 years after work completion to document any change in HMP annual plant populations within impacted area. The 2010 baseline data presented here will be used for comparison along with reference data presented in Section 6.

5.3.2 Monterey Spineflower Survey – Results and Discussion

The total distribution of Monterey spineflower within the survey area is shown in Figures 5-3a and 5-3b, with a total acreage of 6.2 acres in the surveyed area. Areas with cover greater than "Very Sparse" (>3 percent cover) are shown in Figures 5-4a and 5-4b.

Almost 91 percent of the mapped spineflower area was in the "Very Sparse" (0-3 percent) cover category. The remaining area consisted of patches of "Sparse" (4-25 percent) through "Medium" (26 to 50 percent). No areas were mapped that had greater than "Medium" cover.

2010 Total acreage and acreage for each cover class is shown below.

Total area occupied by Monterey spineflower = 6.2 acres

Area at Very Sparse cover (0-3 percent) = 5.63 acres

Area at Sparse cover (3-25 percent) = 0.2 acre

Area at Medium-Low cover (26-50 percent) = 0.22 acre

Area at Medium cover (51-75 percent) = 0.15 acre

Two of the proposed well locations will impact areas of Monterey spineflower at the two lowest cover classes.

5.3.3 Seaside Bird's Beak Survey – Results and Discussion

No Seaside bird's beak plants were encountered in this baseline survey.

5.3.4 Annual Grass Survey – Results and Discussion

Grass location and densities are shown in Figures 5-5a and 5-5b.

The following numbers indicate the acreage occupied by annual grass at each cover class.

Area at Very Low cover (0-5 percent) = 4.0 acres

Area at Low cover (6-25 percent) = 3.5 acres

Area at Medium cover (26-50 percent) = 3.3 acres

Area at High cover (51-75 percent) = 1.0 acres

No areas were mapped with greater than 75 percent cover.

The main access routes to the wells to be installed in the FONR south portion had zero to very low cover of annual grasses. Surveyed areas along either side of access routes had grass cover in all cover classes ranging from Low to High.

Well BW-51 is located in a "Very Low" cover area. Well BW-49 is located in a "High" cover area. Well BW-51 will be monitored for 3 years to determine change in cover of non-native annual grasses. Monterey spineflower is found at "Very Sparse" cover throughout the BW-51 site, and along the access route to this well.

5.4 HMP Species Mitigation and Avoidance Measures within OUCTP U/L 180-ft Aquifer Well Areas

Black Legless Lizard – BLLs were not encountered during the work conducted by Shaw in 2010. However, a BLL was encountered at BW-51 during drilling of BW-51 in January 2011 by Ahtna personnel. The Ahtna biologist recorded and oversaw relocation of the lizard out of the work zone. It was alive and uninjured. The sandy soils and vegetation type at the site are known habitat for the BLL, and the species has historically been encountered on the FONR. Site personnel are briefed on identification of this species, and the protocol to be followed when encountered.

California Tiger Salamander – CTS were not encountered on site during Shaw work in 2010. CTS could potentially be encountered during migration periods. Site personnel were briefed on identification of this species, and the protocol to be followed if found. Any CTS individuals encountered are required to be reported immediately to both the Shaw Biologist and the BRAC Natural Resource Manager. Proper handling and relocation, if necessary, is permitted by USFWS for these persons only on Shaw's projects.

Maritime Chaparral and HMP Plant Species - Well locations have been adjusted from 10 to 150 ft from original planned sites to avoid rare plant populations, or disturbance to maritime chaparral and other rare plant habitat.

Work sites, access routes, and staging areas were defined clearly by fencing and flagging to minimize work footprint.

6.0 Plant Survey Reference Plots

6.1 Introduction

Three reference plots were established in spring 2010 to monitor population abundance of the HMP-listed annual plant species, sand gilia and Monterey spineflower, in order to obtain trend data for these species. Variation in population abundance from year to year is particularly evident in sand gilia, and reference plots provide data on natural environmental factors such as rainfall and temperature patterns. This makes it possible to separate out the effect of work impacts from variation due to natural environmental causes.

These plots will be included in annual monitoring starting from 2010. The results will be used to interpret the monitoring data for HMP species on the CTP and other habitat reserve project sites.

Three plots of 100 square meters (sqm) (mostly 5- by 20-meter configuration) were set up within the FONR. Areas were selected that had high sand gilia and Monterey spineflower abundance in 2010. Plot locations are shown in Figures 3-2, 4-2, and 5-2a.

In addition to these plots, two small locations (Plant Survey Reference Areas 4 and 5) within the CTP Pilot Study Survey Area will continue to provide sand gilia reference data. These areas are shown on the map in Figure 3-2. These are not established plots, but rather natural openings in the chaparral in undisturbed locations. They have been included in the plant monitoring for four consecutive years (Table 6-1). These areas will also continue to be monitored annually for additional sand gilia reference data, as long as they remain undisturbed.

Table 6-1
Sand Gilia Reference Areas 4 and 5

Sand Gilia Reference Areas in Pilot Study Area (2007-2010)		
Year	Sand Gilia Reference Area 5 (NE Pilot Study Site)	Sand Gilia Reference Area 4 (SE Pilot Study Site)
2007	52	93
2008	33	14
2009	1,000	248
2010	1,620	455

6.2 Results

Figures 3-2, 4-2, and 5-2a show the location of the plots and numbers of sand gilia plants in relation to the surrounding site. Survey results for 2010 were as follows. The survey dates are indicated.

Plant Survey Reference Plot 1

Sand gilia = 130 (5/5/11)

Monterey spineflower cover:

Sparse = 4.0 sqm

Medium-Low = 7.5 sqm

Medium = 14.6 sqm

Plant Survey Reference Plot 2

Sand gilia = 100* (5/11/10)

** Note: This count is much lower than the number of plants present, because plants were diminutive and most had gone to seed and were not visible at the time of the count. The number of plants was likely much higher.*

Monterey spineflower cover:

Medium-Low = 71.5 sqm

Plant Survey Reference Plot 3

Sand gilia = 120 (5/5/11)

No Monterey spineflower data are available for this plot.

7.0 Site 39 – Soil Remediation Activities

7.1 Mitigation and Avoidance Measures to Reduce Impacts during Soil Remediation Activities

During 2010, soil remediation activities were conducted at 18 of the Site 39 ranges. Activities included mowing of vegetation within the remediation footprint, excavation, staging and soil stockpiling, site recontouring, and erosion control.

Measures were taken to reduce impacts to HMP species and habitat where possible. Mitigation measures for soil remediation are specifically addressed in the HMP, in the 1999 Biological Opinion (USFWS, 1999), and in the *Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord* (USACE, 2006). These measures are summarized as follows:

- Access routes and staging areas for each site were planned ahead of time to minimize impacts to surrounding habitat and HMP species as much as possible. Existing roads and trails, and pre-existing paved, graded, or disturbed areas, and areas known to be unoccupied by HMP annual species (based on previous surveys) were used for access, staging, and soil stockpiling wherever available.

- No grading for access roads was permitted in areas of high quality habitat where HMP species were present and in CMC. Oak trees outside of remediation areas were avoided. Some branch pruning was conducted as needed to allow access, using best management practices to create clean cuts.

- CTS measures were implemented in November through June or when adjacent vernal ponds were wet. Escape boards were placed in each corner of every excavation hole, regular ground checks were made during the rainy season, and employee briefings were conducted to ensure the field staff followed the protocols for CTS avoidance and reporting. The single CTS encounter in 2010 is described in Section 8.1.1.

- BLL were also noted where encountered during excavation activities. Encounters in 2010 are described in Section 8.1.2.

- Excavation areas and soil stockpiles were protected from erosion using appropriate erosion control materials (straw wattles and silt fencing).

- Erosion problems were addressed by a combination of: light grading of access routes to remove erosion ruts and to prevent further soil runoff; and use of straw wattles, silt fencing, and loose blown straw.

- Completed sites were contoured using heavy equipment to grade the excavation edges into the surrounding area. Barley seed was spread at the rate of 100 pounds per acre, and rice straw (certified weed-free) was spread and crimped into the soil for erosion control and prepared the site for habitat restoration, as outlined in the restoration plan for Fort Ord.

8.0 Other Biological Support Activities in 2010

8.1 HMP Species Reports

8.1.1 California Tiger Salamander Encounters

In 2010, there was one CTS encounter by Shaw on Fort Ord. On the 14th of December, an adult CTS was found alive and uninjured within the excavation area of HA-39/40, during work activity. The encounter was documented by Shaw's biologist (Shirley Tudor) and the salamander was relocated approximately 500 ft away to the opposite side of a vernal pond (Pond 8) from the excavation site. The relocation area had numerous ground squirrel burrows and the released salamander was observed to enter a burrow. The report was submitted to the Army BRAC office on December 15, 2010.

8.1.2 Black Legless Lizard Encounters

In 2010, there were a total of six BLL encountered during Shaw's work. One was found on Burn Unit 14, one during well development on OUCTP System 2A site, and four were found during soil remediation excavations on HA-44 (2 found), HA-19 (1 found), and HA-39/40 (1 found). All were reported alive and uninjured, and were relocated to adjacent areas outside of the work zone.

8.2 Employee Education

New Shaw employees and sub-contracted workers receive a natural resources training on Fort Ord natural resource protection prior to starting work. In 2010, Shaw provided training to 34 new employees for natural resource protection. Training includes the following topics:

- Identification of sensitive HMP-protected habitat and HMP species specific to the work area. Habitats covered in the training focus specifically on maritime chaparral, vernal ponds and wetlands, and beach dunes. The species covered include CTS, Contra Costa goldfields, California linderiella, BLL, sand gilia, Monterey spineflower, Seaside bird's beak, Monterey manzanita, sandmat manzanita, Hooker's manzanita, Eastwood's golden fleece, Monterey Ceanothus, snowy plover, and Smith's blue butterfly.

- Specific guidance for CTS protection, including ability to recognize the species, the protocol for reporting all encounters to the Shaw or Army biologists (who are qualified to handle and relocate CTS), placing escape ramps or covering open trenches, and checking excavations for trapped CTS during migration seasons.

- Instructions for minimizing all work impacts and work footprints, and to avoid areas flagged for sensitive species wherever marked in the field.

- Instructions for restricting vehicle movement and parking to roads, staging areas, and other designated work areas wherever possible.

- Guidance for reducing soil disturbances in sensitive habitat, particularly areas containing seed bank or live individuals of HMP-listed plant species.

9.0 References

U.S. Army Corps of Engineers (USACE), 1997a. *Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord.* With Technical assistance from Jones and Stokes Associates.

USACE, 2006a. *Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord.* Prepared by Burleson Consulting, Inc. Folsom, California.

USACE, 2006b. *Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-wide Multispecies Habitat Management Plan at Former Fort Ord*. Prepared by Burleson Consulting, Inc. Folsom, California.

USACE, 2008. *2007 Annual Biological Monitoring Report.* Prepared by Shaw Environmental, Inc., Fort Ord, California.

USACE, 2009a. *2008 Annual Biological Monitoring Report.* Prepared by Shaw Environmental, Inc., Fort Ord, California.

USACE, 2009b. *Final Operable Unit Carbon Tetrachloride Plume Remedial Action Work Plan, Former Fort Ord, California.* Prepared by Shaw Environmental, Inc., Fort Ord, California.

USACE, 2010a. *2009 Annual Biological Monitoring Report.* Prepared by Shaw Environmental, Inc., Fort Ord, California.

USACE, 2010b. *Final Operable Unit Carbon Tetrachloride Plume Upper 180-foot Aquifer Remedial Design, Former Fort Ord, California*. Prepared by Shaw Environmental, Inc., Fort Ord, California.

USACE, 2010c. *Final Operable Unit Carbon Tetrachloride Plume Lower 180-foot Aquifer Remedial Design, Former Fort Ord, California.* Prepared by Shaw Environmental, Inc., Fort Ord, California.

U.S. Fish and Wildlife Service (USFWS), 1999. *Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California.*

USFWS, 2002. *Biological Opinion on the Closure and Reuse of Fort Ord, as it affects Monterey Critical Habitat.*

USFWS, 2005. *Biological Opinion on the Closure and Reuse of Fort Ord, as it affects CTS and Critical Habitat for Contra Costa Goldfields. And Amendment* (dated June 1, 2007).

Figures

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 3-1
CTP PILOT STUDY SITE
LOCATION OF SITE AND WELLS
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. CTP_location2010.mxd

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 3-2
CTP PILOT STUDY SITE
2010 SAND GILIA LOCATIONS
AND DENSITY
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. CTP_sandgilia2010.mxd

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 3-3
CTP PILOT STUDY SITE
2010 MONTEREY SPINEFLOWER
TOTAL DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. CTP_spineflower2010.mxd

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

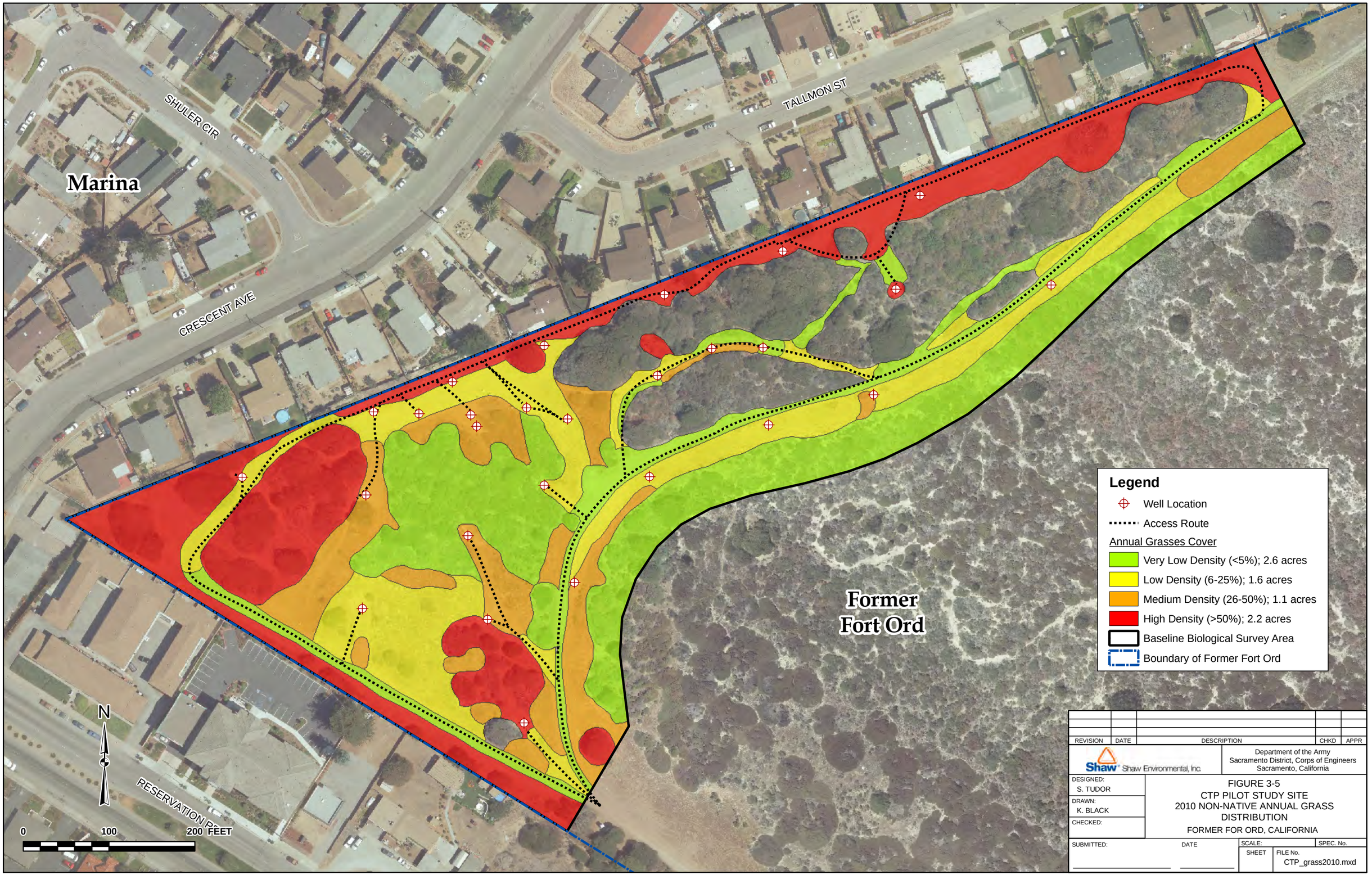
DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 3-4
CTP PILOT STUDY SITE
2010 MONTEREY SPINEFLOWER LOCATIONS
WITH DENSITY >3% COVER
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.

SHEET FILE No. CTP_SF density2010.mxd



REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 3-5
CTP PILOT STUDY SITE
2010 NON-NATIVE ANNUAL GRASS DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. CTP_grass2010.mxd

Figure 3-6a
CTP Pilot Study Site – Monterey Spineflower Cover 2007-2010
(% Cover Classes: 1 = < 3, 2 = 3-25, 3 = 26-50, 4 = 51-75, 5 =75-97)

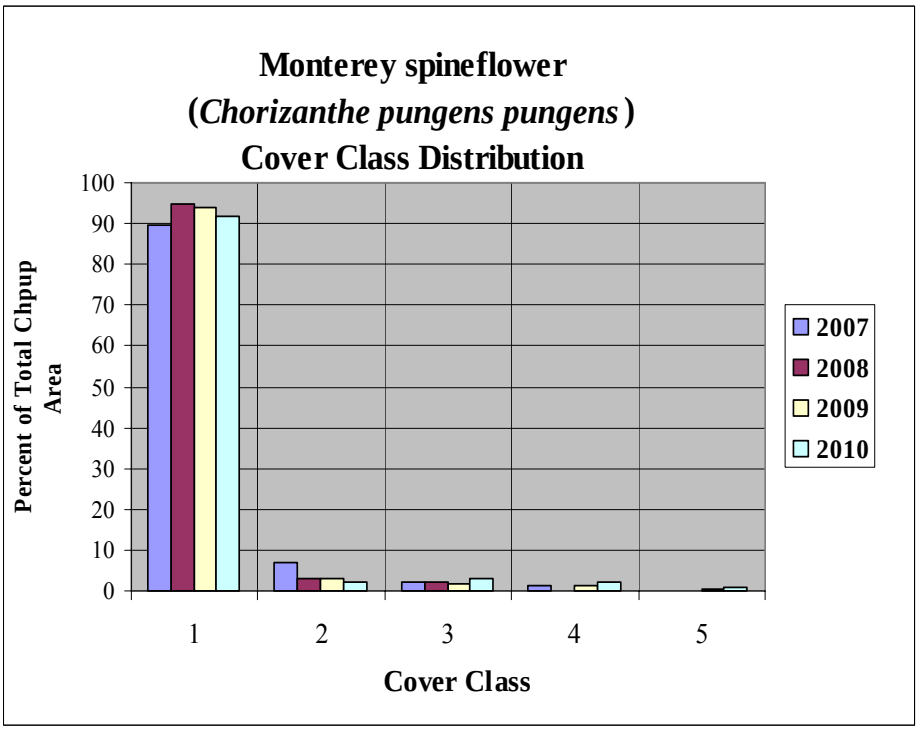
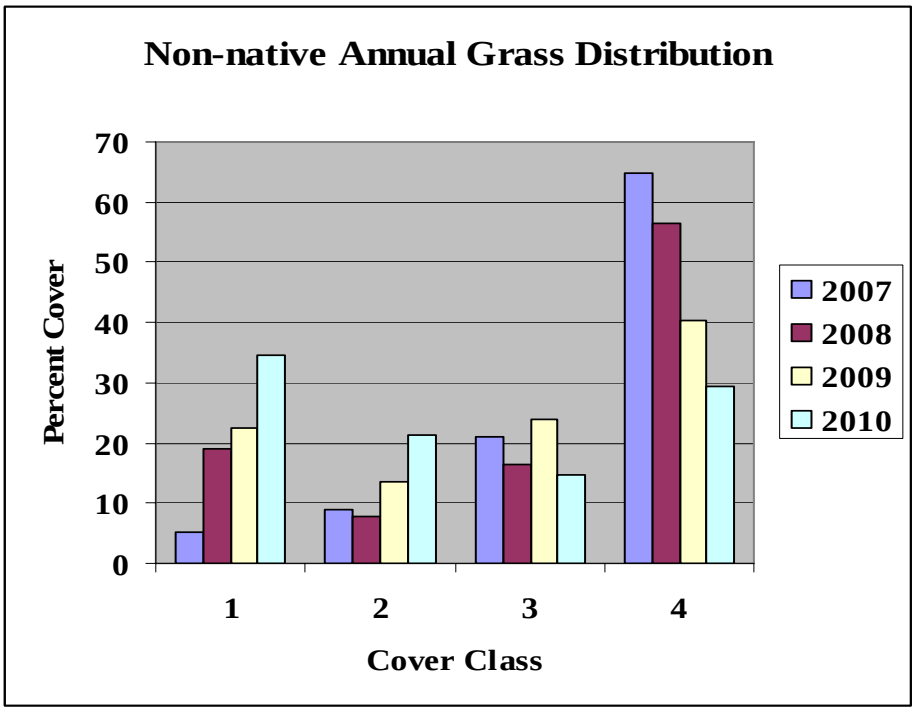


Figure 3-6b
CTP Pilot Study Site – Non-Native Annual Grass Distribution 2007-2010
(% Cover Classes: 1 = < 5, 2 = 6-25, 3 = 26-50, 4 = 51-75)



N

EW-BW-156-A
EW-BW-155-A
EW-BW-154-A
IW-BW-153-A
IW-BW-152-A
EW-BW-150-A
IW-BW-151-A
EW-BW-149-A
EW-BW-148-A
IW-BW-147-A
EW-BW-146-A
IW-BW-145-A
EW-BW-143-A
IW-BW-139-A
IW-BW-136-A
EW-BW-132-A

RESERVATION RD

0 150 300 FEET

LEGEND

- Well Location
- Access Route
- Baseline Biological Survey Boundary
- Boundary of Former Fort Ord

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 4-1

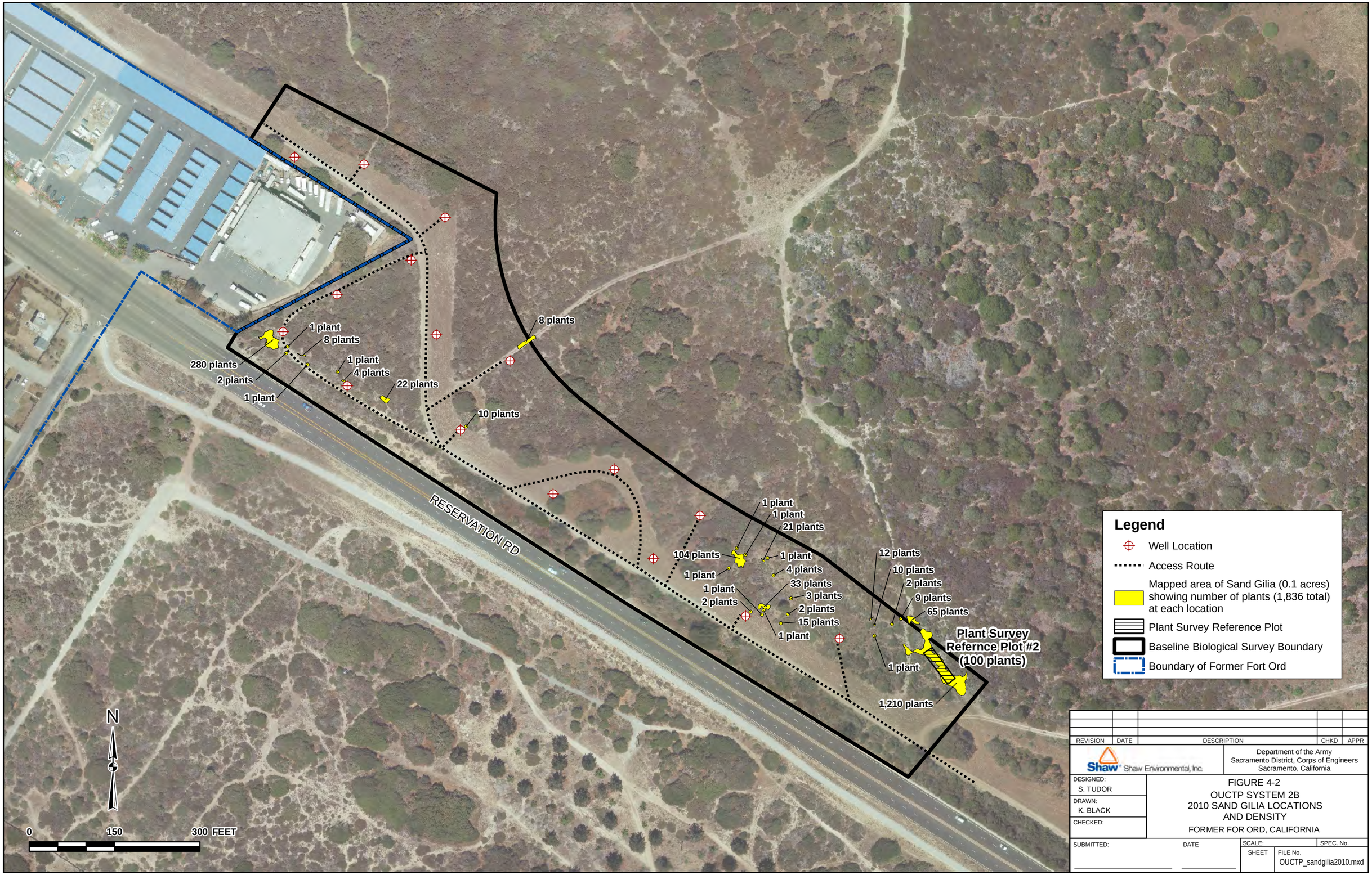
OUCTP SYSTEM 2B
LOCATION OF SITE AND WELLS

FORMER FORT ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.

SHEET FILE No. OUCTP_baseline_area2010.mxd



REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 4-2
OUCTP SYSTEM 2B
2010 SAND GILIA LOCATIONS
AND DENSITY
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. OUCTP_sandgilia2010.mxd

RESERVATION RD

N

0 150 300 FEET

Legend

- Well Location
- Access Route
- Mapped Area of Monterey Spineflower (1.8 acres)
- Baseline Biological Survey Boundary
- Boundary of Former Fort Ord

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 4-3
OUCTP SYSTEM 2B
2010 MONTEREY SPINEFLOWER
TOTAL DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. OUCTP_spineflower2010.mxd

RESERVATION RD

N

0 150 300 FEET

Legend

- Well Location
- Access Route

Monterey Spineflower Cover

- Sparse (3-25%); 0.05 acres
- Medium Low (26-50%); 0.12 acres
- Medium (51-75%); 0.05 acres
- Medium High (76-97%); 0.02 acres
- Baseline Biological Survey Boundary
- Boundary of Former Fort Ord

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 4-4
OUCTP SYSTEM 2B
2010 MONTEREY SPINEFLOWER
LOCATIONS AND DENSITY
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.

SHEET FILE No. OUCTP_SFdensity2010.mxd

RESERVATION RD

N

0 150 300 FEET

Legend

- Well Location
- Access Route

Annual Grasses Cover

- Very Low Density (<5%); 7.8 acres
- Low Density (6-25%); 0.3 acres
- Medium Density (26-50%); 1.7 acres
- Baseline Biological Survey Boundary
- Boundary of Former Fort Ord

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 4-5
OUCTP SYSTEM 2B
2010 NON-NATIVE ANNUAL GRASS DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.

SHEET FILE No. OUCTP_grass2010.mxd

MP-BW-50

MP-BW-51

MP-BW-49

EW-OU2-09-180

IM3IN PKWY

N

0 300 600 FEET

Legend

- Well Location
- Access Route
- Extraction Well Conveyance Pipeline
- Biological Survey Area
- UC Natural Reserve Boundary

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR

DRAWN: K. BLACK

CHECKED:

FIGURE 5-1

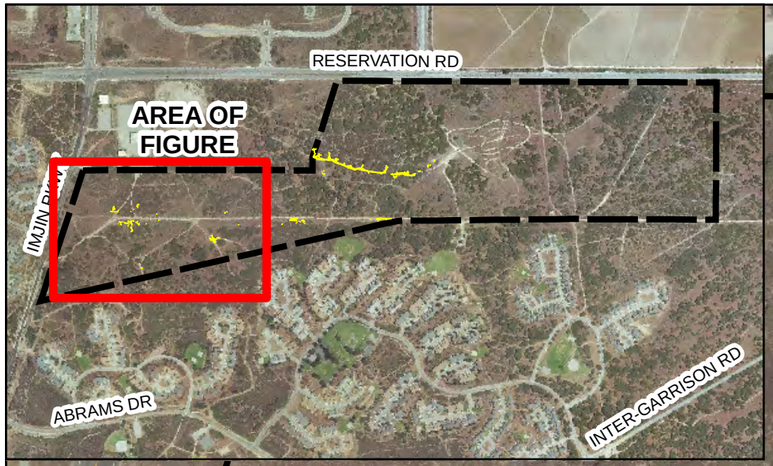
OUCTP U/L 180-FT AQUIFER
LOCATION OF SITE AND WELLS

FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.

SHEET FILE No. RESERVE_location_2010.mxd



Plant Survey Reference Plot #3

120 plants

45 plants

264 plants

80 plants

2 plants

8 plants

10 plants

1 plant

1 plant

11 plants

8 plants

634 plants

14 plants

9 plants

2 plants

2 plants

199 plants

12 plants

3 plants

14 plants

Legend

- Well Location
- Access Route
- Extraction Well Conveyance Pipeline
- Mapped area of Sand Gilia (0.6 acres) showing number of plants (4,932 total) at each location
- Plant Survey Reference Plot
- Biological Survey Area
- UC Natural Reserve Boundary

N

0 125 250 FEET

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-2a
OUCTP U/L 180-FT AQUIFER
2010 SAND GILIA LOCATIONS
AND DENSITY
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. RESERVE_sandgiliaNW_2010.mxd

70 plants
115 plants
40 plants
95 plants
75 plants
85 plants
1,190 plants
50 plants
600 plants
35 plants
8 plants
10 plants
25 plants
15 plants
40 plants
8 plants
674 plants
2 plants
2 plants
10 plants
8 plants
450 plants
3 plants

RESERVATION RD
IMJIN PKWY
ABRAMS DR
INTER-GARRISON RD
AREA OF FIGURE

N

0 125 250 FEET

Legend

- Well Location
- Access Route
- Mapped area of Sand Gilia (0.6 acres) showing number of plants (4,932 total) at each location
- Biological Survey Area
- UC Natural Reserve Boundary

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

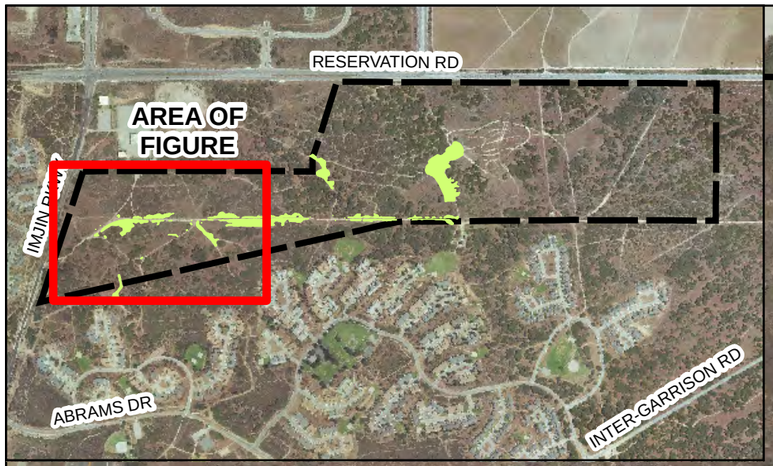
Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-2b
OUCTP U/L 180-FT AQUIFER
2010 SAND GILIA LOCATIONS
AND DENSITY
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. RESERVE_sandgiliaSE_2010.mxd



Plant Survey Reference Plot #3

N

0 125 250 FEET

Legend

- Well Location
- Access Route
- Extraction Well Conveyance Pipeline
- Mapped Area of Monterey Spineflower (6.2 acres)
- Plant Survey Reference Plot
- Biological Survey Area
- UC Natural Reserve Boundary

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-3a
OUCTP U/L 180-FT AQUIFER
2010 MONTEREY SPINEFLOWER
TOTAL DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. RESERVE_spineflowerNW_2010.mxd

Legend

- Well Location
- Access Route
- Mapped Area of Monterey Spineflower (6.2 acres)
- Biological Survey Area
- UC Natural Reserve Boundary

N

0 125 250 FEET

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

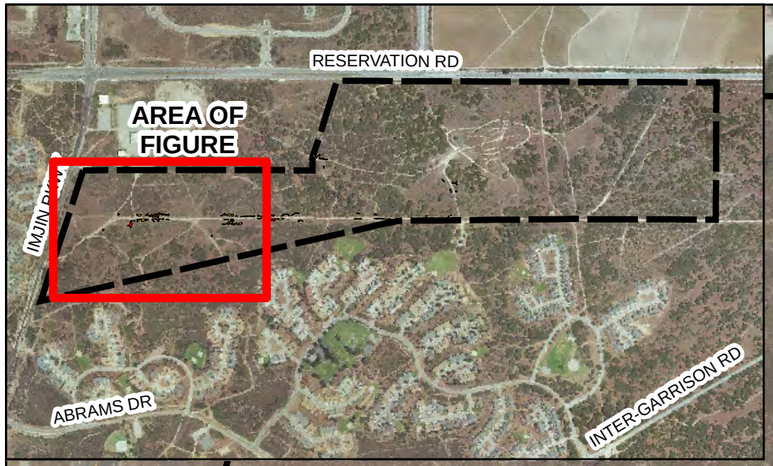
Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-3b
OUCTP U/L 180-FT AQUIFER
2010 MONTEREY SPINEFLOWER
TOTAL DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. RESERVE_spineflowerSE_2010.mxd



Plant Survey Reference Plot #3

Legend

Monterey Spineflower Cover

- Sparse (3-25%); 0.20 acres
- Medium Low (26-50%); 0.22 acres
- Medium (51-75%); 0.15 acres
- Plant Survey Reference Plot
- UC Natural Reserve Boundary

N

0 125 250 FEET

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

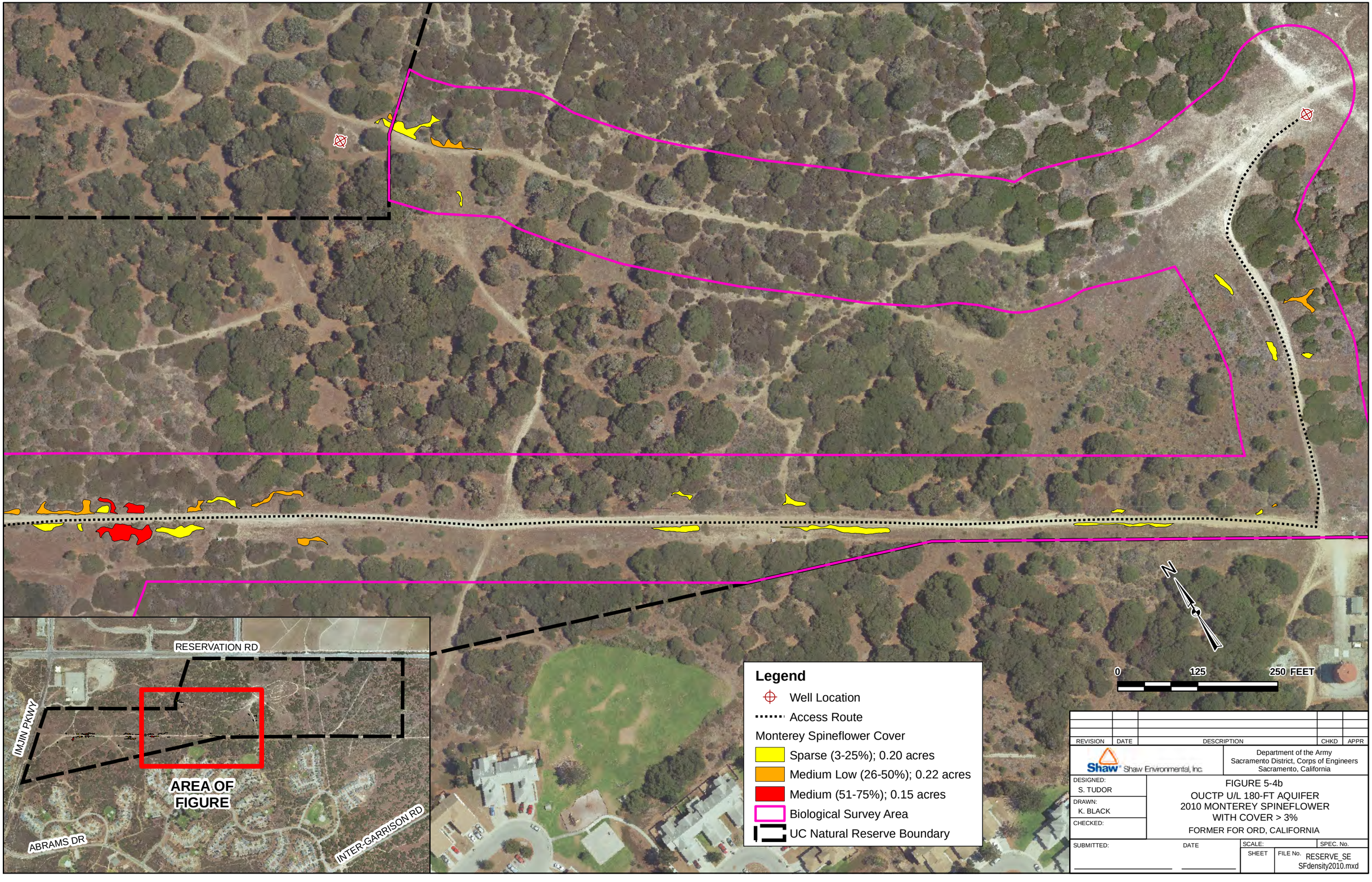
Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-4a
OUCTP U/L 180-FT AQUIFER
2010 MONTEREY SPINEFLOWER
WITH COVER > 3%
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. RESERVE_SFdensityNW_2010.mxd



REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

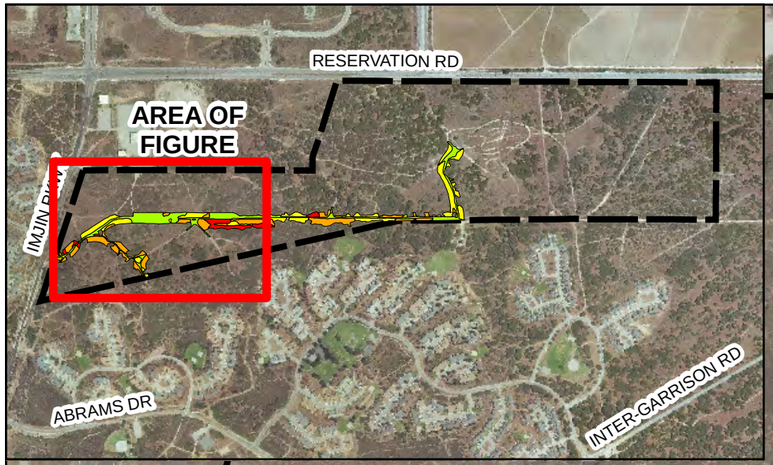
Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-4b
OUCTP U/L 180-FT AQUIFER
2010 MONTEREY SPINEFLOWER
WITH COVER > 3%
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.
SHEET FILE No. RESERVE_SE SFdensity2010.mxd



Plant Survey Reference Plot #3

Legend

- Well Location
- Access Route
- Extraction Well Conveyance Pipeline

Annual Grasses Cover

- Very Low Density (<5%); 4.0 acres
- Low Density (6-25%); 3.5 acres
- Medium Density (26-50%); 3.3 acres
- High Density (>50%); 1.0 acres
- Plant Survey Reference Plot
- Biological Survey Area
- UC Natural Reserve Boundary

N

0 125 250 FEET

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-5a
OUCTP U/L 180-FT AQUIFER
2010 NON-NATIVE ANNUAL GRASS
LOCATIONS AND DENSITY
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

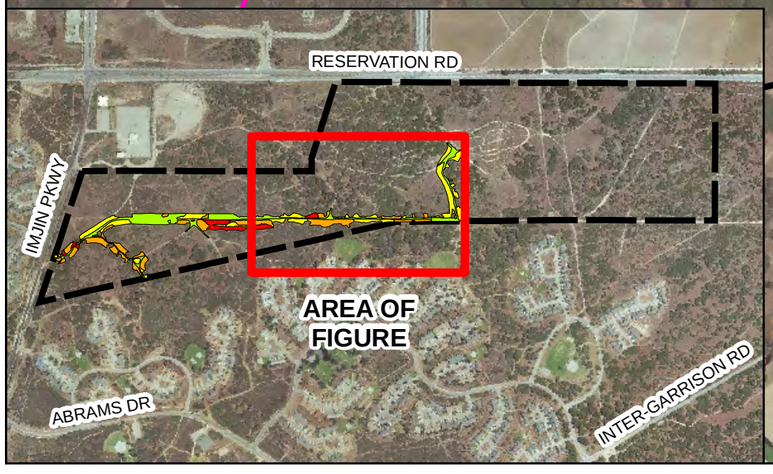
SCALE: SPEC. No.
SHEET FILE No. RESERVE_grassNW_2010.mxd

Legend

- Well Location
- Access Route

Annual Grasses Cover

- Very Low Density (<5%); 4.0 acres
- Low Density (6-25%); 3.5 acres
- Medium Density (26-50%); 3.3 acres
- High Density (>50%); 1.0 acres
- Biological Survey Area
- UC Natural Reserve Boundary



N

0 100 200 FEET

REVISION	DATE	DESCRIPTION	CHKD	APPR

Shaw Shaw Environmental, Inc.

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

DESIGNED: S. TUDOR
DRAWN: K. BLACK
CHECKED:

FIGURE 5-5b
OUCTP U/L 180-FT AQUIFER
2010 NON-NATIVE ANNUAL GRASS DISTRIBUTION
FORMER FOR ORD, CALIFORNIA

SUBMITTED: DATE

SCALE: SPEC. No.

SHEET FILE No. RESERVE_grassSE_2010.mxd

Photographs

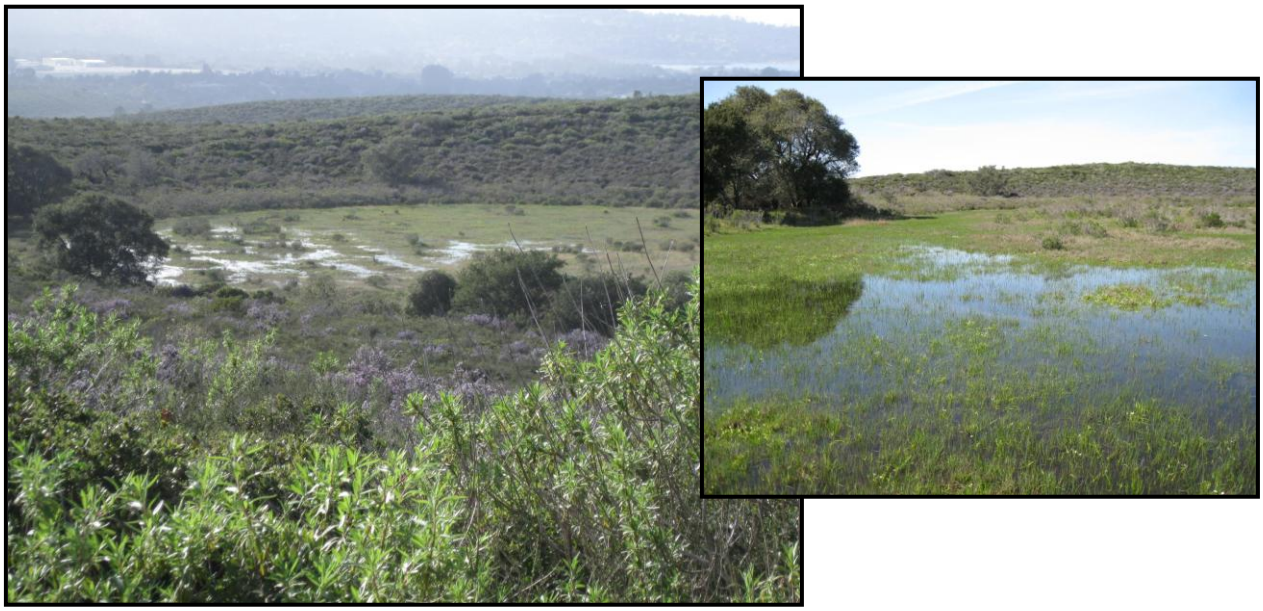
Photograph 2-1
California tiger salamander (CTS) larva found during aquatic sampling at Pond 5 (Reference Pond).

Photograph 2-2
View of Pond 8 adjacent to HA-39/40, a soil remediation site. No CTS were found during aquatic sampling. California Linderiella were found.

Photograph 2-3
View of Pond 11 in Non-Burn Area 2A along Eucalyptus Road. California Linderiella were found, but no CTS.

Photograph 2-4
View of Pond 101 (Reference Pond) along Hennekin's Ranch Road and Gigling Road, on BLM property. CTS eggs and larvae were found here.

Photograph 2-5
View of "No ID Pond" in Non-Burn Area 8B. CTS eggs were found here.



Photograph 2-6
View of Pond 46 in Non-Burn Area 6A. No CTS or California Linderiella were found here.

Photograph 2-7
View of Pond 30 in Soil Remediation Range HA-28. No CTS or California Linderiella were found here.

Photograph 3-1
CTP Pilot Study Site – View of an area in 2010 that has had relatively high abundance of sand gilia and Monterey spineflower in past monitoring years, and had been disturbed by grading in December 2006. In 2010, sand gilia abundance was the highest counted since 2007.

Photograph 3-2
CTP Pilot Study Site – South perimeter access route in 2010. The route still has lower density of annual grasses and forbs compared to the two previous years due to concentrated use for access and staging, but vegetation recovery is progressing.

Photograph 3-3
CTP Pilot Study Site – View of the Central Maritime Chaparral Area, which burned in 2006, with similar cover of annual grasses in 2010 as in previous years.

Photograph 3-4
CTP Pilot Study Site – Access route to Well IW-03, shown in background, from the south end of the access route. This is an area of relatively high annual grass density, which may have encroached into the access route.

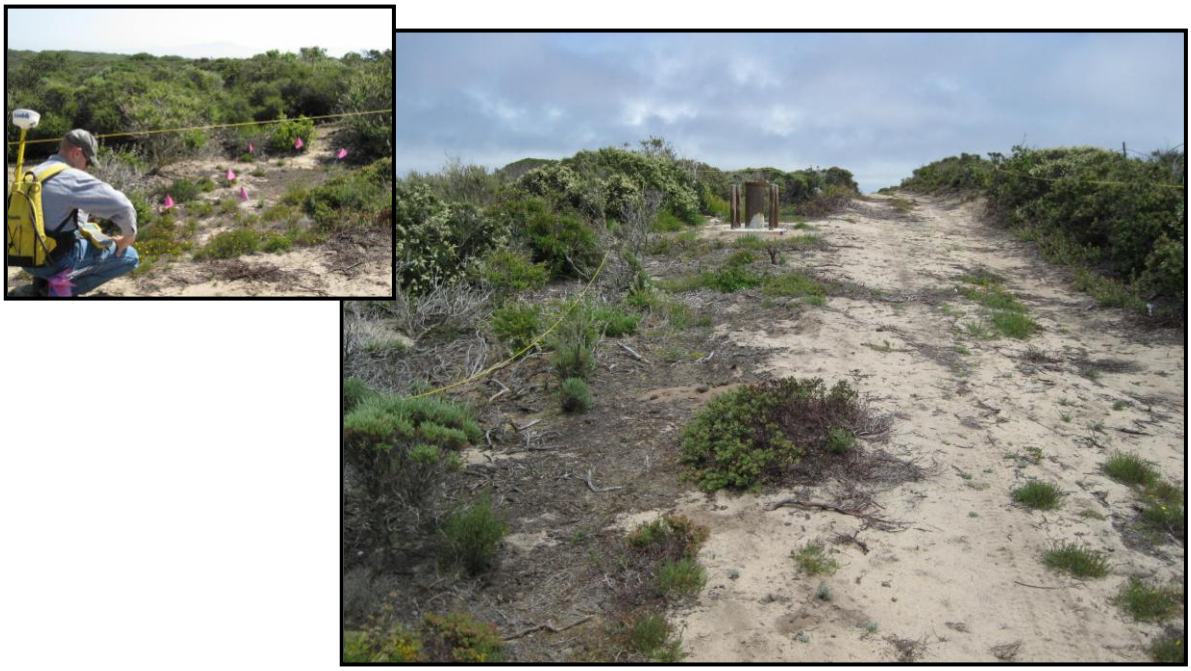
Photograph 3-5
CTP Pilot Study Site – View of mowed fuel break just south of EW-02. Non-native annual grass density was low in this section. Monterey spineflower was found at higher percent cover along the shrub line than in the fuel break.

Photograph 3-6
CTP Pilot Study Site 2010– View of mowed fuel break at Well EW-08. Annual grass density is medium in this section. Monterey spineflower was found along the shrub line.

Photograph 3-7
CTP Pilot Study Site – View of access route to Well IW-02 in 2010. Sandmat manzanita are regrowing in areas where impacted since 2007 from vehicle entry.

Photograph 3-8
CTP Pilot Study Site 2010– View of mowed area to access Well IW-01. Coastal scrub species (coffeeberry, poison oak, sticky monkey flower) continue to resprout and grow slowly since cutting of the shrubs in 2007 to access the well site. Perennial native species such as *Gnaphalium* sp. have germinated.

Photograph 4-1
OUCTP System 2B - View of access route to EW-BW-148A, after mowing. The route required mowing about 2 ft on either side to accommodate 10-ft-wide access for a drill rig and fork lift. The vegetation is primarily a low-growing stand of sandmat manzanita, with shaggy-barked manzanita. Sand gilia plants were mapped in some of the shrub openings beyond the yellow roped area (inset).



Photograph 4-2
OUCTP System 2B - View of area around EW-BW-150A. The roped-off area was demarcated to protect a significant sand gilia patch (numbering 100 in 2009, and 280 in 2010) where purple flags are placed.

Photograph 4-3
OUCTP System 2B - View of location for Well EW-BW-152A. Shrubs were mowed several feet from center route to establish an access route to this well, and Well BW-150A.

Photograph 4-4
OUCTP System 2B - View of Well IW-BW-153A leading in from the Perimeter Road. A one-way loop access route was mowed to accommodate access to three wells in this area. Shrubs were pruned back to a width of 10 ft to accommodate access route. Shrubs were primarily shaggy-barked manzanita, coyote brush, chamise, and black sage.

Photograph 4-5
OUCTP System 2B - View of location for Well IW-BW- 151A (wooden stake), located near the edge of the fuel break. Vehicle access was restricted to the area inside the yellow roped area.

Photograph 4-6
OUCTP System 2B - View of Well IW-BW-154A, located at the edge of the shrub line, where Monterey spineflower was at Medium Low (26-50%) cover in the baseline survey. In 2010, cover was between 26% and 75% along the shrub line. Vehicles accessed the well location on heavy-duty matting to reduce soil disturbance.

Photograph 4-7
OUCTP System 2B - View of matting and rope delineation used to contain footprint of drill rig equipment, and reduce ground disturbance in all off-road well locations. Top photo shows access to BW-149A; middle photo is the work operation at BW-154A, and bottom photo shows the ground to BW-151, after matting was removed.

Photograph 4-8
OUCTP System 2B - View of location for Well EW-BW-143A (wooden stake), located about 75 ft inside the shrub line of the fuel break. Mowing of a 10-ft-wide route was required for vehicle access to this location. Plant surveys showed there is Monterey spineflower at Very Sparse (0-3%) cover in this area.

Photograph 4-9
OUCTP System 2B – View of location for Well EW-BW-149A (wooden stake), located along a trail about 75 ft from the perimeter fuel break. This route had Monterey spineflower at Very Sparse (0-3%) cover. Shrubs required pruning back to accommodate well, and access route 10 ft wide. Shrubs pruned were shaggy-barked manzanita, chamise, and black sage.

Photograph 5-1
180-ft Lower Aquifer – U.C. South Reserve.
Access route to well location EW-09.

Photograph 5-2
180-Ft Lower Aquifer – U.C. South Reserve.
Well location after completion (at barrel) before vault installation. Oak trees and shrubs were pruned back a few feet at the tree line to accommodate equipment.

Photograph 5-3
180-Ft Lower Aquifer - U.C. South Reserve.
Sand gilia area along road edge; this was fenced along road to protect the population from accidental vehicle impacts.

Photograph 5-4
Area with Very High cover of Monterey spineflower mapped along road edges near Well BW-49 (Figure 5-4) and fenced-off near the well installation.

Photograph 5-5
Sand gilia and Monterey spineflower were mapped along road edges. These areas were not impacted as vehicles stayed on the roads.

Photograph 5-6
Walking path with High density of sand gilia and Monterey spineflower. The area was surveyed for a possible access route to Well BW-61. Location of this well has since been moved to a development parcel to reduce impact to sensitive habitat (Figure 5-1).

Photograph 5-7
Access route to Well BW-49. This route had Monterey spineflower at Very Sparse cover. There were patches of higher cover more than 10 ft from the road edge. No sand gilia were identified along this well or access route.

Photograph 5-8
Approximate location of Well BW-49. This area had Monterey spineflower at Very Sparse cover, and no sand gilia. The location was moved about 89 ft to the southeast to avoid shrub cover.

Appendix A
California Tiger Salamander and California Fairy Shrimp Aquatic Sampling Survey Report

California Tiger Salamander and California Fairy Shrimp Aquatic Sampling Survey Report

Prepared for:
Shaw Environmental, Inc.

Prepared By:
Denise Duffy & Associates, Inc.

Contact:
Josh Harwayne
Senior Project Manager
(831) 373-4341

October 2010

SUMMARY

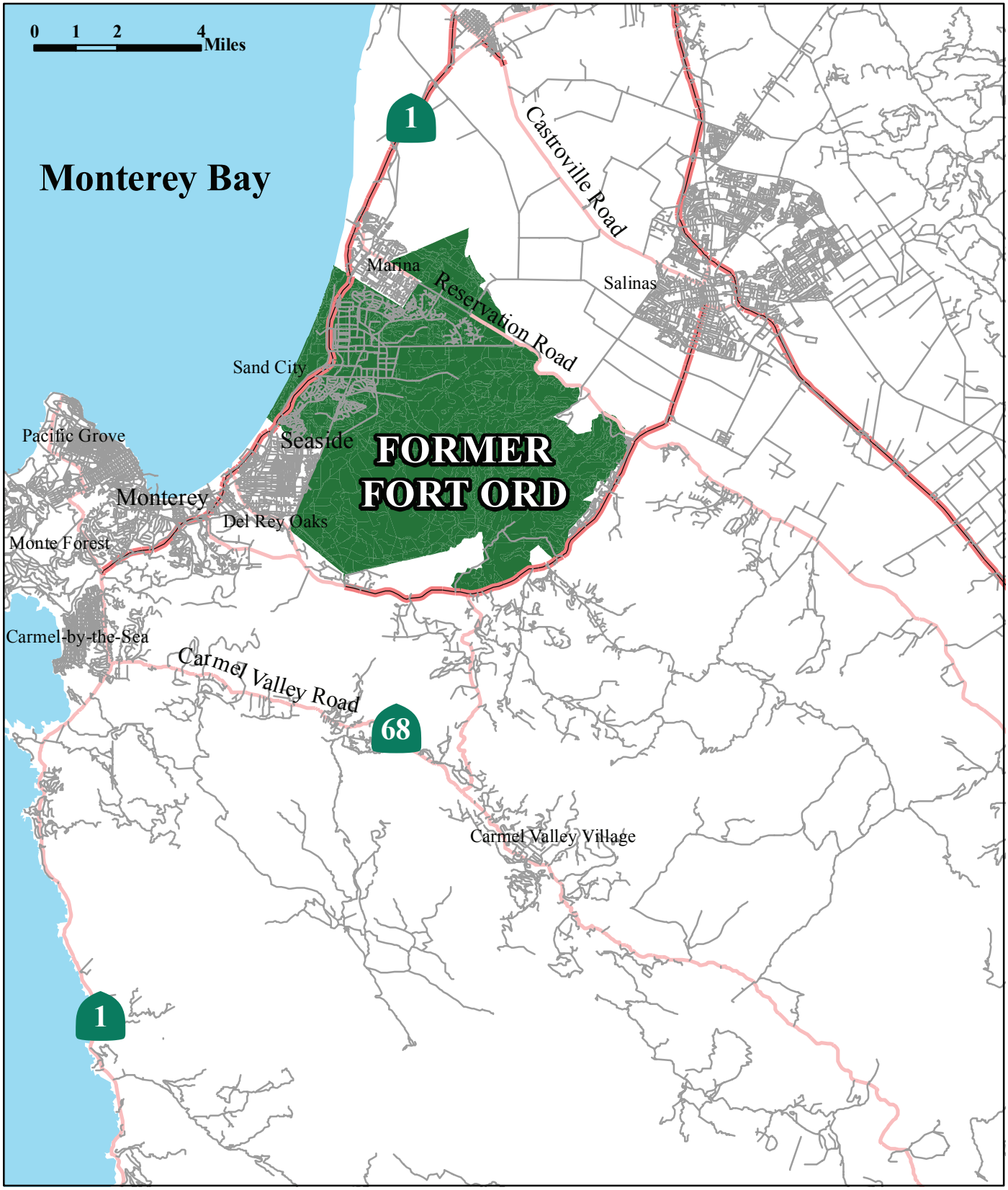
The Army is required to conduct wetland monitoring surveys in any areas where environmental cleanup activities could possibly impact protected wetland species on the Former Fort Ord U.S. Army base (Fort Ord), in Monterey County, California (Figure 1). This study provides faunal wetland baseline data for Ranges where soil remediation is likely to be performed in the near future, and could possibly have biological impacts on protected wetland species or habitat. The monitoring study is consistent with the "*Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord*" (USACOE, 2006). Faunal baseline aquatic sampling studies were conducted by Denise Duffy and Associates, Inc. (DD&A) to determine the presence/absence of the state and federally Threatened California tiger salamander (*Ambystoma californiense,* CTS) and invertebrates, including the California fairy shrimp (*Linderiella occidentalis*), a federal species of special concern, at several locations within Fort Ord. Seven study sites (Pools 5, 8, 11, 30, 46, 101, and No ID[1]) were identified for surveys (Figure 2). All of the pools were sampled on 11 March and 9 April, but Pools 8, 30, 46, and No ID did not have enough water to be sampled a third time on 25 May. All seven water bodies were sampled 11 March for invertebrates. Pools 8 and 11 were not surveyed a second time for invertebrates because fairy ship were documented within these pools during the first rounds of surveys. Methods for invertebrate sampling included using dip nets to sample representative portions of each water body to determine presence/absence of California fairy shrimp and collecting samples for branchiopod abundance counts. Methods for CTS sampling followed guidelines provided in the "*Interim guidance on site assessment and field surveys for determining presence or a negative finding of the California tiger salamander"* developed by the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) in 2003.

During invertebrate sampling, California fairy shrimp were observed at Pools 8 and 11. Additional species observed during these sampling events were copepods, ostracods, water beetles, diving beetles, mosquitoes, dragonfly and damselfly larvae, and Pacific tree frog (*Hyla regilla*), waterfowl, and other birds. During CTS aquatic sampling, CTS eggs were observed at Pools 5, 101, and No ID during the first round of sampling on 11 March. CTS larvae were observed at pool 5 during all three rounds and at pool 101 during the last round of surveys on 25 May.

INTRODUCTION

DD&A was contracted by Shaw Environmental, Inc. (Shaw) to conduct aquatic sampling surveys for the state and federally Threatened CTS and California fairy shrimp, a federal species of special concern, at several locations within Fort Ord, in Monterey County, California (Figure 1). This work was conducted in support of the Shaw Total Environmental Restoration Contract (TERC) with the U.S. Department of the Army Corps of Engineers (USACOE). This report presents the results of invertebrate and protocol-level CTS aquatic sampling surveys within seven study sites (Pools 5, 8, 11, 30, 46, 101, and No ID).

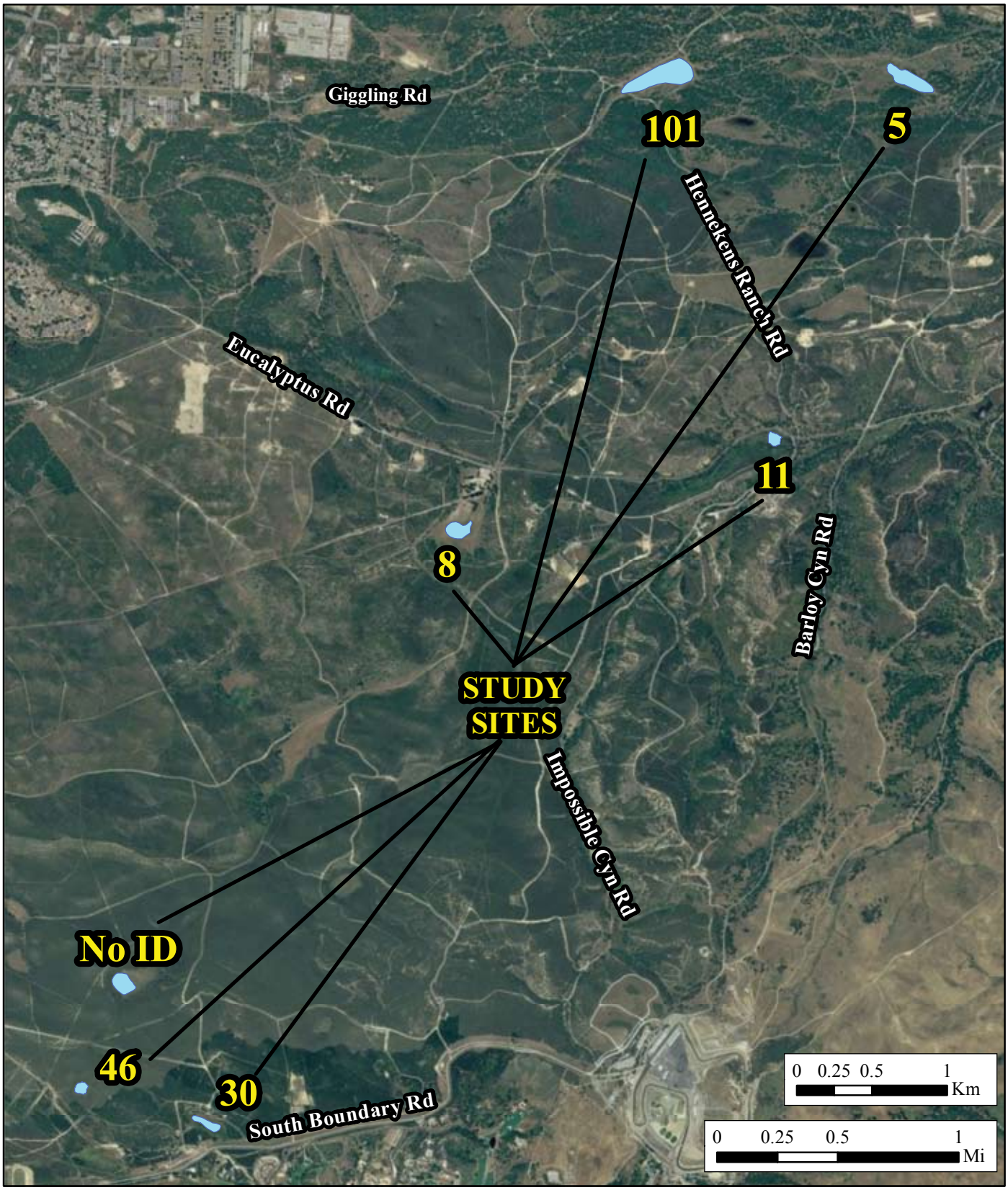
[1] This pond has no known numerical nomenclature and is identified by the text indicated (No ID).



N

Project Vicinity

Figure 1



N

Project Study Sites

Figure 2

DD&A biologists were authorized to initiate aquatic sampling at the Fort Ord water bodies by the 1999 USFWS Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California, and via project-specific authorization from the USFWS Ventura Field Office. All initial observations of CTS larvae were reported to the USFWS Ventura Field Office via e-mail within 72 hours.

SPECIES DESCRIPTIONS

California Tiger Salamander

CTS, specifically the Central California Distinct Population Segment (DPS), were listed as a federally Threatened species on August 4, 2004 (USFWS, 2004), and was also a designated as threatened under the California Endangered Species Act in May of this year. Critical Habitat was designated for CTS on August 23, 2005 (USFWS, 2005a), and went into effect on September 22, 2005. However, Critical Habitat on Fort Ord was excluded for economic reasons.

CTS is a large, stocky salamander that inhabits grasslands and oak savanna habitats in the valleys and low hills of central and coastal California. Adults spend most of their lives underground, typically in burrows of ground squirrels and other animals. During winter rains, between November and February, adults emerge from underground retreats to breed (Stebbins, 2003). Adults may travel long distances between upland sites and breeding sites, and above-ground activity may occur under suitable environmental conditions through May. During breeding migrations, individuals are sometimes found under surface objects such as rocks and logs.

CTS persist in disjunct remnant vernal pool complexes in Sonoma County and Santa Barbara County, in vernal pool complexes and isolated stocks scattered along a narrow strip of rangeland on the fringes of the Central Valley from southern Colusa County south to northern Kern County, and in sag ponds and human maintained stockponds in the coast ranges from the San Francisco Bay Area south to the Temblor Range. Tiger salamanders breed and lay eggs primarily in vernal pools and other temporary rainwater ponds following relatively warm rains in November to February. Adults have been found more than two km (1.24 miles) from breeding sites. Permanent human-made ponds are sometimes utilized if predatory fishes are absent; streams are rarely used for reproduction. Males typically spend six to eight weeks at breeding ponds, while females typically spend only one to two weeks (Loredo et al., 1996). Eggs are laid singly or in clumps on both submerged and emergent vegetation and on submerged debris in shallow water (Stebbins, 1972; Jennings and Hayes, 1994). In years of below average rainfall, or when rains occur late in the season, females may forego breeding (Trehnam et al., 2000). CTS has been eliminated from an estimated 55 to 58 percent of its documented historic breeding sites. Currently, about 150 known local populations of California tiger salamanders are extant.

California Fairy Shrimp

The California fairy shrimp (*Linderiella occidentalis*) is a federal species of special concern. It was proposed for listing along with the vernal pool tadpole shrimp (*Lepidurus packardi*), vernal pool fairy shrimp (*Branchinecta lynchi*), conservancy fairy shrimp (*B. conservatio*), and longhorn fairy shrimp (*B. longiantenna*); however, the proposal was withdrawn when the other four species were listed. The Federal Register (USFWS, 1994) states that the USFWS "has determined that the California linderiella is not likely to become either endangered or threatened

throughout all or a significant portion of its range in the foreseeable future, and it does not qualify for listing under the Act."

The California fairy shrimp is the most common fairy shrimp in the Central Valley (USFWS, 2007). The range extends from Shasta County south to Fresno County and across the valley to the Coast and Transverse Ranges from Willits in Mendocino County south to near Sulfur Mountain in Ventura County. They are most often found in large, relatively clear vernal pools and lakes; however, they can also survive in very small pools, and/or in clear to turbid water with pH from 6.1 to 8.5 and water temperatures from 41° to 85° F.

California fairy shrimp are small (approximately 0.4 inch long) crustaceans in the Linderiellidae family of the order Anostraca. They have delicate elongate bodies; large red, stalked, compound eyes; no carapaces; and eleven pairs of swimming legs. They swim upside down, by beating their legs in a complex, wavelike movement that passes from front to back. Fairy shrimp feed on algae, bacteria, protozoa, rotifers and bits of detritus.

Female California fairy shrimp carry their eggs in a ventral brood sac, and are either dropped to the bottom of the pool or remain in the brood sac until the mother dies and sinks. When the pool dries out, so do the eggs. The resting eggs, known as cysts, are able to withstand heat, cold and prolonged desiccation. They remain in the dry pool bed until rains and other environmental stimuli hatch them. Not all of the cysts may hatch when the pools refill, but may instead remain in the soil for several years before hatching. Once hatched, the average time for fairy shrimp to reach maturity is about forty-five days. Thirty-one days is the approximate minimum time required for maturity, which is the longest minimum for any Central Valley fairy shrimp. Adults are present from late December to early May.

Suitable habitat for the California fairy shrimp has declined dramatically over the past century. The largest threat to their survival is the conversion of grassland-vernal pool ecosystems to urban or agricultural uses. In addition, California fairy shrimp populations have declined due a variety of activities that render existing vernal pools unsuitable for the species. Alteration of vernal pool hydrology, in particular, can dramatically degrade vernal pool habitats. Vernal pool hydrology can be altered by a variety of activities, including the construction of roads, trails, ditches, or canals that block the flow of water into, or drain water away from the vernal pools and vernal pool complexes. Water contamination by toxic chemicals has also caused a decline in California fairy shrimp populations due to the sensitivity of the species to the water chemistry of their habitats. In addition, California fairy shrimp habitats have declined as a result of several other incompatible land uses, including off-road vehicle use, dumping, invasion of non-native species, vandalism, erosion and sedimentation.

SITE DESCRIPTION

Fort Ord was established in 1917 as a military training base for infantry troops. In January 1991, the Secretary of Defense announced the downsizing/closure of the base. Fort Ord consists of approximately 28,000 acres near the cities of Seaside, Sand City, Monterey, Del Rey Oaks, and Marina (Figure 1). Monterey Bay marks the western boundary, Toro Regional Park borders the base to the southeast and land use east is primarily agricultural. A variety of habitats occur

within Fort Ord, including oak woodland, maritime chaparral, grasslands, riparian forest, coastal scrub, and vernal pools.

METHODS

Sampling methods for both CTS and California linderiella were consistent with the Wetland Monitoring and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord.

Table 1 below identifies the dates of aquatic sampling events at each of the study pools.

Table 1. Aquatic Sampling Dates

Water Body Name	Date Sampled	
	Invert.	CTS
Pool 5	3/11/10	3/11/10
	4/9/10	4/9/10
		5/25/10
Pool 8	3/11/10	3/11/10
		4/9/09
Pool 11	3/11/10	3/11/10
		4/9/09
		5/25/10
Pool 30	3/11/10	3/11/10
	4/9/10	4/9/09
Pool 46	3/11/10	3/11/10
	4/9/10	4/9/10
Pool 101	3/11/10	3/11/10
	4/9/10	4/9/10
		5/25/10
Pool No ID	3/11/10	3/11/10
	4/9/10	4/9/10

CTS Study

Senior Environmental Biologist Josh Harwayne was the lead biologist on this project, with the assistance of Jami Davis, and Matt Johnson of DD&A. Josh Harwayne, Jami Davis, and Matt Johnson possess all appropriate state and federal permits to conduct CTS studies independently. Survey methods followed the "*Interim guidance on site assessment and field surveys for determining presence or a negative finding of the California tiger salamander"* developed by the USFWS and CDFG in 2003, except that aquatic sampling continued after initial detection to collect general estimates of the number of CTS larvae over time.

Fine-mesh seines (4' by 10' with 1/8" mesh) were used to capture larvae, tadpoles, and invertebrates. For deeper water bodies, the biologists would wade to a depth of three to four feet, unfurl the seine and pull it to the shore. Care was taken to pull the seine at a speed slow enough to keep the seine dragging along the bottom without collecting much sediment, but fast enough to capture mobile larvae and tadpoles. Long-handled D-shaped dip-nets (fine mesh) were frequently utilized in combination with seine nets and were particularly useful in very deep,

steeply banked, and/or densely vegetated water bodies with problematic substrates (i.e., deep mud).

Samples were collected from each site until the habitat was adequately represented. Between one-quarter hours to two person-hours were spent seining and/or dip-netting each water body per sampling effort, depending on water body size. Sampling locations were selected to survey different portions of large water bodies. Both the shallow and deeper portions of each site were sampled to the greatest extent possible.

All eggs and tadpoles larvae were easily distinguished in the field. Individuals were kept in wet nets or in Nalgene© collection boxes (containing water) for rapid identification. All animals were immediately returned to the water unharmed.

The number of CTS and other species observed at each pool was totaled and the relative abundance defined as follows:

- Few: 1 to 10 individuals;
- Common: 11 to 100 individuals; and
- Abundant: greater than 101 individuals

The length of several CTS larvae was also measured in order to track metamorphosis over time.

To reduce the possibility of spreading disease, nets and waders were scrubbed with Quat-128 solution and completely air-dried or different sets of gear were used before moving from one pool to another. Up to four different sets of seines and dip-nets were used. At the end of each day, all nets and waders were again treated with Quat-128 solution and completely air-dried.

Invertebrate Study

A quantitative assessment of the abundance of branchiopods, maxillopods (copepods), and ostracods was conducted while the presence/absence of other invertebrates was recorded for each water body sampled. Dip nets were used to sample representative portions of each pool. Vernal pool branchiopod species detected were identified to genus with the aid of a field-magnifying lens. Samples were collected from each pool until habitat was represented. If fairy shrimp were observed during the first survey, the pond was not surveyed a second time. The abundance of vernal pool branchiopods was estimated by collecting 5 to 10 samples from each pool (depending on the size and complexity of each pool). The number of vernal pool branchiopods in each sample was totaled and the relative abundance defined as follows (please note that the abundance categories are consistent with previous annual monitoring reports):

- Low abundance: 1 to 10 vernal pool branchiopods;
- Moderate abundance: 11 to 100 vernal pool branchiopods;
- High abundance: 101 to 300 vernal pool branchiopods; and
- Very high abundance: more than 300 vernal pool branchiopods.

RESULTS

CTS Study

CTS eggs were found at Pool and 5, 101, and No ID during the first aquatic sampling survey. CTS larvae were found at Pools 5 and 101 during subsequent aquatic sampling survey. Size ranged from 20-40 mm during the last survey in March. Two size classes were observed. The results of these surveys are presented below in Table 2.

Table 2. CTS Aquatic Sampling Results

Pond #	Date	CTS			Tree Frog		
		E	L	A	E	L	A
Pond 5	3/11/10	F	F		C	A	
	4/9/10		F		C	A	
	5/25/10		C			C	
Pond 8	3/11/10				C		F
	4/9/10					C	
Pond 11	3/11/10				C		F
	4/9/10						
	5/25/10					C	
Pond 30	3/11/10				A	F	F
	4/9/10						
Pond 46	3/11/10				A		
	4/9/10						
Pool 101	3/11/10	F					
	4/9/10						
	5/25/10		C			C	
Pool No ID	3/11/10	C			C	C	
	4/9/10				C	C	

(F = Few, C = Common, A = Abundant)
(E = Egg, L = Larvae, A = Adult)

Invertebrate Study

California fairy shrimp were found at Pools 8 and 11 during the first aquatic sampling surveys. Other branchiopods observed were cladocerans and conchostracans. The abundance of fairy shrimp observed is presented below in Table 3. Additional species observed during these sampling events were copepods, ostracods, water beetles, diving beetles, mosquitoes, dragonfly and damselfly larvae, and pacific tree frog, waterfowl, and other birds. .

Table 3. Abundance of Fairy Shrimp

Water Body	Date	Abundance
Pool 5	3/11/10	
	4/9/10	
Pool 8	3/11/10	Low
Pool 11	3/11/10	Moderate
Pool 30	3/11/10	
	4/9/10	
Pool 46	3/12/09	
Pool 101	3/11/10	
	4/9/10	
Pool No ID	3/11/10	
	4/9/10	

CONCLUSION

DD&A was contracted by Shaw Environmental to conduct aquatic sampling surveys for California fairy shrimp and CTS at seven sites located within Fort Ord in Monterey County, California (Pools 5, 8, 11, 30, 46, 101, and No ID). Surveys were conducted at all of the sites twice (11 March and 9 April). Pools 5, 11, and 101 were sampled a third time on 25 May. CTS eggs were identified at sites 5, 101, and No ID (CTS were previously undocumented at these location). Larvae were detected at Pools 5 and 101.

California fairy shrimp were observed only in Pools 8 and 11.

REFERENCES

Jennings, M. R. and M. P. Hayes, 1994. Amphibian and reptile species of special concern in California. Final report to the California Department of Fish and Game, Inland Fisheries Division. 255 pp.

Loredo et al, 1996. Habitat use and migration behavior of the California tiger salamander. Journal of Herpetology, Vol. 30(2). Pp. 282-285.

Stebbins, R. C. 1972. California amphibians and reptiles. University of California Press, Berkeley. 152 pp.

Stebbins, R. C. 2003. Western reptiles and amphibians, 3rd edition. Houghton Mifflin Company, New York, NY. 533 pp.

Trenham et al, 2000. Life History and Demographic Variation in California tiger salamander (Ambystoma californiense). Copeia, 200(2). Pp. 365-377.

United States Army Corps of Engineers, 2006. Wetland and Restoration Plan for Munitions and Contaminated Soil Remedial Activities at Former Fort Ord. (prepared by Burleson Consulting, Inc.)

United States Fish and Wildlife Service, 1994. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, and the Vernal Pool Tadpole Shrimp; and Threatened Status for the Vernal Pool Fairy Shrimp; Final Rule and Proposed Rule. Federal Register, Vol. 59(17). Pp. 48136.

United States Fish and Wildlife Service, 1999. Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-99-F/C-39R).

U.S. Fish and Wildlife Service and California Department of Fish and Game. 2003. Interim guidance of conducting site assessments and field surveys for determining presence or a negative finding of the California tiger salamander. October 22, 2003.

United States Fish and Wildlife Service, 2004. Endangered and threatened wildlife and plants; Determination of threatened status for the California Tiger Salamander; and special rule exemption for existing routine ranching activities; Final rule. Federal Register, Vol. 69(149). Pp. 47211-47248.

United States Fish and Wildlife Service, 2005a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Tiger Salamander; Central Population; Final Rule. Federal Register, Vol. 70(162). Pp 49379-49458.

United States Fish and Wildlife Service, 2005b. Biological Opinion for the Cleanup and Reuse of Former Fort Ord, Monterey County, California, as it Affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R).

United States Fish and Wildlife Service, 2007. California Fairy Shrimp (*Linderiella occidentalis*) Species Account. http://www.fws.gov/sacramento/es/animal_spp_acct/linderiella.htm.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE April 25, 2011	TRANSMITTAL NO.: 048

Section I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This Section will be initiated by the contractor)*

TO: Bill Nevius U.S. Army Corps of Engineers 1325 "J" Street Sacramento, CA 95814-2922	FROM: Peter Kelsall Shaw Environmental, Inc. P.O. Box 1698 Marina, CA 93933-1698	CONTRACT NO. DACW05-96-D-0011 T.O. # 016 WAD # 07	CHECK ONE: X THIS IS A NEW TRANSMITTAL THIS IS A RESUBMITTAL OF TRANSMITTAL
SPECIFICATION NO. (Cover only one section with each transmittal)	PROJECT TITLE AND LOCATION: FORMER FORT ORD, CALIFORNIA		

ITEM NO a.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)* b.	MFG. OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. *(See Instruction No. 8)* c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO. e.	 DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION *(See Instruction No. 6)* h.	FOR C E USE CODE i.
048	Annual Biological Monitoring Report, 2010, Former Fort Ord, California, Revision 0	N/A	13	SOP17		A		
049	Annual Biological Monitoring Report, 2010, Former Fort Ord, California, Revision 0	N/A	13	SOP17		F		

REMARKS
cc:
See Distribution List

CONTRACTOR QUALITY CONTROL SYSTEMS MANAGER
Shaw Environmental, Inc.

___✓___ Approved
_____ Approved with corrections as noted on submittal data and/or attached sheet(s).

SIGNATURE: _____
TITLE: CONTRACTOR QUALITY CONTROL SYSTEM MANAGER

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Shaw Environmental, Inc.

Peter Kelsall

Digitally signed by Peter Kelsall
DN: cn=Peter Kelsall, o, ou=Shaw E&I, email=peter.kelsall@shawgrp.co m, c=US
Date: 2011.05.03 13:29:15 -06'00'

/PETER KELSALL

NAME AND SIGNATURE OF PROJECT MANAGER

Section II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Shaw Environmental, Inc.

DOCUMENT REVIEW AND RELEASE FORM

Client: USACE	Authors: Shaw	Submittal Register Item No.: 049	Date: April 25, 2011
Document Title:	Annual Biological Monitoring Report, 2010, Former Fort Ord, California	Revision: 0	T.O. # 016	WAD# 07

Reviewer (*print*)	Reviewer Initial & Date	Technical	Project Manager	CQC	Health and Safety Manager	Task Manager	Chemistry	UXO	Construction	Reviewer Comments Resolved (*Signature & Date*)
Peter Kelsall			X							Peter Kelsall Digitally signed by Peter Kelsall DN: cn=Peter Kelsall, o, ou=Shaw E&I, email=peter.kelsall@shawgrp.com, c=US Date: 2011.04.28 17:27:02 -06'00'
Tom Ghigliotto				X						Tom Ghigliotto Digitally signed by: Tom Ghigliotto DN: CN = Tom Ghigliotto C = AD OU = Shaw Environmental, Inc. Date: 2011.04.28 08:33:20 -08'00'
Same as Technical Reviewer above		X	Topic outline with objectives for each section submitted prior to Rev. A							

Program Reviewer's Acceptance for Document Submittal	Signature	Yes	No
1) A 4025 (as applicable) prepared and submitted with document?	Peter Kelsall Digitally signed by Peter Kelsall DN: cn=Peter Kelsall, o, ou=Shaw E&I, email=peter.kelsall@shawgrp.com, c=US Date: 2011.04.28 17:27:19 -06'00'	X	
2) Technical Conclusions adequately supported by text and data?		X	
3) Tables and Figures are in the proper format and checked and approved?		X	
4) The Table of Contents consistent with text information?		X	
5) Technical Reviewers are qualified and accepted by Project Manager?		X	
6) A document Distribution List been prepared and submitted with document?		X	

Recommended
4025 Code A

Peter Kelsall Digitally signed by Peter Kelsall DN: cn=Peter Kelsall, o, ou=Shaw E&I, email=peter.kelsall@shawgrp.com, c=US Date: 2011.04.28 17:27:36 -06'00'

Project Manager

Tom Ghigliotto Digitally signed by: Tom Ghigliotto DN: CN = Tom Ghigliotto C = AD OU = Shaw Environmental, Inc. Date: 2011.04.28 08:33:27 -08'00'

Contractor Quality Control Systems Manager