United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
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IN REPLY REFER TO:
81440-2009-F-0334

May 28, 2015

William Collins, Environmental Coordinator
Department of the Army
Army Base Realignment and Closure, Fort Ord Office
P.O. Box 5008, Building #4463 Gigling Road
Monterey, California 93944-5008

Subject: Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (8-8-09-F-74)

Dear Mr. Collins:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Department of the Army's (Army) proposed cleanup and reuse actions on the former Fort Ord, Monterey County, California, and its effects on the federally endangered Contra Costa goldfields (*Lasthenia conjugens*), Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*), Smith's blue butterfly (*Euphilotes enoptes smithi*), and Yadon's piperia (*Piperia yadonii*); the federally threatened California tiger salamander (*Ambystoma californiense*) and Monterey spineflower (*Chorizanthe pungens* var. *pungens*); and critical habitat for Monterey spineflower, in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). We received your June 1, 2009, request for reinitiation of formal consultation on June 5, 2009. The purpose of this reinitiation of formal consultation is to address the effects of the Army cleanup and transfer actions, including changes to fuel break construction and maintenance for the prescribed burn program, and all other updated actions on the former Fort Ord to the abovementioned federally protected species and associated critical habitat.

We based this biological opinion on information which accompanied your June 1, 2009, request for consultation, including the 2009 biological assessment (Army and Shaw Environmental, Inc. (Shaw) 2009), the 2011 biological assessment for vegetation clearance activities and transfer of parcel E29b.3.1 (Army 2011) and associated biological opinion 8-8-11-F-39 (Service 2011a); the 2014 biological opinion for vegetation clearance activities 8-8-14-F-28 (Service 2014); and existing biological opinions 1-8-99-F/C-39R, 1-8-01-F-70R, 1-8-04-F-25R (and amendment to 1-8-04-25R) (Service 1999, 2002a, 2005a, 2007a) for ongoing Army cleanup and reuse activities, and correspondence and personal communications between the Army and our staff. A complete record of this consultation can be made available at the Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

In 1991, the Army was directed to close Fort Ord and transfer its property. The Army's action was considered a major Federal action that may affect species proposed for listing or listed as threatened or endangered under the Act. The Army prepared a biological assessment (Army Corps of Engineers (Corps) 1993a) to identify potential impacts to federally listed species, critical habitats, and species proposed for listing. The Army issued a supplement to the draft biological assessment (Corps1993b) describing potential impacts to listed species and critical habitats that may occur as a result of additional reuse alternatives. The Army submitted the biological assessments to the Service for the purpose of formal consultation in accordance with Section 7 of the Act. As a result of the initial consultation, the Service issued the Army a biological opinion (1-8-93-F-14) in 1993 (Service 1993) that addressed impacts to listed species as a result of the transfer and reuse of former Fort Ord property. The Service further required the Army to develop and implement a habitat management plan to reduce the incidental take of listed species and loss of habitat that supports these species. The Installation-Wide Multispecies Habitat Management Plan (HMP) was published initially in February 1994. The Army revised the HMP in April 1997 (Corps 1997) to address changes in reuse plans and the Army's cleanup program in accordance with the 1993 biological opinion.

As a result of changes in land use, remediation, and additional listings of species and critical habitat designations, the Army has completed several consultations with the Service. These consultations resulted in issuance of the following biological opinions: Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-99-F/C-39R) (Service 1999); Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California, as it affects Monterey Spineflower Critical Habitat (1-8-01-F-70R) (Service 2002a); Cleanup and Reuse of former Fort Ord, Monterey County, California, as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R) (Service 2005a); amendment to the 2005 biological opinion (1-8-04-F-25R) (Service 2007a); the Biological Opinion for the former Fort Ord Vegetation Clearance Activities and Transfer of Parcel E29b.3.1 (8-8-11-F-39)(Service 2011a); and Formal Consultation for Vegetation Clearance Activities on 309 Acres in Burn Units 1, 2, and 3, on former Fort Ord, Monterey County, California (8-8-14-F-28) (Service 2014). These biological opinions have been applied during ongoing remediation projects, caretaker actions, interim uses, and property transfers.

Biological opinion 1-8-04-F-25R (Service 2005a) incorporated two memoranda of agreement (MOA) which addressed the effects of development of two properties in California tiger salamander habitat (Fort Ord Reuse Authority (FORA) 2005a, 2005b). These MOAs are unique to biological opinion 1-8-04-F-25R and will continue to be implemented until those projects are complete.

In addition to the biological opinions issued by the Service, the FORA prepared a Land Use Modification Assessment for Parker Flats and East Garrison (Assessment) (Zander Associates

2002). The Assessment resulted in land use changes with a net effect of adding an additional 447 acres of habitat reserve. On May 28, 2002, the Service issued a letter acknowledging the modifications would provide a net gain in overall habitat reserve area of almost 250 acres and would result in a net gain in habitat protected for the Monterey spineflower and would not reduce the acres conserved for the Monterey gilia beyond what was described in the existing HMP and biological opinion 1-8-99-F/C-39R (Service, in litt. 2002). The HMP map has been revised to reflect the changes in land use.

Since 2002, the Service has issued concurrence letters supporting the Army's fuel break expansions for the annual prescribed burn program. In our 2005 letter, we recommended that the Army consider reinitiating consultation with the Service to ensure changes in the project description were consistently described; consequently, in 2009, the Army reinitiated consultation with the Service on all Army actions. While this consultation has been in progress, the Service has continued to support the Army's fuel break preparations, vegetation clearance activities, and transfer of parcel E29b.3.1 in the concurrence letters and biological opinions referenced above.

The HMP addresses 18 special-status flora and fauna species, 7 of which are listed as threatened or endangered. The federally endangered Contra Costa goldfields was not discovered on Fort Ord until after development of the 1997 HMP and is not listed as an HMP species; however, it is provided protection through implementation of resource conservation and management requirements described in Chapters 3 and 4 of the HMP and in the terms and conditions of biological opinion 1-8-04-F-25R for the cleanup and reuse of former Fort Ord as it affects California tiger salamander and critical habitat for Contra Costa goldfields (Service 2005a). Another purpose of the HMP is to provide a foundation for a prelisting agreement between the Service and recipient landowners to facilitate development of a habitat conservation plan for compliance by non-Federal agencies. Army predisposal and property transfer actions have made substantial progress towards the identification and remediation of contaminated areas and property transfer of former Fort Ord since the 1997 HMP and subsequent consultations. A goal of the HMP is to "promote preservation, enhancement and restoration of habitat and populations of special status species, while allowing implementation of a community-based reuse plan that promotes economic recovery after the closure of Fort Ord" (Corps 1997). This goal is being accomplished through the designation and management of 18,766 acres (67 percent) of the 27,827-acre former military installation as habitat reserve, habitat corridor, and development with reserve areas or development with restrictions. These parcel management categories are defined in the HMP and are outlined below.

Habitat Reserve - no development allowed; management goal is conservation and enhancement of threatened and endangered species

Habitat Corridor - lands between major reserve areas; to be managed to promote connections between conservation areas

Development with Reserve Areas or Development with Restrictions - lands slated for development that contain inholdings of reserve or require specific restrictions to protect biological resource values; management of reserve inholdings must match that for habitat reserves, while management in developable areas must proceed with certain specific restrictions identified in the HMP

Borderland Development Areas Along Natural Resources Management Area Interface - areas abutting the Natural Resources Management Area[1] (NRMA) that are slated for development; management of these lands includes no restrictions except along the development/reserve interface

Development - no management restrictions are contained in the HMP; some plans for salvage of biological resources from these lands may be specified

Future Road Corridors - lands within habitat reserve set aside for future road development; to be managed as habitat reserve until road development occurs

Habitat reserves comprise 16,199 acres of the former Fort Ord. These large, contiguous, biologically diverse habitat parcels are being transferred to natural resource management agencies such as the Bureau of Land Management (BLM) and the California Department of Parks and Recreation (State Parks) for conservation and beneficial enhancement of habitat important to many rare, threatened, and endangered species using appropriate habitat management techniques including prescribed burns. In 2009, an additional 399 acres was transferred to Monterey County for management as habitat corridor with allowance for development on 52 acres to support a youth camp. Another 2,166 acres are designated, and would be managed as development with reserve areas or development with restrictions, providing additional habitat for the special-status species found on former Fort Ord. The development with reserve areas or development with restrictions parcels accommodate limited development but require property recipients implement natural resource conservation and management requirements as described in Chapter 4 of the HMP. In addition to future habitat management requirements described in Chapter 4 of the HMP, the Army is required to implement conservation measures in habitat reserves during the cleanup to minimize impacts to HMP species and critical habitat. By ensuring the reserves are managed to promote the conservation of these rare species and habitats, other areas containing these species can be developed. The remaining 9,065 acres are designated as development parcels that are either already developed or are planned for development under FORA's reuse plan that was prepared to facilitate economic recovery of the area following base closure. Although the majority of the development parcels can be developed without resource conservation or management requirements, development parcels located adjacent to the NRMA are required to implement

[1] The BLM NRMA is located in the southern and eastern portions of former Fort Ord. Totaling approximately 15,000 acres, this reserve is the largest natural area being retained in the HMP area. Some portions of the area have already been transferred to BLM and are being managed as reserve. This transfer includes most of the land east of Barloy Canyon Road.

short and long-term resource conservation and management requirements to prevent impacts to adjacent habitat reserve areas. To date, the Army has transferred 19,280 acres of former Fort Ord.

This programmatic biological opinion will address anticipated effects to federally protected species on the former Fort Ord and associated critical habitat as a result of the Army's activities and will incorporate any changes and new activities proposed by the Army. This programmatic biological opinion will supersede the existing biological opinions with the exception of the MOAs mentioned previously between city of Del Rey Oaks, East Garrison, FORA, the Service, and other respective signatories, as described in the 2005 biological opinion (1-8-04-F-25R) (Service 2005a). The associated effects, reasonable and prudent measures, and incidental take statement from the 2005 biological opinion will remain valid for the MOAs and are not addressed further in this biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Former Fort Ord comprises 27,827 acres on the central coast of California in northwestern Monterey County. The Monterey Bay and the Santa Lucia Ranges from the western and southern boundaries of former Fort Ord, respectively. The cities of Marina and Seaside are northwest and southwest of former Fort Ord, respectively.

Fort Ord is a former military installation that served as a training and staging facility for infantry troops from its opening in 1917 until its closure in 1994. With the closure of Fort Ord in 1994, responsibility for the cleanup and transfer was delegated to the Presidio of Monterey, California. However, on October 1, 2003, cleanup and transfer of former Fort Ord became the responsibility of the U.S. Army Base Realignment and Closure Division under the Assistant Chief of Staff for Installation Management.

Former Fort Ord is listed on the National Priorities List as a Superfund site. A Federal Facilities Agreement, negotiated under Section 120 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and signed by the U.S. Environmental Protection Agency, California Department of Toxic Substances Control, Regional Water Quality Control Board, and the Army, requires the preparation and coordination of environmental documentation necessary to conduct remedial actions in accordance with applicable or relevant and appropriate requirements. The Army is required to ensure the property is protective of both human health and the environment.

On April 20, 2012, President Barack Obama signed a proclamation to designate 14,651 acres of the former Fort Ord as the Fort Ord National Monument. The President stated, "The protection of the Fort Ord area will maintain its historical and cultural significance, attract tourists and

recreationalists from near and far, and enhance its unique natural resources, for the enjoyment of all Americans."

Description of Army Actions

Army cleanup actions that may affect listed species on former Fort Ord include munitions response actions, contaminated soil remediation, groundwater contamination investigation and remediation, and landfill closure and maintenance activities. Remaining munitions response actions are being conducted within the Impact Area Munitions Response Area and the BLM Area B (Appendix A), contaminated soil remediation is being conducted within Site 39 (Appendix D), groundwater contamination investigation and remediation are being conducted at Operable Units 1, 2, 2/12, and CTP (Appendices E through I). These actions are necessary as part of the Army's environmental responsibilities to prepare former Fort Ord for reuse[2]. The following is a description of the Army's cleanup and transfer actions that may affect listed species (Table 1).

Table 1. HMP species and critical habitat that may be affected by Army Actions

Army Cleanup and Property Transfer Actions	Acreages of HMP Species and Critical Habitat that May be Affected							
	California Tiger Salamander		Contra Costa Goldfields	Sand Gilia	Monterey Spineflower	Monterey Spineflower Critical Habitat	Smith's Blue Butterfly	Yadon's Piperia
Army Cleanup Actions	Breeding Habitat	Upland Habitat						
Prescribed Burning	23	2271	698	75	1261	2,191	none	4,100sf [1]
Manual and Mechanical Vegetation Clearance	13	1776	571	182	943	1,758	none	3,700sf [1]
Re-mastication	14	978	185	45	588	860	none	7,000sf [1]
Retardant	none*	321	72	44	164	214	none	2,400sf [1]
MR Remediation	16	2815	869	233	1,402	2,666	none	3,700sf [1]
MEC Saturated Area Remediation	none	85	none	none	85	85	none	none
Contaminated Soil Remediation	13 [2]	13 [2]	13 [2]	13 [2]	13 [2]	13 [2]	none	none
Groundwater Remediation OU-1	none	none	none	4,200sf	4,200sf	4,200sf	none	none
Groundwater Remediation OU-CTP	none	none	none	8,500sf	8,500sf	8,500sf	none	none
Groundwater Remediation OU-2/12	none	none	none	none	1,100sf	800sf	1,100sf	none
Groundwater Remediation OU-2	none	1,200sf [3]	none	2,400sf	2,400sf	500sf	none	none
Total Cumulative Effects	26	4473	1052	269	2231	3966	1,100sf	8,300sf
Property Transfer [4]								
Development	1	2,973	42	738	2,745	188	2	none
Development with Reserve or Restrictions	none	961	248	123	988	988	37	1.25 [5]
Habitat Corridor	none	252	27	30	153	252	none	none
Habitat Corridor with Development	none	144	none	35	48	144	none	none
Habitat Reserve	80	14,046	1,690	3,347	6,526	9,515	140	45.64 [6]

1. Acreage was calculated by multiplying number of piperia locations within the action areas by 100sf (assumed disturbance).
2. Acreage was calculated based on assumption that 13 acres would be excavated in action area for soil cleanup.
3. Acreage was calculated by multiplying number of well locations within the action areas by 100sf (assumed disturbance).
4. Property Transfer calculations include past and future property transfers.
5. Acreage was calculated by the length of 45 foot Fuel Breaks and where surveyes for Yadon's Piperia were conducted in parcels owned by the Army.
6. Acreage was calculated by the length of all 45 foot Fuel Breaks where surveyes for Yadon's Piperia were conducted.

* Retardant will not be applied within 300 feet of vernal pools.

[2] Information describing remedial actions being taken on former Fort Ord can be found in CERCLA documents describing investigations and response actions at former Fort Ord. These documents include Archive Search Reports, Technical Memoranda, Remedial Investigation/Feasibility Studies, Human Health and Ecological Risk Assessments, Proposed Plans, Work Plans and associated Records of Decision. These documents can be reviewed at the former Fort Ord Administrative Record and online at http://www.fortordcleanup.com/adminrec/.

1.0 Munitions Response

The Federal Facility Agreement signed by the U.S. Army, U.S. Environmental Protection Agency, and the California Department of Toxic Substances Control, governs environmental cleanup of former Fort Ord to include the investigation and remediation of munitions and explosives of concern (MEC). Outstanding actions on all ranges and munitions response sites[3] (MRS) include implementation of work plans in accordance with the records of decision.

In 2007 the Army signed an Environmental Services Cooperative Agreement **(**ESCA) with the FORA enabling them to complete the CERCLA munitions response actions on approximately 3,279 acres of former Fort Ord. Munitions response actions would be conducted in accordance with the ESCA and include implementation of the HMP resource management and conservation requirements as well as the terms and conditions of all applicable biological opinions to ensure compliance with the Act.

The Army has identified approximately 2,815 remaining acres of non-ESCA areas either known or suspected of containing MEC (Appendix A). Munitions response actions have been ongoing since 1993.

1.0.1 Vegetation Clearance

Many munitions response sites at former Fort Ord are densely vegetated, which restricts visibility of the surface, impedes movement, creates physical hazards, and potentially exposes workers or trespassers to serious safety risks from MEC. Vegetation clearance, including preparation of the containment line network for prescribed burns, is considered vital and necessary to protect firefighters and cleanup personnel from injury or death, provide operational control of prescribed burns, facilitate the ability to safely remove munitions and explosives of concern, protect public safety and property, reduce the risk of wildfires, and reduce smoke impacts to nearby communities by containing the prescribed fire within a containment line network. Vegetation clearance is required prior to munitions response actions because vegetation prohibits safe entry into a site and prevents the effective use of MEC detection equipment. The ability to burn prior to munitions response actions is determined by the site safety team and the Chief of the Presidio of Monterey Fire Department, based on site-specific conditions such as fuel loading, slope, topography, anticipated flame heights, MEC presence, and proximity to the wildland/urban interface.

[3] A munitions response site is a discrete location within a munitions response area that is known to require a munitions response. A munitions response area is any area on a defense site that is known or suspected to contain unexploded ordnance, discarded military munitions, or munitions constituents. Examples are former ranges and munitions burial areas. A munitions response area comprises one or more munitions response sites (MACTEC 2007).

Selection of vegetation clearance methods for a specific site would be based on the Draft Final Technical Memorandum, Evaluation of Vegetation Clearance Methods, Ordnance and Explosives, Remedial Investigation/Feasibility Study, former Fort Ord, California (Harding 2002) and the various work plans that describe procedures and methods for clearance activities. Vegetation clearance methods are limited within parcels designated as habitat reserve, areas of development with reserve, areas of development with restrictions, habitat corridors with development allowances, or habitat corridors, but are not constrained in munitions response sites located within development parcels.

Prescribed Burning

Prescribed burns support the Army's requirement to conduct munitions response actions while still supporting the goals and objectives of the HMP which requires the use of prescribed fire to manage maritime chaparral habitat due to the presence of listed plant species including Monterey gilia and Monterey spineflower, and many other species considered species of special concern. Although prescribed burning is the primary method of vegetation clearance in habitat reserve areas containing maritime chaparral, manual and mechanical vegetation clearance methods are necessary to prepare the containment line network for prescribed burns, and also following the burns to masticate the remaining standing plant material to facilitate safe access to the cleanup site and allow use of the MEC detection equipment.

The majority of munitions response sites on former Fort Ord occur within maritime chaparral habitat. Maritime chaparral on former Fort Ord is considered a rare and declining habitat type that contains many of the rare, threatened, or endangered HMP species. If maritime chaparral within designated habitat reserve areas must be cleared to support munitions response actions, the HMP requires the vegetation to be cleared and successfully restored using prescribed fire. A vegetation management plan has been prepared to identify vegetation clearance units for future munitions response actions (Appendix B).

The major elements of prescribed burning include: (1) preparation of a burn prescription/burn plan outlining the objectives of the burn, burn area, and the range of environmental conditions under which the burn would be conducted; workforce and equipment resources required to ignite, manage and contain the fire; and communication procedures; (2) site preparation, including establishment and maintenance of containment lines; (3) conducting the burn within the range of environmental conditions established in the burn prescription; and (4) follow-up operations to ensure the fire is fully contained. The Army has determined that the term "fuel breaks" will apply only to the existing 45 to 50 foot wide roads between the units considered development (Appendix C), and that any additional

mastication to support the burn will be termed “primary containment lines,” which would be temporary.

The sizes of the burn areas are contingent on many factors, the most important being the location and condition of major fuel breaks. Other factors considered are topography, slope, aspect, fuel type, fuel loading, fire behavior, and the proximity of urban/wildfire interface. The actual size and configuration of burn areas is determined by the Army fire department. The fire department determines these parameters to: minimize the size and duration of each burn, best maintain control of the burn, minimize smoke impacts, and execute the burn within the narrow meteorological window while also considering explosives safety and other technical and practical considerations. Unless specifically coordinated with the Service, each contiguous prescribed burn would not exceed 400 acres and no more than 800 acres would be planned for prescribed burning in any given year. The prescribed burns would occur between 1 July and 31 December.

The fire department would select areas to strategically create a primary containment line around the burn areas, which would protect communities from any potential wildfire or fire hazard and firefighting staff from the risk of explosives. Depending on the proximity to the surrounding communities, the topography, and the fragmentation distance of potential MEC items, the expected width of the primary, secondary, and tertiary containment lines would be between 100 and 320 feet for each planned burn area. The methods of creating containment lines include manual and mechanical clearance. To minimize impacts to the listed species and other natural resources, the mastication of containment lines occurs after June 1, unless otherwise coordinated with the Service.

Established roads and fuel breaks that are accessible by vehicles and fire management equipment are utilized as secondary or tertiary containment lines. These are considered development areas and would be regularly maintained by mowing prior to a prescribed burn. If the mowing occurs in the spring or summer, the fuel breaks are surveyed for Yadon’s piperia and flagged prior to the mowing.

Fire retardant, foams, or gel may be pre-applied if deemed necessary by the Incident Commander or the Burn Boss to contain prescribed fires, safeguard life, or protect property. Details on the use of fire retardants, foams, and gels are discussed further in section 1.5.1 below.

All preparation activities leading to the prescribed burn would be described in site-specific burn plans that are made available for regulatory and public review. The decision to conduct the prescribed burn is made once all preparatory activities

are complete, the support resources are available, and the environmental conditions established in the burn prescription are projected to be met.

Prescribed burning is conducted using aerial methods (such as a helicopter equipped with a torch to initiate the burn). Fire suppression crews stand by during the burn and emergency fire crews from local jurisdictions are on notice in case the fire travels in an unplanned direction. The suppression phase of the prescribed burn begins once the ignition of the vegetation is complete, and it includes aerial water drops, and ground support with fire engines stationed on the roads and fuel breaks. Water used during and following prescribed burns is potable fresh water, provided either by the Marina Coast Water District or from the Army's Operable Unit 2 groundwater treatment system.

In cases when the fire has a potential to cross the containment lines, additional activities may be necessary to keep the fire under control. This includes cutting additional containment lines and dropping fire retardant. Additional containment lines are created by removing vegetation using heavy equipment such as bulldozers, utilizing established fuel breaks, roads and trails to the extent possible. Creating emergency containment lines through undisturbed vegetation may be necessary, but is not expected to exceed 5 acres.

Follow up operations consist of putting out small spot fires and smoldering locations using aerial water dumps and water cannons and hoses from fire trucks stationed on the fuel breaks. Updates to prescribed burn activities are described in further detail in section 1.5.1 below.

Manual and Mechanical Clearance

Mechanical and manual methods are used in limited areas at Fort Ord under the following circumstances: (1) where burning cannot be conducted safely due to presence of large munitions items known or suspected to occur on the surface or due to potential of a wildfire and smoke impacts near populated areas; (2) to create primary, secondary, and tertiary containment lines in preparation of prescribed burns; (3) where remediation areas would be difficult to burn because of their size, topography, and lack of existing fire roads; (4) in areas of high vegetation moisture content; (5) in areas requiring further evaluation due to extreme terrain[4]; and (6) in areas where a prescribed burn was conducted but the vegetation did not burn completely.

Vegetation clearance using manual and mechanical methods to clear unburned areas within habitat reserve areas containing maritime chaparral would be restricted to the extent possible and would typically be limited to 50 acres or less

[4] The Army currently plans to evaluate the remedial action approaches to the units, which could involve vegetation cutting and digital geophysical investigation of 25 percent of the units

within a munitions response site or unit. There are 14 units where MEC cleanup still needs to be conducted, and 2 units where MEC cleanup is in progress (Table 2). This limitation does not apply to the need to clear vegetation within munitions response areas with a high risk of wildfire, where severely restricted burn prescriptions exist, or where the Army's ability to conduct a prescribed burn is precluded by explosive hazards.

Mechanical vegetation clearance consists of using human-operated mechanical equipment such as a rotary mower, compact tractor, or an excavator-accessorized masticator. Operators maneuver the equipment onto the MEC sites to clear the vegetation. In sparsely vegetated areas, a single pass with the masticator is conducted. In areas of heavy vegetation, mechanical cutting is performed in two stages. First, the vegetation clearance teams, with escort support from unexploded ordnance (UXO)-qualified personnel, cut vegetation to a height of approximately 18 inches above the ground surface. The UXO escort then uses a magnetometer as needed in conjunction with a visual survey of the ground surface to identify MEC. If MEC or an unknown item is encountered during mastication, vegetation clearance would stop, and the UXO escort would investigate the item. After the visual survey is performed, the vegetation is cut to a height of approximately 6 inches above the ground surface. The mowing apparatus shreds the vegetation in place leaving chipped material on the ground. The amount and size of chipped material depends on the type of cutting head or blade and the density of vegetation.

Manual methods involve cutting and clearing vegetation using motorized chainsaws, power chippers, weed eaters, and mowers. Small stem diameter shrubs would typically be cut using a variety of tools such as loppers or chain saws depending on site-specific conditions. Grass clippings and small shrubs would be brought to either a staging or stockpiling area for chipping or disposal or left in place depending on the amount of material and visibility requirements for performing MEC remedial action and future reuse of the site. Large stem diameter shrubs would be pruned to allow access under the canopy for workers.

The Army proposes to manually or mechanically cut up to 1,642 acres of maritime chaparral to 6 inches above the ground surface to facilitate timely removal of munitions and explosives of concern (Table 2). Up to 101 acres may need to be cut due to high risk of wildfire and smoke impacts, 346 acres may need to be cut due to potential for large MEC items to be present on the surface and pose unacceptable risks to firefighters, and 841 acres as primary containment lines in preparation for prescribed burns, for a total of 1,288 acres (Appendix B). Once the munitions response actions have been completed in the above areas and the vegetation has sufficiently regrown (estimated to be about 5 years) to carry a fire, the area would be burned to stimulate reestablishment of HMP plant species,

unless otherwise coordinated with the Service. The total area proposed for prescribed burns is anticipated to be 3,687 acres, which includes the above-mentioned 1,288 acres of masticated areas. Several areas would be logistically difficult to burn due to location, size, and varied topography, which the Army is proposing to cut and not burn. Those areas are Unit 28, and portions of BLM Area B, totaling 354 acres. Based on previous activities supporting MEC removal, the Army expects to masticate between 70 and 680 acres annually (Appendix B).

Table 2. Proposed manual and mechanical vegetation removal (in acres).

Unit	MR Status	Area	Area already cut	Area left to cut	Re-mastication Area	Rationale for future cutting	Follow up burn area
5A	Not started	33	3	30	15	Wildfire and Smoke Impacts	33
9	Not started	79	8	71	4	Wildfire and Smoke Impacts	79
		112	**11**	**101**	**19**	**TOTAL Wildfire and Smoke Impacts**	**112**
23	Not started	367	21	346	113	Potential of large MEC on surface	367
		367	**21**	**346**	**113**	**TOTAL Potential of large MEC on surface**	**367**
1	Complete	160	160	0	47	Primary containment line	160
2	Complete	193	193	0	56	Primary containment line	193
3	Complete	146	146	0	46	Primary containment line	146
4	Complete	148	148	0	67	Primary containment line	148
6	Complete	73	73	0	34	Primary containment line	73
5	Not started	130	0	54	49	Primary containment line	130
11	In progress	273	273	0	70	Primary containment line	273
12	In progress	203	203	0	62	Primary containment line	203
13	Not started	157	0	52	34	Primary containment line	157
17	Not started	562	0	132	61	Primary containment line	562
20	Not started	208	0	48	48	Primary containment line	208
25	Not started	95	0	67	43	Primary containment line	95

31	Not started	103	0	40	19	Primary containment line	103
BLM Area B-subarea A*	Not started	449	0	248	37	Primary containment line	333
BLM Area B-subarea B*	Not started	292	0	121	26	Primary containment line	272
BLM Area B-subarea C*	Not started	165	0	79	10	Primary containment line	152
		3357	**1196**	**841**	**709**	**TOTAL Primary containment line**	**3208**
28	Not started	105	0	105	0	Difficult to prescribe burn	0
BLM Area B-3 cut	Not started	249	0	249	0	Difficult to prescribe burn	0
		354	**0**	**354**	**0**	**TOTAL Difficult to prescribe burn total**	**0**
Totals		**4,190**	**1,228**	**1,642**	**841**		**3,687**

Although temporary impacts to HMP species are likely, the impacts would be monitored and minimized by future burning of the areas (minus the 354 acres that would not be burned) to facilitate habitat reestablishment, unless otherwise approved by the Service. Army actions will be followed by monitoring and implementation of corrective measures if success criteria are not met to ensure reestablishment of HMP species (see Conservation Measures). Manual and mechanical vegetation clearance methods would also be used within coast live oak savannah and woodlands, grasslands and in wetland areas located in habitat reserve parcels.

Fuel Breaks and Primary Containment Lines

The Army initially identified two types of fuel breaks necessary to contain prescribed fires: (1) primary fuel breaks, which involve manually or mechanically clearing vegetation (as described above) 320 feet wide around each designated unit (depending on the MEC safety standards for the hazardous fragmentation distance of MEC suspected in a Unit); and (2) secondary/tertiary fuel breaks, which occur on and adjacent to existing maintained fuel breaks which are 45 to 50 feet wide (Appendix C). The cut primary containment lines, which contain chaparral and are located within habitat reserves, would be burned before, during, or after a prescribed fire to the extent possible in order to restore a healthy chaparral ecosystem. Use of manual and mechanical methods to clear vegetation would continue to occur in non-chaparral habitats including vernal pools/ponds, grasslands, coast live oak savannahs, and oak woodlands. Areas adjacent to vernal pools/ponds would be mowed, if necessary, but only during the dry season, and only at the recommendation of the Incident Commander or Burn Boss. Vegetation clearance adjacent to potential California tiger salamander breeding

habitat would be conducted, if necessary, in the summer or fall months when the wetlands are dry.

1.0.2 MEC Investigation and Removal Actions

Once vegetation has been cleared, MEC would be located visually and by electromagnetic metal detectors and digital geophysical means [5](DGM). Once MEC are located, they are identified and detonated in place or in a new location, rendering them harmless for disposal. During the location process, inert ordnance and ordnance scrap may be collected and disposed of. The detonation would be conducted on the surface with engineering controls such as watering and sand bags put in place to prevent wildfires or injury due to flying fragments. The area disturbed is usually no more than 100 square feet. In order to conduct MEC Investigation and Removal Actions, the workers drive trucks, and all-terrain vehicles utilizing existing roads and trails to the extent possible.

Surface removal of munitions would be conducted throughout the entire Impact Area Munitions Response Area (MRA), as well as portions of BLM Area B. Detonations of MEC items would be conducted using engineering controls as appropriate. MEC detection instruments would be available on-site to aide in the detection of surface MEC in areas where the ground surface is not visible. MEC would be identified and surveyed using a global positioning system. Munitions debris with greater than 2-inch minimum dimensions would be removed and the total weight of debris removed would be recorded for each 100-foot-by-100-foot grid on the installation master grid system, which overlays the entire former Fort Ord. Each individual grid has its unique identification number. Digital surveys would provide a record of unexploded ordnance to assist future property users in identifying areas where explosives safety support (e.g., on-site construction support) may be required for ground disturbing or intrusive activities. Unexploded ordnance within the areas identified for subsurface removal would be investigated or resolved. Subsurface removal of MEC is identified within designated roads/fuel breaks and other areas such as along the development interface. These actions may require excavation of soil from around the ordnance. Excavations could range in size from a single cubic foot to several thousands of cubic feet, depending on the type, numbers, location, and position of the munitions and explosives of concern. The amount of excavations to be conducted annually is unknown; however, the majority of the remaining units are areas where only surface removals are anticipated. Over the life of the project, excavations will affect an estimated total of 160 acres.

[5] DGM - instruments that digitally record subsurface geophysical measurements and georeference data to where each measurement occurred. This family of tools can be interpreted in real time, near real time, or any later time after data collection work is complete. DGM instruments include advanced electromagnetic induction (EMI) sensors that can collect DGM data either in a production or in a static mode.

Based on completed and ongoing munitions response projects, the most appropriate technology for completing the subsurface MEC removal is described here: (1) detecting and removing subsurface MEC to depth[6] with magnetometers; (2) digitally mapping the post-removal conditions with a metal detector or a magnetometer, as well as investigating and resolving any remaining unexploded ordnance detected during the mapping process; (3) conducting a quality control inspection on the removal work with the magnetometers; and (4) conducting quality assurance inspections. Portions of the site where this approach cannot be implemented would be delineated as "special-case" areas and addressed through either large-scale excavations and sifting operations or by leaving MEC on -site and restricting future site access At a minimum, munitions response sites would receive a visual surface removal.

MEC items at the former Fort Ord are typically encountered at depths less than their calculated maximum penetration depths (based on Fort Ord-specific MEC penetration data). Approximately 97 percent of items recovered at the former Fort Ord have been found within the top 2 feet of the surface.

It should be noted that many of these various operations would be performed concurrently within different areas of a site. Based on experience at former Fort Ord, the Army expects that maritime chaparral will re-grow following a burn to a height that will limit access to the surface within approximately 15 months; therefore, surface and subsurface removal actions within HMP habitat areas containing maritime chaparral would be considered first priority for cleanup to avoid the need to re-disturb HMP species and their habitats.

1.0.3 MEC Saturated Removal Areas

Range targets are scattered throughout the munitions response sites and more may become visible following prescribed burns. Range targets are typically 6 feet tall metal silhouettes, 55-gallon drums, armored personnel carriers, cement-filled targets, dumpsters, tanks, and/or wheeled vehicles. Range targets would be removed once vegetation clearance has been completed.

Areas surrounding range targets are usually heavily impacted as a result of being fired upon for decades. It is likely that some of these target areas are saturated with large amounts of metallic debris that would prohibit a geophysical survey from being conducted. Therefore, during initial munitions response actions, range target areas may be so saturated with metallic debris that the areas must be

[6] MEC removals to depth are necessary only to the extent of the anticipated reuse. For example, in a fuel break that may need to be graded in the future by BLM, the Army performs a removal to depth, which is typically to a depth of 4 feet. This provides sufficient safety for BLM to conduct intrusive (ground disturbing) activities typical of maintaining fuel breaks.

delineated as requiring excavation and sifting that may result in significant ground disturbances similar to disturbances expected from remediation of contaminated soils. Based on a review of currently available data, an estimated 85 acres of the Impact Area MRA could contain significant amounts of UXO that are military munitions with sensitive fuzes (all-ways-acting or piezoelectric fuzes, 40-millimeter (mm) grenade high explosive projectiles, 40-mm practice projectiles M382 series, M407 series, or any other 40-mm practice series projectiles containing enough explosives to rupture the projectile) and/or associated metallic debris (Appendix D). These UXO could present a significant hazard to people that may work within these 85 acres if only a surface MEC removal is conducted; therefore, these areas would be a candidate for subsurface MEC removal using excavation and sifting. Sifting is expected to be to a depth of 2 feet which would cause significant temporary impacts and may result in impacts to listed species, seed bank, or critical habitat. The area outlined in the biological assessment that would require excavation and sifting is approximate. The actual area requiring the use of this removal process would be confirmed during remediation. The excavated and sifted areas would be followed by geophysical survey and require habitat restoration in accordance with this biological opinion. The Habitat Restoration Plan for Site 39 Inland Ranges (Shaw and Denise Duffy and Associates 2009), designed specifically for soil remediation sites, provides the restoration approach, and any potential modifications would be coordinated with the Service during the Fort Ord Annual Meeting.

The previous biological opinions limited large-scale excavations within habitat reserve parcels (such as those excavations expected to occur during contaminated soils remediation and MEC saturated area treatments) to 75 acres. As a result of the Track 3 Remedial Investigation/Feasibility Study (MACTEC 2007), the Army anticipates the need to excavate and sift sensitively fuzed munitions from an additional 85 acres in the Impact Area (Appendix A). This has increased the number of acres affected from 75 acres to 160 acres within munitions response and contaminated soil areas within habitat reserve parcels.

1.0.4 Environmental Services Cooperative Agreement (ESCA)

The ESCA agreement is between the Army and the Fort Ord Reuse Authority which provides the funding and framework necessary for the Fort Ord Reuse Authority to perform remediation of MEC on approximately 3,280 acres of former Fort Ord (Appendix A). Remediation performed under the ESCA has been completed in accordance with the CERCLA. The Army has retained its lead Federal agent authority under CERCLA. The Army has also retained its consultation responsibilities pursuant to Section 7 of the Act. The Army is overseeing the remedial actions conducted under the ESCA to ensure compliance with conservation requirements outlined in the HMP and this biological opinion. As of February 2015, the ESCA munitions response work is complete. Work was

conducted in accordance with the provisions of the HMP and the existing biological opinions. Results of the follow-up biological monitoring are reported annually, in accordance with the Army's current biological monitoring protocol and the ESCA Habitat Restoration Plan (ESCA Remediation Program Team 2013).

1.1 Contaminated Soil Remediation

Contaminated soils associated with small arms and munitions training located on the inland ranges (Appendix D) have been excavated from the Impact Area and placed at the Operable Unit (OU)-2 Landfill (Appendix I) in accordance with the selected remedy identified in the Basewide Remedial Investigation Sites, Fort Ord, California (Basewide ROD) dated January 13, 1997 (Army 1997a). The Final Record of Decision Amendment, Site 39 Inland Ranges (ROD Amendment), former Fort Ord, California (Army 2009) describes changes in final soil cleanup levels and the volume of soil to be excavated. These changes are discussed further in section 1.5 Army Cleanup Program Changes, below. Results of studies used to determine the cleanup levels are presented in the following documents, as well as other documents in the Fort Ord Administrative Record:

1. Record of Decision, Basewide Remedial Investigation Sites, Fort Ord, California (Basewide ROD) (Army 1997a);
2. Explanation of Significant Differences, Consolidation of Remediation Waste in a Corrective Action Management Unit, Operable Unit 2 Landfill, former Fort Ord, California (Explanation of Significant Differences) (Army 1997b);
3. Explanation of Significant Differences, Excavation and Segregation of Spent Ammunition from Soil, Site 39, former Fort Ord, California (Army 2003);
4. Comprehensive Basewide Range Assessment, former Fort Ord, California (Army 2006a);
5. Ecological Risk Assessment for Small Arms Ranges, Habitat Areas, Impact Area (Ecological Risk Assessment) (MACTEC and ABBL 2007); and
6. Feasibility Study Addendum, Site 39 Ranges, former Fort Ord, California (FS Addendum) (MACTEC 2008).
7. Record of Decision Amendment, Site 39 Inland Ranges, former Fort Ord, California (Army 2009).

The Site 39 Inland Ranges (Appendix D) comprise approximately 8,000 acres in the southwestern portion of the former Fort Ord**,** and contain multiple small arms and multi-use firing ranges previously used for live fire training exercises. Of the original 8,000 acres comprising the historical Impact Area, approximately 6,830 acres are designated as habitat reserve. These ranges occur in the habitat reserve areas investigated and characterized under the Comprehensive Basewide Range Assessment. Based on an assessment of habitat quality and distribution of contaminants within these areas, potential ecological risks at these ranges were evaluated in the Ecological Risk Assessment.

Evaluation of chemical contamination related to military munitions use within the Site 39 Inland Ranges was first conducted as part of the Basewide Remedial Investigation/Feasibility Study (Harding Lawson Associates 1995). The area was investigated for contamination related to small arms and military munitions use at military targets within specific ranges inside the Impact Area. Munitions-related compounds and metals were generally below reporting limits and were present primarily in surface soils and in ranges that showed evidence of heavy use (such as those with targets), and where visible evidence of explosive ordnance was present.

The Basewide ROD identified the selected remedy for the Site 39 Inland Ranges (excavation and on-site placement at the OU-2 landfill beneath a cap) based on the reuse of the capped areas as habitat reserve. Following completion of the Basewide ROD, some portions of the Site 39 Inland Ranges were identified for development. Additional characterization was conducted in the residential and mixed use areas of the Impact Area that do not occur within habitat reserve areas under the Draft Final Additional Soil Characterization – Site 39, Work Plan, former Fort Ord, California (Harding Lawson Associates 1999a). This characterization included performing a literature review to identify other areas of potential small arms use inside and outside the Impact Area, site reconnaissance and mapping, soil sampling, data evaluation, and recommendations for remedial actions within the non-habitat areas of the Impact Area. Based on the results of the characterization activities completed at the Site 39 Inland Ranges, remedial actions in the development portions of Ranges 18, 19, 21, 24, 25, and 46 have been completed since 1999. The Army completed additional remediation in the inland ranges. The acreages, volumes, and soil cleanup levels for contaminated soil remediation on the former Fort Ord are discussed in section 1.5 Army Cleanup Program Changes.

1.2 Groundwater Investigation and Remediation

Activities associated with the groundwater cleanup include the continuous operation of the groundwater extraction, treatment and discharge system, weekly inspections, and quarterly monitoring activities, building new roads or widening existing roads for equipment access and the installation and demolition of groundwater extraction, injection and monitoring wells and pipelines (W. Collins, Army Base Realignment and Closure Office (BRAC), in litt. 2012).

Currently there are 368 wells and approximately 51,000 linear feet of groundwater pipelines on former Fort Ord installed for investigation and/or remediation of groundwater (Appendix E) associated with four contaminated groundwater plumes located at former Fort Ord. As of December 31, 2014, approximately 8.54 billion gallons of contaminated groundwater have been treated and re-injected into the aquifers. One hundred and fifteen of the wells are located in non-development parcels (90 in habitat reserve, and 25 in development with reserve or restrictions). The total acreage of habitat reserve and development with reserves or restrictions parcels affected by groundwater

remediation is anticipated to be less than a third of an acre (115 wells by 100 square feet per well). Appendix E identifies the locations of groundwater extraction, injection, and monitoring wells.

All work in habitat reserve areas would be performed in accordance with conservation measures established in the HMP and this biological opinion. Well installation and demolition impacts would result in the temporary disturbance of approximately 100 square feet per well. Some wells serve as groundwater treatment wells where pipelines are connected to transport the groundwater to and from treatment systems. Pipelines are installed both below ground and aboveground. Biological baseline and follow-up monitoring surveys are conducted within all Habitat Reserve areas and survey results can be found in the Army's Annual Habitat Monitoring Reports.

Groundwater remediation now underway is being conducted in compliance with the Records of Decision for each plume:

1. Record of Decision, Operable Unit 2, Fort Ord Landfills, Fort Ord, California (Army 1994);
2. Record of Decision, Operable Unit 1, Fritzsche Army Airfield Fire Drill Area, Fort Ord, California (Army 1995a);
3. Explanation of Significant Differences, Operable Unit 2, Fort Ord Landfill (Army 1995b);
4. Explanation of Significant Differences, Area A, Operable Unit 2, Fort Ord Landfill (Army 1996);
5. Record of Decision, Basewide Remedial Investigation Sites, Fort Ord, California (Basewide ROD) (Army 1997a);
6. Explanation of Significant Differences, No Further Action for Munitions and Explosives of Concern, Landfill Gas Control, Reuse of Treated Groundwater, Designation of Corrective Action Management Unit (CAMU) Requirements as Applicable or Relevant and Appropriate Requirements (ARARs), Operable Unit 2, Fort Ord Landfills (Army 2006b)
7. Record of decision, Operable Unit Carbon Tetrachloride Plume. Fort Ord, California (Army 2008a);
8. Explanation of Significant Differences, Operable Unit 1 Off-Site Groundwater Remediation, former Fort Ord, California (Army 2010).

As the contaminated groundwater plumes become smaller due to treatment success, wells would be removed and new wells would be installed closer to the remaining contamination. The total number of additional wells necessary to complete the work is not known at this time. All wells are demolished following completion of remediation. The groundwater remediation program is expected to continue for another 20 to 30 years depending on treatment success. The following sections describe the specific on-going

and anticipated future activities associated with remediation for each of the contaminated groundwater plumes.

1.2.1 Operable Unit-1 (OU-1)

A groundwater treatment system installed to treat trichloroethylene-(TCE) contaminated groundwater present in this plume is on standby during attainment monitoring to confirm whether aquifer cleanup goals have been met. The treatment system previously operated 24 hours a day extracting TCE, treating the water, and re-injecting it back into the aquifer. The treatment of the OU-1 plume has been ongoing since 1989 and more than 319.3 million gallons of groundwater have been treated through December 31, 2014).

Appendix F illustrates all existing wells installed in OU-1 to date. Wells would be demolished once the Army obtains approval from EPA, DTSC, and RWQCB, which will result in temporary disturbances of 42 wells at100 square feet per well, or 4,200 square feet.

1.2.2 Operable Unit-Carbon Tetrachloride Plume (OU-CTP)

Carbon tetrachloride contamination has been identified in three aquifer units on former Fort Ord. The ROD-prescribed remedial actions for addressing the plumes are unique for each aquifer: *in situ* bioremediation for the A-Aquifer, groundwater extraction and treatment for the Upper 180-Foot Aquifer, and monitored natural attenuation for the Lower 180-Foot Aquifer with ongoing monitoring of the groundwater to determine success. These processes require installing wells and temporary infrastructure, such as pipeline connections to the treatment areas. Quarterly groundwater monitoring is conducted until the remediation is completed for each area.

Appendix G identifies the locations of the OU-CTP wells and temporary infrastructure placed up to the present. Eight additional wells would be constructed in 2015 to help evaluate whether additional *in situ* treatment is necessary to reach the remedial objective described in the record of decision for OU-CTP (Appendix G). Seven of the eight new wells would be installed in habitat reserve (seven wells at 100 square feet per well), resulting in 700 square feet of temporary disturbance. If additional *in situ* treatment is necessary, up to 10 additional injection wells and 10 additional extraction wells (20 total) may be installed.

Ongoing groundwater monitoring of OU-CTP wells would continue through the end of the project (approximately 5 years for the A Aquifer, and 25 years for the Lower 180 Aquifer). A ROD for remediation of the OU-CTP dated November 2, 2007, obtained final signature by the U.S. Environmental Protection Agency on February 6, 2008 (Army 2007a). The OU-CTP ROD identifies the remedy as

several activities: (1) the enhanced *in situ* bioremediation of the A-Aquifer, (2) monitored natural attenuation (reduction of contaminants over time through natural processes without treatment) with wellhead treatment contingency for the lower 180-foot aquifer, and (3) institutional controls (e.g. deed restrictions, land use controls, etc.) to prevent access or use of the groundwater within the OU-CTP area for any purpose until cleanup levels are met and to maintain the integrity of any current or future remedial or monitoring system (including monitoring, extraction, and injection wells of all aquifers).

Once the remedial action objectives have been met, wells would be monitored for a period of time before they are demolished. Demolition involves the excavation and removal of the top 5 feet of the well casing after grouting in the well to prevent a conduit for contaminants to reach groundwater.

1.2.3 Operable Unit-2/12 (OU-2/12)

Remedial actions at OU-2/12 include contaminated groundwater extraction on the east side of Highway 1 with treatment to remove volatile organic compounds, and treated water disposal on the west side of Highway 1. As of December 31, 2014, approximately 1.794 billion gallons of contaminated groundwater have been treated and re-injected into the aquifer. This cleanup is planned for an additional 3 to 5 years. Once the remediation is completed, monitoring and disposal facilities (injection wells and infiltration galleries) would be removed or abandoned. Appendix H identifies the locations of OU-2/12 wells and infrastructure placed up to the present. There are no additional wells anticipated to be necessary within habitat reserve parcels.

Demolition of 11 wells would also occur west of Highway 1, temporarily impacting approximately 100 square feet per well, a total of approximately 1,100 square feet of Smith's blue butterfly habitat over a number of years. Baseline surveys of habitat would be conducted prior to demolition of each well and monitoring would follow after demolitions are completed. Restoration of habitat would be implemented if necessary.

1.2.4 Operable Unit-2 (OU-2)

OU-2 consists of two major components: (1) the closed landfill and (2) the associated groundwater extraction treatment and disposal operations. As of December 31, 2014, approximately 6.425 billion gallons of contaminated groundwater have been treated and re-injected into the aquifer. The landfill has been capped and the Army continues to conduct long-term operations and maintenance work to ensure the five landfill caps continue to meet regulatory requirements. In addition, the Army conducts landfill gas treatment and quarterly landfill gas monitoring activities.

The existing groundwater treatment system is located near the western extent of the plume. The plume in the Upper 180-Foot Aquifer has migrated eastward due to regional groundwater extraction in the Salinas Valley. In addition, the existing plant has reached the end of its operational life and significant upgrades are required to maintain operations. Based on these two factors, the Army has initiated plans to move the groundwater treatment operations to the landfill parcel. The new site would utilize a previously disturbed area and all new pipelines would utilize existing pipeline routes, disturbed areas, and roads.

Once groundwater remedial actions have met all requirements in the OU-2 ROD (Army 1994), above-grade infrastructure would be removed or demolished. This would include removal of treatment facilities such as buildings and wells. Wells would be decommissioned as required under state regulations. Appendix I identifies the locations of current and planned OU-2 wells and infrastructure. Eleven new wells are anticipated for the groundwater treatment system relocation, four of them to be installed on development with reserves or development with restrictions parcels.

1.3 Landfill Closure and Maintenance Actions

The former Fort Ord landfills occur on a development with reserves or development with restrictions parcels (E8a.1.1.1 and E8a.2) and include approximately 120 acres of land divided into 5 cells: Areas B through F. Area A was located on the north side of Imjin Road and originally part of the OU-2 landfills and has been excavated and relocated to the south side of Imjin Road and consolidated in accordance with the Explanation of Significant Differences (Army 1997b) to the OU-2 Landfill.
Construction of the engineered cover over Areas B through F was completed from 1997 to 2002; however, due to the need for remediation at the Site 39 Inland Ranges, and the availability of additional capacity at Area E, contaminated soil from the Site 39 Inland Ranges would be placed within the existing footprint of Area E as a vertical expansion.

Closure of the landfill is ongoing and expected to be complete by 2022, following MEC and contaminated soil remediation. The closure would occur once the contaminated soil from Site 39 has been placed on Cell E (in the southern portion of the landfill where current vertical expansion is occurring) and covered with a cap and 2 feet of vegetated cover soil. The vegetated cover would be applied via hydro-seeding.

Although the HMP does not require the Army to compensate for biological resource impacts associated with capping of the landfill (Corps 1997), the Army will continue to implement appropriate construction management techniques to avoid unnecessary disturbance of adjacent habitat during remediation.

1.4 Property Transfer Actions

The Army continues to transfer excess lands to Federal, State, and local jurisdictions for reuse. Transfer documentation (such as deeds) contains HMP specific language drafted by the Army and the Service during development of the HMP. The deed language ensures that property recipients or their assignees will be made aware of and implement resource conservation and management requirements applicable to each parcel. The deed also serves as a disclosure notifying future landowners that the HMP does not exempt them from complying with environmental laws and regulations enforced by Federal, State, and local agencies.

Of the 19,280 acres transferred to date, 9,065 acres have been transferred as habitat reserve (Appendix J). These habitat reserve recipients must implement resource conservation/management and follow reporting requirements described in the HMP. In addition, 1,661 acres have been transferred as development with reserve areas or development with restrictions parcels. These parcels allow limited development as described in the HMP with an emphasis on conserving and managing HMP species. A total of 8,156 acres have been transferred as development parcels. Biological resources found on development parcels are not considered essential to the long-term preservation of HMP species at former Fort Ord; however, development parcels located along the NRMA interface would be managed in a manner to reduce the spread of non-native invasive weeds, reduce impacts from erosion and unauthorized vehicle access, and to provide a sufficient fuel break and fire fighter access to manage wildfire risks. These requirements are further described in the HMP.

The remaining 8,553 acres are still owned by the Army. The Army intends to transfer 7,737 additional acres as habitat reserve, and would retain 811 acres as development parcels supporting the Presidio of Monterey.
The HMP designates five land use types that are described in more detail below: (1) development, (2) development with reserves or development with restrictions, (3) habitat corridor, (4) habitat corridor with development allowances, and (5) habitat reserves. In addition, development parcels located adjacent to the NRMA are considered borderland development areas along NRMA interface parcels with resource conservation and management requirements.

Development Parcels

Lands designated as development have no management restrictions. For those parcels designated for development, complete loss of biological resources are anticipated, although in some cases open space areas may be preserved. Salvage of sensitive biological resources for use in restoration activities within conservation areas may continue to occur from parcels that are likely to be developed. The HMP does not exempt future land owners from complying with environmental regulations enforced by Federal, State, and local agencies.

Acreages of listed HMP species and critical habitat that will be or have been transferred are described in Table 1 and Appendix J.

Development with Reserve Areas or Development with Restrictions
Some of the lands slated for development contain in-holdings of habitat reserve land or require development restrictions to protect habitat within or adjacent to the parcels. This management category requires that management practices must be consistent with maintenance of the reserves. The in-holding reserve areas are subject to the same management conditions described for the habitat reserve category, including management by an entity acceptable to the Service. Acreages of listed HMP species and critical habitat that will be or have been transferred are described in Table 1 and Appendix J.

Habitat Corridor with Development Allowances
The HMP describes the habitat corridor with development allowances (Parcel L20.2.2) as a portion of habitat corridor with allowances for future development. The parcel is approximately 144 acres in size including an existing 1-acre fishing pond. The HMP recognizes that development will be concentrated in the existing campground. Based on discussions with Monterey County and Monterey County Parks, development within that parcel will be limited to a total of 52 acres. Acreages of habitat and critical habitat for federally listed species that will be or have been transferred as habitat corridor with development allowances are described in Table 1 and Appendix J.

Habitat Corridor
The HMP describes the habitat corridor as a 252-acre parcel with resource conservation and management requirements. Acreages of federally listed species and critical habitat that will be or have been transferred as habitat corridor are described in Table 1 and Appendix J.

Habitat Reserve
Habitat reserve parcels total 16,199 acres. These acres will be conserved and managed for special-status species found on former Fort Ord. Acreages of HMP species and critical habitat that will be or have been transferred as habitat reserves are described in Table 1 and Appendix J.

1.5 Army Cleanup Program Changes

Several changes to Army cleanup actions at former Fort Ord have occurred since previous consultations. The following is a summary of changes in Army actions, not previously addressed in consultations that may affect listed species. Details describing the actions, impacts, and conservation measures are provided below.

1.5.1 Changes in Munitions Response Actions

Primary Containment Lines

The Track 3 ROD (Army 2008b) describes remedial actions necessary to cleanup unexploded ordnance from the former Fort Ord Impact Area. The Army committed to continue to clear maritime chaparral within habitat reserves using prescribed burns to facilitate access and cleanup of unexploded ordnance; however, there are a few changes to the program not previously addressed in the existing biological opinions.

The Army has historically prepared prescribed burn areas by maintaining a system of 45 to 50 foot wide fuel break roads and masticating primary containment lines to the Incident Commander's specifications to assist in containing the prescribed fires. However, based on lessons learned from previous prescribed burns conducted in munitions response sites, the Army has determined that the temporary fuel breaks serving as primary containment lines need to be expanded up to 320 feet in width. The width of the primary containment lines depends on the hazardous fragmentation distance of the site-specific type of unexploded ordnance, fuel loading, slope, topography, anticipated flame heights, and proximity to developed areas in order to assist in containing the prescribed fires. The Army has received concurrence from the Service to increase fuel break (primary containment lines) widths in letters dated August 28, 2002; June 14, 2005; March 13, 2006; May 3, 2007; May 30, 2008, June 16, 2009, May 2, 2011, and April 24, 2012 (Service 2002b, 2005b, 2006a, 2007b, 2008a, 2009a, 2011b, 2012). The current request for consultation includes an evaluation of manually and/or mechanically cutting vegetation surrounding the units to a width of up to 320 feet to serve as primary containment lines. This temporary vegetation clearance would result in preparation of between approximately 40 and 248 acres of primary containment lines per unit being prepared for burning each year for the duration of the munitions response program, resulting in a total of approximately 841 acres to be cut through completion of the program (Table 2). Based on lessons learned from the 2013 prescribed burn, the Army may need to masticate areas up to 200 feet wide in units adjacent to units being prepared for prescribed burns (Presidio of Monterey Fire Department 2014). These additional areas would be part of containment lines that may be cut in areas that have already been masticated, burned, or both. This will result in re-mastication of approximately up to 709 acres (Table 2). The re-masticated areas will be burned in the future if they occur within units that were not already burned as part of munitions response actions. This increase in width and acreages of containment lines is necessary to reduce the risk of an escape (i.e., wildfires) during prescribed burns (Presidio of Monterey Fire Department 2014). The expansion of the primary containment lines is temporary and only necessary to prepare units for prescribed burns. After prescribed burning, the primary containment lines would be returned to the 45- to 50-foot-wide fuel break system.

Unit Size and Order

The HMP states that clearing or burning vegetation for the cleanup of ordnance and explosives (now munitions and explosives of concern) in maritime chaparral would initially be conducted at sites up to 400 acres in size with the preferred burn sizes being between 200 and 300 acres. Cleanup sites should be separated by undisturbed chaparral, in patches greater than 25 acres, to create a mosaic of patches burned or cleared at different times. No more than 800 acres of maritime chaparral per year should be cleared or burned." However, the HMP also states that the cleanup site sizes and yearly acreage limit can be adjusted as better techniques and more understanding of maritime chaparral reestablishment are developed during early ordnance cleanup efforts (Corps 1997).

A substantial amount of information has been gathered over the last 20 years of the munitions response program including information on habitat reestablishment. The Track 3 ROD (Army 2008b) for the Impact Area states that vegetation clearance would continue using prescribed burns in habitat reserve areas with maritime chaparral. Prescribed burns would continue to be limited to no more than 800 acres per year unless approved by the Service. The order of burning units depends on several factors, including proximity to previously burned areas that serve as a safety buffer, the burn prescription criteria, fuel loading, and anticipated flame heights for the particular unit. Vegetation clearance currently planned includes units that are 400 acres or smaller and bounded by existing access roads, with the exception of Unit 17, which is 562 acres. Two to three prescribed burns are anticipated to occur each year through the remainder of the cleanup program. The units were designed primarily using existing fuel breaks and access roads. Burn prescriptions for these units are coordinated with the U. S. Environmental Protection Agency, California Department of Toxic Substances Control, Monterey Bay Unified Air Pollution District, and California Air Resources Board, to reduce smoke impacts on the local communities while still allowing for the safe and effective use of fire for clearing maritime chaparral in habitat reserves.

Foam, Gel, and Fire Retardant Use

Foams, gels, or fire retardant may be used if deemed necessary by the Incident Commander or the Burn Boss for prescribed fire containment or to safeguard life or property. The type of fire retardant, foams, or gel that would be used is PhosCheck, which is a phosphate based product commonly used in fertilizers. Fire retardant, foam, or gel may be pre-applied in masticated areas, on containment lines, or on live fuel, but not within 300 feet of known vernal pools or ponds. If addressed as part of burn preparation, fire retardant, foam, or gel may be applied through front and side sprayers on water tenders, by aerial application with helicopter buckets, or by single engine air tankers. Fire retardant may be

applied in up to 90 days in advance (but not prior to July 1) of a prescribed burn. Fire retardant may be applied aerially in an emergency to prevent an escape into adjacent properties.

The maximum area of emergency fire retardant application would be approximately 30 acres for each prescribed burn. The Army will monitor the water quality vernal pools/ponds for 5 years following emergency deployment if retardants are deployed within 300 feet of the vernal pools or ponds, in the manner described in the Army's wetland monitoring and restoration plan (Burleson 2006).

Areas containing special-status species and areas of chaparral will be avoided during placement of all fire retardant, gels, and/or foam to the extent possible. Wetlands will not be disrupted or have any fire retardant, foam, or gel applied within 300 feet of their boundaries unless required by the Incident Commander in an emergency or to prevent an escape. The Army anticipates the application of fire retardant, foam, or gel on up to 324 acres until the end of the project (Appendix K).

Manual/Mechanical Vegetation Clearance

In addition to the need for widening primary containment lines, the Army is proposing a change to allow for the manual and mechanical clearance of maritime chaparral in habitat reserve areas to facilitate the remediation of unexploded ordnance. These changes and methods were previously described in the vegetation clearance section 1.0.1. Additional information on high-explosive munitions detection and related clearance activities are described immediately below.

High-Explosive Munitions Detection and Manual/Mechanical Vegetation Clearance

Although prescribed burning is the primary method of vegetation clearance in areas designated as habitat reserve and development with reserve, mechanical vegetation clearance methods may be used under very restrictive circumstances where they would not undermine the goals of species preservation described in the HMP (Corps 1997). On May 13, 2011, the Army discovered an 8-inch high-explosive projectile and a 155-mm high-explosive projectile on the ground surface while conducting vegetation cutting within the primary containment lines in preparation for a prescribed burn in Unit 11 (273 acres). On May 19, 2011, the Army discovered a 155-mm high-explosive projectile on the ground surface while conducting vegetation cutting within the primary containment lines in preparation for a prescribed burn in Unit 12 (203 acres). These projectiles were not expected to be found on the surface and necessitated an increase in the safety set-back distances. The safety set-back distance for firefighters during a prescribed burn is

the hazardous fragmentation distance (HFD) for the munitions expected in the burn area. The hazardous fragmentation distance for the 155-mm and 8-inch projectiles are 450 feet and 423 feet, respectively. While the horizontal distance can be mitigated by cutting wider fuel breaks, the vertical set-back for aerial ignition helicopters would be difficult or impossible to mitigate as they require a certain maximum height above vegetation (fuels), less than the hazardous fragmentation distance identified for these units in order to maintain full control of the ignition torches. The potential for detonation of 8-inch or 155-mm projectiles on the surface during burns in Units 11 and 12 (a total of 476 acres) posed an unacceptable risk to firefighting personnel; therefore, the Army proposed to cut the units.

The discovery of these high-explosive projectiles on the surface, precluding a safe prescribed burn, has prompted the Army to include the potential manual or mechanical removal of vegetation instead of prescribed burning in the current consultation in the event that these types of munitions are discovered in the future. The Army expects similar explosive projectiles are present in Unit 23; therefore, the Army plans to masticate the entire unit.

While the mechanical cutting of the vegetation still poses risks to equipment operators, the risks are manageable through the implementation of safety measures such as double cutting and ordnance escorts to identify possible MEC prior to the vegetation being cleared to 6 inches above the ground. Following the vegetation cutting and subsequent MEC surface remediation, the Army would conduct periodic inspections of the units to ensure that the surface remediation remains effective, and conduct vegetation monitoring and reporting to evaluate vegetation reestablishment. These results would be discussed during the annual Fort Ord meeting. Once the MEC cleanup has been completed and vegetation has regrown enough to carry a fire, the Army would conduct prescribed burns in these cut units to facilitate the reestablishment of the rare and listed plant species found in this fire-adapted plant community.

Manual and mechanical vegetation removal methods would also be the primary methods used in grasslands, oak savannahs, and oak woodlands. Vegetation in and directly around ephemeral California tiger salamander breeding ponds at former Fort Ord are dominated by nonnative and native grasses, and wetland or facultative wetland herbaceous species. Mechanical mowing would only be needed in areas where the vegetation is too dense to safely locate and remove the MEC. Manual vegetation clearance methods have been described in section 1.0.1.

Excavation and Sifting in Habitat Reserve Parcels

The Track 3 ROD also addresses the need to excavate and sift approximately 85 acres of habitat reserve that contain high densities of MEC that are sensitively fuzed (Appendix D). Sensitive fuzes make the traditional methods of locating MEC unsafe in high-density areas. These 85 acres within the Impact Area are in addition to the 75 acres of contaminated soil areas discussed in the existing biological opinions. The Habitat Restoration Plan for the Site 39 Inland Ranges has been prepared for these areas to restore the remediation areas, ensuring reestablishment of HMP species (Shaw and Denise Duffy and Associates 2009).

Herbicide Use

The Army has been treating invasive plant species using manual methods and glyphosate based herbicides since 1995. This work has been and continues to be conducted through the Interagency Service Agreement with BLM, the future land recipient. To date, approximately 27,000 person-hours have been dedicated to control invasive species from Army lands on the former Fort Ord. To avoid potential adverse effects to California tiger salamander and aquatic environments, the Army changed from using higher toxicity glyphosate herbicide (Roundup Pro) to a low toxicity glyphosate herbicide (Rodeo) with the surfactant Agri-Dex. All herbicide applications are conducted according to requirements specified on the label and in accordance with BLM's Integrated Weed Management Program for former Fort Ord. This weed management program was addressed in the biological opinion for BLM's ongoing activities on Fort Ord public Lands (1-8-04-F/C-22) (Service 2005c).

Vegetation Monitoring Protocol

The Army has been conducting vegetation monitoring on former Fort Ord since 1994 to assess the impacts of the cleanup actions on listed species and the reestablishment of central maritime chaparral habitat to ensure the success criteria in the HMP are met. The Army collected baseline data and follow-up monitoring occurred annually in years 1 through 5. Line-intercept transects were established to monitor shrub species, herbaceous cover was measured using quadrats along transects, meandering transects were used to detect HMP annual species, and their distribution was mapped and densities were either counted or estimated following the protocol of Jones and Stokes (1995). Invasive weeds have been evaluated as a component of shrub transect data analysis and have been mapped and reported as incidental observations for future eradication. Nonnative annual grasses have been mapped and assigned a density class along fuel breaks, within masticated containment lines around the perimeter of each MRS/Unit, and within MRS/Units intermittently. In 2009, the Army issued an updated protocol for vegetation monitoring (Burleson 2009), which changed the methods for estimating the densities of each HMP annual species in 100-by-100-foot grids already utilized in the MEC cleanup program. In the baseline year, meandering transects were

conducted to determine how many of the 100-by-100-foot grids were occupied by the HMP annual species in MRS/Unit. Twenty percent, or 38 of the occupied grids, whichever number was greater, were randomly selected for density monitoring. The same grids were monitored in years 1, 3, 5, and 8, following MEC response actions to assess variation in densities. Frequency of monitoring for shrubs and herbaceous vegetation was changed to years 3, 5, 8, and 13, following MEC response actions, because it was determined not enough growth occurred in the first 5 years following MEC cleanup to accurately assess the reestablishment of maritime chaparral community.

By the end of 2014, the Army had monitored vegetation on over 5,000 acres on former Fort Ord affected by MEC response actions, some areas for 8 to 10 years following MEC cleanup. Analysis of the existing HMP annual species data indicate that while trajectories of change in density and response to treatment for a given species often differ between adjacent units, there does not appear to be a consistent differential response to burning or mastication, and these species continue to persist after vegetation clearance activities (Tetra Tech and EcoSystems West Consulting Group (EcoSystems West) 2014, 2015a). Cluster and ordination analyses of the shrub transect data showed that there are structural patterns in the shrub community with three distinct major groups of transects based on differences of the dominant species (Tetra Tech and EcoSystems West 2015b). Each group varies in the composition of the dominant species and successional patterns following MEC cleanup activities, but all demonstrate a steady progression toward baseline conditions.

Based on these findings, the Army updated the protocol for vegetation monitoring with revised methods and frequency for monitoring, and revised success criteria that are better suited to measure whether the objectives of the HMP have been met (Tetra Tech and EcoSystems West 2015b). The primary changes to the current monitoring protocols include:

- Reduction of period to monitoring of HMP annual species to years 1, 3, and 5.
- Incorporation of macroplots to assess frequency of occurrence of HMP annual species in post-treatment years.
- Revision of success criteria for HMP annual species to include frequency of occurrence and availability of bare ground.
- Reduction of period of monitoring for shrub communities to years 3, 5, and 8.
- Identification of three discrete shrub assemblages, with independent success criteria.
- Provision of success criteria for intermediate stages of shrub community succession.

1.5.2 Environmental Services Cooperative Agreement (ESCA)

The ESCA allowed the early transfer and remediation of approximately 3,280 acres of former Fort Ord. In May 2009, 1,922 acres of development, 275 acres of development with reserve or restrictions, 253 acres of habitat corridor, and 831 acres of habitat reserve were transferred. The ESCA allowed FORA to conduct post-disposal remediation in accordance with the CERCLA. On April 19, 2006, the Service issued a comment letter to the Army regarding the Army's negotiation of an ESCA and potential impacts to federally listed species on former Fort Ord (Service 2006b). In that letter, the Service reiterated the Army's responsibility to consider effects to listed species and to assess whether the ESCA would have effects not addressed in the existing biological opinions. The Service also sought clarification on whether the Army would retain its consultation responsibilities pursuant to section 7 of the Act under the potential ESCA. The Army responded in a letter dated June 21, 2006, stating that the Army would retain its lead agent authority for remedial activities conducted under the ESCA, that ESCA actions would not result in impacts to listed species or critical habitats beyond those already addressed in previous consultations, and that the Army would continue to implement applicable conservation measures (G. Youngblood, Army BRAC, in litt. 2006). As of February 2015, all known fieldwork for the ESCA munitions response is complete. Work was conducted in accordance with the provisions of the HMP and the existing biological opinions. The Army continues to oversee the habitat monitoring and restoration activities conducted under the ESCA, and the annual habitat restoration and monitoring reports of ESCA activities are submitted annually to the Service by the BRAC Office.

1.5.3 Contaminated Soil Remediation

The ROD Amendment (Army 2009) presents a change in the final soil cleanup levels and volume of soil to be excavated under the original Basewide ROD. The selected alternative identified in the 1997 Basewide ROD addressed the risks to human health from lead contamination in soils co-located with bullets and constituents of explosives in soils at the Site 39 Inland Ranges. The selected alternative in the 1997 ROD described the need for excavation of approximately 4,520 cubic yards of soil, placing contaminated soil at the OU-2 landfill, and prescribed deed restrictions until the remaining MEC were removed. Since the Basewide ROD was signed, additional range areas and soil volumes have been identified as requiring cleanup to address ecological risks.

The ROD Amendment (Army 2009) addresses current or potential risks to human health and the environment from lead and constituents of explosives present in the Inland Ranges. The selected alternative identified in the ROD Amendment is Remedial Alternative 3, the remediation to range-wide weighted average for lead and constituents of explosives, with special considerations for ecological receptors. This alternative would involve the excavation of soil containing

concentrations above the following ecological risk assessment cleanup levels: a range-wide weighted average of 225 milligrams per kilogram (mg/kg) for lead, and for constituents of explosives of 5.9 mg/kg for trinitrotoluene (TNT), 3.1 mg/kg for cyclotrimethylene trinitramine (RDX), and 2.7 mg/kg for cyclotetramethylene tetranitramine (HMX).

To date, 62 acres at the Site 39 Ranges within the NRMA have been disturbed as a result of contaminated soil remediation. Remediation activities have resulted in the excavation of 152,748 cubic yards of contaminated soils. The remediated areas are being passively or actively restored in accordance with the Habitat Restoration Plan Site 39 Inland Ranges (Shaw and Denise Duffy and Associates 2009). Additional areas may be identified for excavation during future munitions response activities.

The amount of California tiger salamander habitat and Monterey spineflower critical habitat that may be affected as a result of changes in the final soil cleanup levels and volume in contaminated soil remediation and MEC sifting areas combined is expected to be less than 160 acres, of which 62 acres have already been remediated. The Army will reinitiate formal consultation if they expect more than 160 acres would be impacted by large-scale excavations within habitat reserves. After remediation is completed, no access management measures or deed restrictions would be required related to residual contamination in soil. However, in order to maintain preservation of the natural habitat and diversity of native species in habitat reserve areas, Site 39 would include (1) access management measures such as maintained fences and signs surrounding the site perimeter, and (2) a deed restriction that prohibits unrestricted land use as specified in the Track 3 ROD (Army 2008b).

Following the excavation of contaminated soil, habitat restoration including both active and passive restoration methods would occur in the remediation areas. Restoration is expected to take several years and habitat monitoring would occur for approximately 13 years. The Army estimates that long-term management activities, including habitat monitoring, would continue until 2023. In an effort to address specific habitat concerns, the remedial design includes the following provisions:

1. Special considerations for ranges near ponds that may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40). In these locations, all sample locations with lead concentrations above 225 mg/kg would be removed, and the range-wide weighted averages for constituents of explosives would be 0.59 mg/kg for TNT, 2.4 mg/kg for RDX and 2.7 mg/kg for HMX.

2. Special considerations for ranges with large areas of very high quality chaparral habitat (Range 19) that include remediation of the target and firing lanes and all areas with greater than 10 percent spent small arms bullets distribution. The approach was to "leave" islands of very high quality habitat within the remediation areas to establish a vegetative base for re-growth. This resulted in the post remediation range-wide weighted average of 355 mg/kg.
3. The approximate range-wide weighted average concentrations of lead that would remain on-site under the selected remedy vary from 50 to 190 mg/kg, except for Range 19 (see provision #2 above).

1.5.4 Groundwater Remediation

As the groundwater remediation program matures, additional groundwater extraction, monitoring, and injection wells would be installed over the next several years to expedite the groundwater remediation. Most wells are projected to be drilled within current housing development areas, or in areas slated as development parcels according to the HMP. However, a number of wells (estimated at 6 to 8) would be placed within habitat reserve areas, most notably in the University of California's Natural Reserve in the City of Marina. Once the remedial action objectives have been met, wells would be monitored for a period of time before they are demolished. This process involves the excavation and removal of the top 5 feet of the well casing after grouting in the well to prevent a conduit for contaminants to reach groundwater.

Previous biological opinions issued by the Service addressed the impacts associated with well and pipeline installation with regard to protection of listed species and habitat. Conservation measures required by the biological opinions have been put into effect during all groundwater operations since the biological opinions were issued. Baseline surveys, minimization methods to reduce impacts during work procedures, and annual follow-up monitoring using established methods have all been implemented as required. To date, follow-up surveys have not indicated significant decrease in any listed species populations or habitat as a result of groundwater investigation or remedial actions.

While the exact number of future well installations is not known at this time, it is anticipated that the conservation measures currently being implemented, and as described in the conservation measures below (including baseline surveys, monitoring, meeting success criteria, implementation of corrective measures, and annual reporting), are adequate for future groundwater remediation actions.

1.6 Conservation Measures

The following section describes conservation measures designed to reduce and minimize impacts to listed HMP species during Army cleanup and property transfer actions. These measures were developed as part of the natural resource conservation and management

requirements for the HMP and were later expanded to accommodate additional Army actions, new species listings, or changes in species status that were addressed in several biological opinions for the closure and reuse of former Fort Ord.

The first section describes the general conservation measures that are pertinent to every type of Army action expected to occur for the duration of the cleanup. The subsequent sections describe conservation measures that are specific to various Army actions. Implementation of the conservation measures described below is intended to provide sufficient long-term protection for the continued survival of listed HMP species as well as the many other rare HMP species and their habitats on former Fort Ord.

1.6.1 General Conservation Measures

1. Before any new phase of munitions response, soil or groundwater remediation activity begins, all supervisors and field personnel will attend an environmental training program. A biologist familiar with Fort Ord HMP plant and wildlife species will present the environmental training program. As the project proceeds, all new personnel will also attend the environmental training before working on the site. Topics covered in the training will include the components listed below:
    a. a Habitat Checklist or similar form will be completed that identifies the HMP species present on the site and measures to reduce and/or avoid impacts during the actions;
    b. a description and photo presentation of HMP plant and wildlife species that could be encountered in the project area;
    c. environmental laws related to the conservation of these species;
    d. guidelines and specific conservation measures that personnel will follow to reduce or avoid impacts to HMP species or habitat, including but not limited to: maps indicating locations of marked plants to avoid, instructions for replacing topsoil during digs in HMP-plant occupied areas, California tiger salamander-specific instructions (detailed below), and;
    e. appropriate points of contact to report unforeseen impacts on HMP species and encounters with California tiger salamanders
2. Baseline surveys will be conducted before the start of work. Presence, abundance, and locations of HMP species and the condition of critical habitat will be recorded using the protocols outlined in the most current vegetation monitoring protocols (Tetra Tech and EcoSystems West 2015b) and wetland monitoring and restoration plan (Burleson 2006). In addition to the baseline habitat monitoring surveys, monitoring of HMP species and/or their habitat will also be conducted. Surveys will be conducted in years 1, 3, and 5, following the response actions to assess the reestablishment of HMP annual species and surveys will be conducted in years 3, 5, and 8, following the response actions to assess the reestablishment of the HMP shrub species. Yadon's piperia will be included in annual surveys (Collins, pers. comm. 2013).

3. To the extent possible, activities in areas containing HMP annual species will begin on or after June 1, to allow these plants to set seed. Baseline surveys and follow-up monitoring for the wetland HMP species, California tiger salamander, Contra Costa goldfields, and their habitat will be conducted until the fifth year following response actions in occupied wetlands to assess the reestablishment of wetland habitat for these species. Measurements will include wetland function, as measured by the parameters of hydrologic conditions (inundation area, depth, duration of ponding, pH, dissolved oxygen, and turbidity); wildlife usage, specifically California tiger salamander larval presence and abundance; a complete list of plant species observed; and percent submergent, floating, and emergent vegetative cover and species composition including Contra Costa goldfields.
4. Only heavy equipment will be refueled in the field. All refueling will be conducted on the 45-foot wide fuel breaks and approved access roads. Spill control materials such as absorbent pads, noncombustible granular absorbent material, and polyethylene sheeting, will be immediately available to all refueling crews. This information will be included in the Habitat Checklists for all proposed activities.

1.6.2 Conservation Measures: Munitions Response

In addition to the general conservation measures described above, numerous measures are in place to minimize disturbance and impacts to HMP species and their habitat during munitions response actions. The following measures will be implemented before, during and after munitions response actions:

MEC Investigation and Removal Actions

1. An on-site biologist will oversee munitions response activities to ensure conservation measures are implemented. The biologist will also oversee habitat checklist measures and revise as necessary.
2. Populations of HMP plant species will be flagged and/or mapped to the extent possible to facilitate avoidance of unnecessary disturbances.
3. The footprint of work areas, excavations, staging, and road access areas will be restricted to the extent possible; access and work areas will be delineated to limit unnecessary impacts to HMP species and habitat.
4. Existing roads will be used wherever possible; use of vehicles off-roads will be minimized.
5. In maritime chaparral, topsoil (approximately 2 inches) will be set-aside during smaller excavations. When possible, the topsoil will be replaced once the excavations have been back-filled to preserve seed bank of HMP plants.
6. Within wetlands and vernal pools, work will be conducted when the vernal pools are dry, or when water is at its lowest limit.
7. Within vernal ponds, dry topsoil (approximately 2 inches) will be set-aside during all excavations and replaced once the excavations have been back-filled to preserve seed bank of Contra Costa goldfields.
8. Excavations and other work disturbances will occur after HMP annual plants

have set seed to the extent possible; in wetlands these activities will occur during the dry season.

9. Vegetation clearance will be avoided within occupied Contra Costa goldfield areas (the vegetation is typically low growing (less than 6 inches) and does not limit safe access). Work in areas containing Contra Costa goldfields will be conducted during the dry season. Follow-up visits will be conducted on all sites to identify potential erosion areas and apply weed free straw, straw wattle, or other corrective measures as necessary.

Manual/Mechanical Vegetation Clearance

1. Baseline habitat monitoring will occur for HMP annual species and shrubs prior to cutting.
2. Manually and mechanically cleared areas will be prescribed burned following munitions response action when the vegetation has grown sufficiently to carry a fire. Habitat monitoring will occur at years 1, 3, and 5 for annuals and at years 3, 5, and 8 for shrubs. Habitat monitoring will restart following prescribed burning of cut units.
3. Yadon's piperia will be included in annual surveys (Collins, pers. comm. 2013).
4. Monitoring data will be presented in annual reports to determine success of plant species reestablishment.
5. Invasive weed and erosion control will continue until completion of MEC work and property transfer, anticipated by 2022.

Manual/Mechanical Vegetation Clearance due to High Explosive Munitions Detection

1. The Army will follow the wetland monitoring and restoration plan (Burleson 2006). This plan addresses proper survey protocols consistent with the Service's aquatic survey guidelines, criteria for which ponds should be sampled and at what frequency, effective sampling protocols, and monitoring success criteria for California tiger salamander.
2. After manually or mechanically cleared areas have re-grown for approximately 5 years, or when vegetation has grown sufficiently to carry a fire, the Army will conduct a prescribed burn to stimulate fire dependent species. Although temporary impacts to HMP species are likely due to manual and mechanical clearing, the impacts will be minimized by burning of the areas to facilitate habitat reestablishment.

Herbicide Use

The Army will implement the following additional protective measures when using herbicides for the control of invasive, exotic plants:

1. All herbicide applications will be conducted according to requirements specified on the label and in accordance with BLM's Integrated Weed Management Program for former Fort Ord.
2. Precautions will be taken to ensure that no herbicide is applied to native vegetation; only spot applications would occur on weeds in native or sensitive plant areas.
3. Foliar applications of herbicide will not occur when wind speeds are in excess of 10 miles per hour.
4. No herbicides will be applied within 24 hours of forecasted rain and within 48 hours of substantial rainfall (over 0.25 inch precipitation).
5. All mixing and refilling of herbicides will be conducted outside of native habitat at an appropriate mixing facility.

Prescribed Burning

1. No more than 800 acres of maritime chaparral will be burned in one year to ensure a mosaic of different aged strands, which will provide diverse habitat for populations of HMP species within the Site 39 Impact Area.
2. In the event that cutting of a primary containment line(s), up to 320 feet wide, is necessary to ensure containment of a prescribed burn, the cut primary containment line(s) will be burned, if possible, either before, during, or after burn operations to facilitate regeneration of HMP plant species.
3. Habitat monitoring will be conducted for effects of chemical fire retardant, gels, and foams on plant communities and in affected wetlands (Note: Fire foams, gels, and retardants that may be used will not contain sodium ferrocyanide) (Collins, pers. comm. 2012).

California Tiger Salamander-Specific Measures

1. Drift fence and pitfall trapping and relocation of adults will be conducted in upland habitat within 1,640 feet of a breeding pond, if more than 10 percent (or 19 acres) of the upland habitat needs to be excavated.
2. Regular visual inspections and the use of ramps and boards will be provided in excavations or trenches greater than 0.05 acre, greater than 6 inches deep, and within 1.24 mile of a known or potential breeding pool, to allow California tiger salamanders to escape and/or to provide them cover. Inspections and conservation measures for excavations and trenches will be performed during the rainy season and the dry season when either adults or newly metamorphosed California tiger salamander may be migrating;
3. Authorized biologists will record all relevant information, conduct California tiger salamander relocation in the event of encounters during work activity, and report any injury or death.
4. For prescribed burns, if more than 50 percent of the watershed of a known or potential breeding pond is affected, the Army will conduct 2 years of pre-activity larval sampling, to the extent possible. Post-burn presence/absence

sampling will occur in years 1, 2, and 3, if California tiger salamanders are detected in pre-activity larval sampling, and if ponds hold at least 20 centimeters of water. The Army will evaluate the effects of ash and sediment on water quality of the ponds.

5. The Army will monitor the water quality for 5 years following deployment if retardants are deployed within 300 feet of vernal pools or ponds.
6. For erosion control activities, work areas will be searched for California tiger salamanders during rainy periods.
7. The wetland monitoring and restoration plan (Burleson 2006) will be followed. This plan addresses proper survey protocols, criteria for which ponds need to be measured during pre-work assessments, effective sampling protocols, and monitoring success criteria for the California tiger salamander.

Primary Containment Lines

1. Primary containment lines will be prescribed burned to the extent possible to stimulate vegetation reestablishment of HMP species.
2. The Army will assess the effects of use of manual/mechanical vegetation cutting methods and the use of fire retardant and foam chemicals on primary containment lines using surveys focused specifically within the cut areas.
3. Surveys will identify baseline conditions of HMP annual species, HMP shrub species, and non-native grass and weed encroachment. Data from these surveys will be used when implementing weed management programs.
4. Follow-up habitat monitoring in expanded fuel breaks will help determine whether HMP species reestablishment has met the established success criteria.
5. Monitoring data will be provided in annual reports.

Success Criteria

After the completion of the final monitoring period for each of the species or critical habitats of concern, species reestablishment will be considered successful according to these criteria:

For Monterey gilia and Monterey spineflower and its critical habitat, reestablishment will be considered successful if, at the end of 5 years:

1. Self-sustaining populations exist within an overall mosaic of maritime chaparral habitat in different stages of succession.
2. The amount of HMP species occupied habitat varies over time within a range that includes amounts similar to, or greater than, the amount of habitat and size of the population estimated for these species in previous baseline surveys for each species.
3. Population sizes vary from year to year within a range that includes annual species populations similar in size to those estimated in 1992.

For the California tiger salamander and Contra Costa goldfields, species reestablishment will be considered successful if, at the end of the monitoring,

each of the following is directly comparable to the conditions before the start of the work:

1. Wetland function, as measured by the parameters of hydrologic conditions (inundation area and depth, pH, dissolved oxygen levels);
2. Wildlife usage, specifically California tiger salamander larval presence;
3. Plant cover and wetland plant species diversity and dominance; and
4. Contra Costa goldfields abundance.

Corrective Measures

If success criteria for maritime chaparral or wetlands and their associated HMP species are not satisfied, corrective measures will be developed on a case-by-case basis to rectify the failure. Previous monitoring data will be analyzed, and, if necessary, specific studies will be undertaken to determine the reason for failure to meet success criteria. Corrective measures will be developed to respond to the cause of noncompliance determined from these data. An appropriate corrective measure must be implemented within 1 year if the success criteria are not satisfied, and the chaparral or vernal pool or pond will be monitored for additional 3 years after implementation as specified in the Wetland Monitoring and Restoration Plan (Burleson 2006).

The Army will provide the Service with a review of all proposed wetland corrective measures before they are implemented. If after two attempts at implementing corrective measures, success criteria are still not satisfied, another conservation site may be chosen for replacement of the HMP species population, or the chaparral or vernal pool or pond enhancement, creation, or restoration.

Each monitoring year following the start of the corrective measure, the same information will be recorded for each restored maritime chaparral area, or vernal pool or pond as is described in the vegetation and wetland monitoring plans (Burleson 2006, 2009).

1.6.3 Conservation Measures: Contaminated Soil Remediation

Impacts from contaminated soil remediation are expected to be temporary because excavated sites will either be allowed to recover naturally or will be actively restored. The final habitat restoration plan for the Site 39 Inland Ranges (Shaw and Denise Duffy and Associates 2009) has been developed to guide the appropriate restoration of these areas. Each area will be monitored according to the Habitat Restoration Plan (Shaw 2009) and the Wetland Monitoring and Restoration Plan (Burleson 2006) to ensure the chaparral, wetland, or HMP species habitat recovers in accordance with the success criteria relevant for each habitat type, which are included in the restoration plans. The excavated and restored areas are being transferred to the BLM, who will manage the sites as part of the NRMA.

The purpose of these conservation measures is to reestablish a healthy, high diversity habitat with microhabitat for HMP annual species following the remediation of contaminated soil. These conservation measures are intended to benefit HMP species and their habitats, and will be implemented at all soil remediation sites not planned for development. Conservation measures for soil remediation sites will be the same as those implemented during munitions response actions and so are not repeated here. Additional general conservation measures for contaminated soil remediation are listed below.

Impacts have been identified based on anticipated levels and types of disturbance required to treat each area, and appropriate conservation measures have been incorporated into the project designed to minimize disturbance to natural resources including HMP species. The remediated areas will either be allowed to recover naturally or will be passively or actively restored by planting species consistent with the baseline condition. The following conservation measures will be implemented before, during and following excavation of contaminated soils.

General Soil Remediation Measures

The following measures will be employed before, during, and following remediation of contaminated soil:

1. An employee training program, as described previously, will be given by a biologist (who will be familiar with all HMP plant and wildlife species) to all workers on the groundwater remediation sites. The training will include a description of all HMP species of concern, environmental laws pertaining to these species, and will outline specific mitigation measures that will be used to reduce biological impacts.
2. A Habitat Checklist, as described previously, will be briefed to all personnel working on the site and will identify HMP resources present and recommend measures to reduce and/or avoid impacts during the remediation actions.
3. Populations of HMP plant species in nearby areas will be flagged or mapped to avoid of unnecessary disturbances.
4. The footprint of the soil remediation areas, excavations, staging, and road access areas will be restricted to the extent possible. Access and work areas will be clearly delineated to avoid unnecessary impacts to HMP species and habitat.
5. Existing roads will be used wherever possible, and use of vehicles off-road will be minimized.
6. Baseline surveys of maritime chaparral and wetland habitats will be conducted before the habitats are impacted by soil remediation activities and follow-up monitoring to document restoration of HMP species will also be conducted.
7. Work will be conducted during the dry season to the extent possible when excavation of contaminated soil is necessary in wetlands/vernal pools.

8. All excavated sites will be treated, as appropriate, with erosion control measures such as application of weed free straw, straw wattle, or use of other measures.
9. Invasive weed and erosion control will continue within the remediation areas to prevent degradation of the habitats of HMP species.

Site Habitat Restoration

1. Depending upon the extent of soil remediation areas, recontouring of excavation sites may be required for erosion control and slope stabilization. Recontoured areas will be graded to create a natural landscape transitioning smoothly into existing topography. Site restoration will include soil stabilization using certified weed-free straw applications and crimping where necessary or other suitable techniques to prevent erosion.
2. After completion of excavation, any sites containing HMP species or potential habitat that are larger than 1 acre and are greater than 100 feet in width will be actively restored to support HMP species to a condition comparable to that which was present prior to the remediation work. Habitats of concern include: maritime chaparral, wetland and vernal pond habitat, and coastal scrub.
3. The Final Site 39 Habitat Restoration Plan (Shaw and Denise Duffy and Associates 2009) identifies plant species, planting protocols, a monitoring plan, success criteria, and corrective measures if goals are not met. At a minimum, chaparral and wetland species present prior to remediation will be established at each site through passive or active planting.
4. The Army has overseen a 2-acre habitat restoration project at Fort Ord Dunes State Park (formerly Site 3) to determine whether healthy dune vegetation can be reintroduced in areas that have had no soil remediation performed. Site 3 extends approximately 3.2 miles along the coastline of Monterey Bay along the western portion of the former Fort Ord. The site was used for small arms training beginning in the 1940s. The Army continues to monitor the site for effects.

Biological Monitoring and Reporting

As with munitions removal sites, baseline surveys will be completed for all soil remediation sites. Presence, abundance, and locations of HMP species, and the condition of designated critical habitat will be recorded using the most current vegetation monitoring protocols.

Following the soil remediation work and the subsequent habitat restoration, monitoring of non-wetland HMP species and/or their habitat will be conducted according to the Site 39 Habitat Restoration Plan (Shaw and Denise Duffy and Associates 2009). Follow-up habitat monitoring will be conducted in years 1 through 4 following the soil excavation/habitat restoration for assessing the reestablishment of the HMP annual plant populations and shrub species.

Monitoring data will include native and HMP species richness and abundance. Surveys for HMP annuals will continue at years 5 and 8 following restoration. Follow-up monitoring for HMP shrubs will continue at years 5, 8, and 13, following restoration. Yadon's piperia will be included in annual surveys, where appropriate (Collins, pers. comm. 2013).

In wetland habitat, follow-up monitoring for California tiger salamander and Contra Costa goldfields and their habitats will be conducted until the fifth year following soil remediation in occupied or potential wetlands habitat (Burleson 2006). This monitoring will assess the reestablishment of habitat for these species. Each monitoring year, the following information will be recorded for each vernal pool or pond that may have been impacted by soil remediation: (1) dates each pool or pond begins to fill and when it dries ; (2) water conditions (depth, surface area, turbidity, dissolved oxygen, and pH); (3) percent submergent, floating, and emergent vegetative cover (estimated using transects, quadrats, or other appropriate techniques), and species composition; and (4) occurrence and relative abundance of larvae of California tiger salamander.

These monitoring data will be analyzed and compiled into annual monitoring reports. Conclusions drawn from data in monitoring reports will be incorporated into the 5-year reviews required by the Site 3 Record of Decision (Army 2005).

California Tiger Salamander-Specific Measures

The California tiger salamander-specific measures outlined above in the munitions response section will also be implemented for contaminated soil remediation activities. In addition, the Army has proposed to conduct wetland monitoring work in accordance with the Declining Amphibian Populations Task Force Fieldwork Code of Practice (DAPTF 1998) (Appendix L).

Success Criteria

Following the completion of the final monitoring period, restoration of species will be considered successful according to the criteria provided in the relevant habitat restoration plans:

For Monterey gilia and Monterey spineflower and their maritime chaparral habitat, restoration will be considered successful if the following objectives are met:

1. native species richness consists of a minimum of 10 native species for each restoration area;
2. native species percent cover within each restored area is 20 percent or greater;
3. percent cover of exotic species within each restored area is less than 10 percent; and

4. target HMP species at each remediated range are present in greater than 50 percent of the restored area.

For California tiger salamander and Contra Costa goldfields, restoration will be considered successful if at the end of 5 years monitoring, each of the following is directly comparable to the conditions before the start of the work:
1. wetland function, as measured by the parameters of hydrologic conditions (inundation area and depth, pH, dissolved oxygen levels);
2. wildlife usage, specifically California tiger salamander larval presence;
3. plant cover and wetland plant species diversity and dominance; and
4. Contra Costa goldfields abundance.

Success criteria of habitat restoration at Site 3 are outlined in the Site 3 Habitat Restoration and Monitoring Plan (Shaw 2008a). The plan requires that after 5 years:
1. vegetation cover and diversity will be comparable to that of reference sites,
2. weed cover is not to exceed 20 percent;
3. buckwheat planting survivorship should remain at or above 80 percent;
4. buckwheat population density in the restoration sites will not be significantly less than in the reference sites; and
5. buckwheat average plant height, stem abundance, leaf and inflorescence abundance, and leaf color in the restoration sites will not be significantly different from buckwheat in the reference sites.

After 5 years of monitoring, all of the above criteria except buckwheat planting survivorship and the number of leaves and peduncle lengths, have been met. These differences may likely have been due to the ongoing drought and high level of herbivory (State Parks 2014). The Army will conduct additional monitoring and will determine if there are differences between buckwheat survivorship in non-remediated and reference areas that could be attributed to unremediated lead in the soil.

Corrective Measures

If success criteria for restoration of either maritime chaparral or wetlands and associated HMP species are not satisfied, corrective measures will be developed, on a case-by-case basis, to identify the cause of failure. Previous monitoring data will be analyzed and, if necessary, specific studies will be undertaken to determine the reason for failure to meet success criteria. Corrective measures will be developed to respond to the cause of noncompliance determined from these data.

For vernal pools or ponds, an appropriate corrective measure must be implemented within 1 year of determination that success criteria have not been

satisfied, and the vernal pool or pond will be monitored for an additional 3 years after implementation. The Army will provide the Service all proposed wetland corrective measures for review before they are implemented. If after two attempts at implementing corrective measures, success criteria are still not satisfied, another conservation site within the NRMA may be chosen for vernal pool or pond enhancement or creation in coordination with the Service.
For maritime chaparral sites, monitoring and continued corrective measures will be applied until the success criteria are met. If success criteria cannot be met, alternative conservation measures will be considered at that time in coordination with the Service.

1.6.4 Conservation Measures: Contaminated Groundwater Remediation
The purpose of the following conservation measures is to maintain as healthy and high diversity a habitat following remediation of groundwater as before. These conservation measures are expected to benefit HMP species and their habitats and will be implemented at all sites not planned for development.

Impacts have been identified based on previous work completed, and appropriate conservation measures will be incorporated into the project plans to minimize disturbance to natural resources, in particular, HMP species. The remediated areas will likely be allowed to recover naturally, as the impacts are not anticipated to be significant or permanent. If impacts are determined to be significant or permanent, corrective actions will be implemented as needed.

Groundwater remediation actions may result in impacts to the species and critical habitat under consideration mostly through well installation and removal procedures. As with MEC removal, these impacts will be minimized through implementation of the conservation measures described below. The following conservation measures will be implemented before, during, and following well installation and removal as applicable:

<u>General Contaminated Groundwater Remediation Measures</u>
Measures 1 through 5 outlined in the general soil remediation measures in section 1.6.3 above will also apply for contaminated groundwater remediation. To the extent possible, new well construction and well demolition will occur after June 1 to allow Monterey gilia and Monterey spineflower to set seed prior to disturbance. If new wells need to be installed in high quality areas that are not accessible by existing roads, or in areas prone to erosion, matting will be used on access routes to minimize impact.

<u>Biological Monitoring and Reporting</u>
As with munitions response and contaminated soil remediation sites, baseline surveys will be conducted for all groundwater remediation sites located on lands designated as habitat reserve parcels. Presence, abundance, and locations of HMP

annuals using the protocols described in the 2014 FONR annual monitoring report (HydroGeologic, Inc. 2014) for groundwater remediation activities.

Following groundwater remediation, monitoring of HMP annuals and/or their habitat will be conducted where HMP annuals were present prior to remediation and will be monitored for 3 years following the completion to assess the reestablishment of the HMP annual plant populations (Monterey gilia and Monterey spineflower) unless otherwise coordinated with the Service. The exception for this 3-year monitoring schedule will be in the University of California Natural Reserve, where monitoring will be suspended at sites where HMP annuals have not been documented during baseline surveys nor in the first year of follow-up surveys. Additionally, surveys for HMP annuals will not be conducted in areas considered low quality habitat for these species (Service 2013). Yadon's piperia will be included in annual surveys in areas where habitat for this species is present. Monitoring data will include native and HMP annual species richness, abundance, and distribution. These monitoring data will continue to be analyzed and compiled into annual monitoring reports. An assessment of the weed control treatments conducted from 2007 to 2013 will evaluate effectiveness on controlling invasive species. The Army will provide recommendations for future weed control activities based on the results of the assessment.

Success Criteria

After the final monitoring period for each of the federally listed species or designated Monterey spineflower critical habitat, species reestablishment will be considered successful when:

1. densities and acreage of HMP annual species are within a normal range compared with information from reference sites, and;
2. The number of wells where HMP annual species are detected in follow up surveys will be the same or greater than the number of wells where these species were found in baseline surveys.

Corrective Measures

If populations of HMP annuals or critical habitat are determined to have been adversely affected by remediation activity, based on evaluation of the monitoring data, corrective measures will be developed and applied on a case-by-case basis in coordination with the Service.

1.6.5 Conservation Measures: Landfill Closure and Maintenance

No HMP conservation measures are required during closure and maintenance activities at the former Landfill; however, the Army will continue to implement appropriate construction management techniques to avoid unnecessary disturbance of adjacent habitat

and promote conservation to the extent possible.

1. The Army will prohibit the use of non-native invasive species in hydro-seed mixes;
2. continue to maintain and use the existing system of access roads;
3. continue to control the spread of non-native invasive weeds such as Pampas grass (*Cortaderia selloana*), French broom, and iceplant; and
4. work with local jurisdictions and provide access to allow habitat restoration projects consistent with the requirements of the Basewide ROD (Army 1997a).

1.6.6 Conservation Measures: Property Disposal

The Army will ensure the HMP deed language is included in all property transfer documentation. Implementation of the HMP will result in the long-term conservation and management of approximately 16,595 acres and a portion of the 2,165 acres designated as development with reserve or development with restrictions. The resource conservation and management requirements described below will promote the continued conservation of the listed HMP species as well as many other rare species and their habitats. Table 1 identifies the acreages of HMP species and critical habitat found within the five HMP land use categories.

Development

Although transfer of 9,065 acres of development parcels may result in the loss of listed HMP species occurring on those parcels, implementation of HMP conservation and management requirements, including conservation measures implemented during Army cleanup activities on the remaining 18,762 acres, will offset the impacts to species in development parcels. Table 1 identifies the acreages of HMP species and critical habitat impacted by development.

Development with Reserves or Development with Restrictions

Although a portion of these 2,165 acres have allowances for development, resource conservation and management requirements on the majority of these parcels will include the appropriate management of HMP species consistent with the measures taken on habitat reserve parcels. Table 1 identifies the acreages of HMP species and critical habitat found within these parcels.

Habitat Corridor with Development Allowance

Although transfer of the habitat corridor with development allowance parcels (L20.2.2 and L20.2.3.1) would result in 52 acres of development to support a youth camp for environmental education, the remaining 92 acres would be managed as a habitat corridor.

Habitat Corridor

The habitat corridor parcel, L20.2.1, is 252 acres and will not be developed. This parcel serves as a corridor for plants and animals between the northern and

southern habitat reserves. Implementation of the resource conservation and management requirements identified in the HMP will further benefit HMP species conservation at former Fort Ord.

Habitat Reserve

The habitat reserve parcels total 16,199 acres and provide habitat for all HMP species. Implementation of the resource conservation and management requirements identified in the HMP are designed to offset the losses to HMP species found on the development portions of former Fort Ord. Table 1 identifies the acreages of HMP species found in habitat reserve parcels.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

The jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species,* which describes the range-wide condition of the California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, Smith's blue butterfly, and Yadon's piperia; the factors responsible for those conditions, and their survival and recovery needs; (2) the *Environmental Baseline,* which analyzes the condition of the six species; the factors responsible for those conditions, and the relationship of the action area to the survival and recovery of the six species; (3) the *Effects of the Action,* which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the six species; and (4) the *Cumulative Effects,* which evaluates the effects of future, non-Federal activities in the action area on the six species.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, Smith's blue butterfly, and Yadon's piperia**,** and the role of the action area in the survival and recovery of the six species as the context for evaluation of the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied on the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the *Status of critical habitat,* which describes the range-wide condition of designated critical habitat for Monterey spineflower in terms of primary constituent elements (PCEs), the factors responsible for those conditions, and the intended recovery function of the critical habitat overall; (2) the *Environmental Baseline,* which analyzes

the condition of the critical habitat in the action area, the factors responsible for those conditions, and the recovery role of the critical habitat in the action area; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the PCEs and how that will influence the recovery role of the affected critical habitat units; and (4) *Cumulative Effects*, which evaluates the effects of future non-Federal activities in the action area on the PCEs and how that will influence the recovery role of affected critical habitat units.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of critical habitat for the Monterey spineflower and the role of the action area relative to that intended function as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the adverse modification determination.

STATUS OF THE SPECIES

California Tiger Salamander

The Service recognizes three distinct populations of the California tiger salamander in Sonoma County, in central California, and in northern Santa Barbara County. On September 21, 2000, the Service listed the Santa Barbara County distinct population segment of the California tiger salamander as endangered (Service 2000). On March 19, 2003, the Service listed the Sonoma County distinct population segment of the California tiger salamander as endangered (Service 2003a). On August 4, 2004, the Service published a final rule listing the California tiger salamander as threatened range-wide, including the previously identified Sonoma and Santa Barbara distinct population segments (Service 2004a). On August 19, 2005, U.S. District Judge William Alsup vacated the Service's downlisting of the Sonoma and Santa Barbara populations from endangered to threatened. Thus, the Sonoma and Santa Barbara populations are listed as endangered, and the central California population is listed as threatened. Critical habitat for the central population of the California tiger salamander was designated on August 23, 2005 (Service 2005d).

The California tiger salamander is endemic to the grassland community found in California's Central Valley, the surrounding foothills, and coastal valleys (Fisher and Shaffer 1996). As noted previously, three distinct populations are recognized by the Service: (1) in the coastal ranges of Sonoma County; (2) in central California including the San Francisco Bay area, the Central Valley, southern San Joaquin Valley, and the Central Coast Ranges; and (3) in northern Santa Barbara County. The distribution of breeding locations of this amphibian does not naturally overlap with that of any other species of tiger salamander (Loredo et al. 1996, Petranka 1998, Stebbins 2003).

The California tiger salamander was first described as *Ambystoma californiense* by Gray in 1853, based on specimens that had been collected in Monterey, California (Grinnell and Camp 1917). Storer (1925) and Bishop (1943) also considered the California tiger salamander to be a distinct

species. Dunn (1940), Gehlbach (1967), and Frost (1985) believed the California tiger salamander was a subspecies of the more widespread tiger salamander (*A. tigrinum*). However, based on studies of the genetics, geographic distribution, and ecological differences among the members of the *A. tigrinum* complex, the California tiger salamander has been determined to represent a distinct species (Shaffer and Stanley 1991, Jones 1993, Shaffer et al. 1993, Shaffer and McKnight 1996, Irschick and Shaffer 1997).

The California tiger salamander is a large and stocky terrestrial salamander with small eyes and a broad, rounded snout. Adults may reach a total length of 8.2 inches, with males generally averaging about 8 inches total length, and females averaging about 6.8 inches in total length. For both sexes, the average snout-to-vent length is approximately 3.6 inches (Service 2000). The small eyes have black irises and protrude from the head. Coloration consists of white or pale yellow spots or bars on a black background on the back and sides. The belly varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. Males can be distinguished from females, especially during the breeding season, by their swollen cloacae (a common chamber into which the intestinal, urinary, and reproductive canals discharge), larger tails, and larger overall size (Loredo and Van Vuren 1996).

Historically, natural ephemeral vernal pools were the primary breeding habitats for California tiger salamanders (Twitty 1941, Fisher and Shaffer 1996, Petranka 1998). However, with the conversion and loss of many vernal pools through farmland conversion and urban and suburban development, ephemeral and permanent ponds that have been created for livestock watering are now frequently used by the species (Fisher and Shaffer 1996, Robins and Vollmar 2002). California tiger salamanders spend the majority of their lives in upland habitats and cannot persist without them (Trenham and Shaffer 2005). The upland component of California tiger salamander habitat typically consists of grassland, but includes grasslands with scattered oak trees, and scrub or chaparral habitats (Shaffer et al. 1993, Service 2000). Juvenile and adult California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925, Loredo and Van Vuren 1996, Trenham 1998, Pittman 2005). Burrow habitat created by ground squirrels and utilized by California tiger salamanders suggests a commensal relationship between the two species (Loredo et al. 1996).

Movement of California tiger salamanders within and among burrow systems continues for at least several months after juveniles and adults leave the ponds (Trenham 2001). California tiger salamanders cannot dig their own burrows, and as a result, their presence is associated with burrowing mammals (Seymour and Westphal 1994). Active ground-burrowing rodent populations likely are required to sustain California tiger salamanders because inactive burrow systems become progressively unsuitable over time (Service 2004a). Loredo et al. (1996) found that California ground squirrel burrow systems collapsed within 18 months following abandonment by, or loss of, the mammals.

California tiger salamanders have been found in upland habitats various distances from aquatic breeding habitats. In a trapping study in Contra Costa County, California tiger salamanders were trapped approximately 2,625 feet to 3,940 feet away from potential breeding habitat (Service 2004a). During a mark and recapture study in the Upper Carmel River Valley in Monterey County, Trenham et al. (2001) observed California tiger salamanders dispersing up to 2,200 feet between breeding ponds between years. In research at Olcott Lake in Solano County, Trenham and Shaffer (2005) captured California tiger salamanders in traps installed 1,312 feet from the breeding pond. In a study in Contra Costa County, Orloff (2011) found that the majority of California tiger salamanders captured were at least 2600 feet from the nearest breeding habitat and some were over 7200 feet from the nearest breeding habitat.

Adults enter breeding ponds during fall and winter rains, typically from October through February (Storer 1925, Loredo and Van Vuren 1996, Trenham et al. 2000). Males migrate to the breeding ponds before females (Twitty 1941, Shaffer et al. 1993, Loredo and Van Vuren 1996, Trenham 1998). Males usually remain in the ponds for an average of about 6 to 8 weeks, while females stay for approximately 1 to 2 weeks. In dry years, both sexes may stay for shorter periods (Loredo and Van Vuren 1996, Trenham 1998).

Females attach their eggs singly or, in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris in the water (Storer 1925, Twitty 1941). In ponds with little or no vegetation, females may attach eggs to objects, such as rocks and boards on the bottom (Jennings and Hayes 1994). In drought years, the seasonal pools may not form and the adults may not breed (Barry and Shaffer 1994). The eggs hatch in 10 to 14 days with newly hatched salamanders (larvae) ranging in size from 0.5 to 0.6 inch in total length (Petranka 1998). The larvae are aquatic. Each is yellowish gray in color and has a broad, fat head; large, feathery external gills; and broad dorsal fins that extend well onto its back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about 6 weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume smaller tadpoles of tree frogs (*Pseudacris* spp.) and California red-legged frogs (*Rana draytonii*) (J. Anderson 1968). California tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems.

The larval stage of the California tiger salamander usually lasts 3 to 6 months, because most seasonal ponds and pools dry up during the summer (Petranka 1998). Amphibian larvae must grow to a critical minimum body size before they can metamorphose to the terrestrial stage (Wilbur and Collins 1973). Larvae collected near Stockton in the Central Valley during April varied from 1.9 to 2.3 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding pools 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. The longer the inundation period, the larger the larvae and metamorphosed juveniles are able to grow, and the more likely they are to survive and reproduce (Semlitsch et al. 1988, Pechmann et al. 2001). The larvae perish if a site dries before they complete metamorphosis (P. Anderson 1968, Feaver 1971). Pechmann et

al. (2001) found a strong positive correlation between inundation period and total number of metamorphosing juvenile amphibians, including tiger salamanders.

Metamorphosed juveniles leave the breeding sites in the late spring or early summer. Like the adults, juveniles may emerge from these retreats to feed during nights of high relative humidity (Storer 1925, Shaffer et al. 1993) before settling in their selected upland sites for the dry, hot summer months. While most California tiger salamanders rely on rodent burrows for shelter, some individuals may utilize soil crevices as temporary shelter during upland migrations (Loredo et al. 1996). Mortality of juveniles during their first summer exceeds 50 percent (Trenham 1998). Emergence from upland habitat in hot, dry weather occasionally results in mass mortality of juveniles (Holland et al. 1990).

We do not have data regarding the absolute number of California tiger salamanders due to the fact that they spend most of their lives underground. Virtually nothing is known concerning the historical abundance of the species. At one study site in Monterey County, Trenham et al. (2000) found the number of breeding adults visiting a pond varied from 57 to 244 individuals. A Contra Costa County breeding site approximately 124 miles north of the Trenham et al. (2000) study site in Monterey County showed a similar pattern of variation, suggesting that such fluctuations are typical (Loredo and Van Vuren 1996). At the local landscape level, nearby breeding ponds can vary by at least an order of magnitude in the number of individuals visiting a pond, and these differences appear to be stable across years (Trenham et al. 2001).

Lifetime reproductive success for California tiger salamanders is typically low. Less than 50 percent breed more than once (Trenham et al. 2000). In part, this is due to the extended length of time it takes for California tiger salamanders to reach sexual maturity; most do not breed until 4 or 5 years of age. Combined with low survivorship of metamorphs (in some populations, less than 5 percent of marked juveniles survive to become breeding adults (Trenham 1998)), low reproductive success limits California tiger salamander populations. Because of this low recruitment, isolated subpopulations can decline greatly from unusual, randomly occurring natural events as well as from human-caused factors that reduce breeding success and individual survival. Based on metapopulation theory (Hanski and Gilpin 1991), factors that repeatedly lower breeding success in isolated ponds that are too far from other ponds for migrating individuals to replenish the population further threaten the survival of a local population.

The California tiger salamander is threatened primarily by the destruction, degradation, and fragmentation of upland and aquatic habitats, primarily resulting from the conversion of these habitats by urban, commercial, and intensive agricultural activities (Service 2000, Service 2003a, Service 2004a). Additional threats to the species include hybridization with introduced nonnative barred tiger salamanders (*A. tigrinum mavortium*) (Service 2000, 2004), destructive rodent-control techniques (e.g., deep-ripping of burrow areas, use of fumigants) (Service 2003a), reduced survival due to the presence of mosquitofish (*Gambusia affinis*) (Leyse and Lawlor 2000), and mortality on roads due to vehicles (Service 2000).

Recovery Objectives

A recovery plan for the central California population of the California tiger salamander has not been completed; however, the 2004 listing rule outlines these conservation measures for protection and recovery of the species. The Service believes that protection and recovery of the California tiger salamander will require reduction of the threats from destruction, fragmentation, and degradation of wetland and associated upland habitats due to urban development, conversion of habitat to intensive agriculture, predation by nonnative species, disease, contaminants, agricultural and landscaping contaminants, rodent and mosquito control, road-crossing mortality, hybridization with nonnative tiger salamanders, and some livestock grazing practices. Threats from pesticide drift also must be reduced. These threats should be considered when management actions are taken in habitats currently and potentially occupied by the California tiger salamander, and areas deemed important for dispersal and connectivity or corridors between known locations of this species. Monitoring also should be undertaken for any management actions or scientific investigations designed to address these threats or their impacts.

Development of a recovery plan will bring together Federal, State, and regional agency efforts for the conservation of the California tiger salamander. A recovery plan will establish a framework for agencies to coordinate their recovery efforts. The plan will set recovery priorities and estimate the costs of the tasks necessary to accomplish the priorities. It also will describe the site-specific actions necessary to achieve conservation and survival of the species (Service 2004a).

Contra Costa Goldfields

Contra Costa goldfields was listed as a federally endangered species on June 18, 1997 (Service 1997). Critical habitat for this species was proposed on September 24, 2002, and the final rule to designate critical habitat for the Contra Costa goldfields was published on August 6, 2003 (Service 2003b). An evaluation of economic exclusions from the August 2003 final designation was published on August 11, 2005 (Service 2005f), and administrative revisions were published on February 10, 2006 (Service 2006c). Information contained in this account was obtained primarily from the Contra Costa Goldfields 5-year review: Summary and Evaluation (Service 2008b).

Contra Costa goldfields is an annual flowering plant in the aster family (Asteraceae) that grows 4 to 12 inches tall and usually has a branched stem. The leaves are opposite, light green, and hairless. The lower leaves have smooth margins, but stem leaves have one or two pair(s) of narrow lobes. The daisy-like flower heads are terminal, solitary, and all disk and ray flowers are golden-yellow (Greene 1888; Ornduff 1993). The phyllaries (bracts below the flower head in the aster family) are one-quarter to one-half fused; where all other species of *Lasthenia* have either free phyllaries or phyllaries fused more than two thirds of their length. The achenes (fruit) of Contra Costa goldfields are less than 0.06 inch long and always lack a pappus (the hair-like or scale-like structures attached to an achene, which assist in dispersal) (Ornduff 1969, Ornduff 1993). Contra Costa goldfields flower from March to June (Ornduff 1966, Ornduff 1976) and are self-incompatible.

Habitat for Contra Costa goldfields includes vernal pools, swales, moist flats, and depressions within a grassland matrix (California Natural Diversity Database (CNDDB) 2013a). The two most commonly reported associates are Italian ryegrass (*Lolium multiflorum*) and popcorn flower (*Plagiobothrys* spp.). Other plant species that occur at several Contra Costa goldfield sites include brass buttons (*Cotula coronipifolia),* valley downingia (*Downingia pulchella*), California eryngo (*Eryngium aristulatum*), smooth goldfields (*Lasthenia glaberrima*), common mousetail (*Myosurus minimus*), and California semaphore grass (*Pleuropogon californicus*). Other rare plants that co-occur with Contra Costa goldfields include alkali milk-vetch (*Astragalus tener* var. *tener*), few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora*), and Greene's legenere (*Legenere limosa*) (CNDDB 2013a). Contra Costa goldfields typically grow in vernal pools, swales, moist flats, and depressions within a grassland matrix (CNDDB 2013a), and have been found in three types of vernal pools: northern basalt flow, northern claypan, and northern volcanic ashflow (Sawyer and Keeler-Wolf 1995). Landforms and geologic formations for sites where Contra Costa goldfields occur have not been identified. Elevations for this species typically range from 6 to 200 feet, but one occurrence in Napa County was recorded at 1,460 feet, and the Monterey County occurrences are at 400 feet (CNDDB 2013a).

Contra Costa goldfields has been reported in ten counties, which include: Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, Santa Barbara, Santa Clara, Solano, and Sonoma. The CNDDB reports 34 occurrences of this species; 7 that are extirpated, 4 that are potentially extirpated, and 23 that are presumed extant (CNDDB 2013a).

The status of the species is uncertain due in part to the difficulty of relocating sites and also because this species may reappear on a site after several years, even if it is absent during a given survey. Additionally, CNDDB occurrences have, in some cases, either been deleted or lumped, making tracking of the number of occurrences difficult. The majority of the location information used in the Service's 2008 5-year status review is from the CNDDB, which reports species locations as "occurrences" rather than populations. An "occurrence", which may represent a documented collection, observation, or museum specimen of a species, is defined by the CNDDB as a location occupied by a species separated from other locations by at least 0.25 mile, and may contain multiple records.

When Contra Costa goldfields was listed as endangered in 1997, the primary threats to its survival and recovery were activities that result in the direct destruction of the plants and their habitats or hydrologic changes in their vernal pool habitats. Such activities include urbanization, wetland drainage, industrial development, agricultural land conversion, ditch construction, off highway vehicle use, road widening, and trampling by cattle. We have no new information to suggest that these threats to the species have substantially changed since the time of listing in 1997. In addition, other factors, such as drought, vineyard conversion, competition from weedy invasive plants, inappropriate livestock grazing, and elimination of grazing may also threaten this species. The majority of the localities of Contra Costa goldfields do not have management plans, monitoring programs, or adequate funding to ensure that these localities are sustainable in perpetuity. Lack of management, monitoring, and funding are not, in themselves, threats to

Contra Costa goldfields; however, without these components, the potential threats described above may not be identified and eliminated.
The CNDDB currently lists 23 extant occurrences; 5 on Federal lands, 14 on private lands, and 4 with unknown ownership (CNDDB 2013a). Other than habitat preservation, other criteria discussed within the recovery plan (Service 2005e) for the species have not been met, and in some instances, not initiated, including research, monitoring, management, and public participation and outreach. Contra Costa goldfields continues to be faced with threats of habitat loss due to urbanization, agriculture practices, invasive weeds, and intensive cattle grazing.

Recovery Objectives
The overall goals for endangered species in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005e), which includes Contra Costa goldfields, are to achieve and protect in perpetuity self-sustaining populations throughout the full ecological, geographical, and genetic range by ameliorating or eliminating the threats that caused the species to be listed, and to delist the endangered species outlined in the plan.

Interim Goals of the Recovery Plan
1. Stabilize and protect populations so further decline in species status and range are prevented.
2. Conduct research necessary to refine reclassification and recovery criteria.
3. Reclassify to threatened (downlist) those taxa currently federally listed as endangered. Reclassification will be appropriate when each taxon is no longer in danger of extinction throughout a significant portion of its range. Because data upon which to base decisions about reclassification and recovery are mostly lacking, downlisting and recovery criteria in the recovery plan are necessarily preliminary and may be revised as necessary data are obtained.

Overall Objectives of the Recovery Plan
1. Ameliorate or eliminate the threats that caused the species to be listed as endangered (as discussed in the status of the species section) and ameliorate any other newly identified threats to conserve and allow delisting of the species.
2. Promote natural ecosystem processes and functions by protecting and conserving intact vernal pools and vernal pool complexes within the recovery planning area to maintain viable populations of listed species and species of concern, and prevent additional threats from emerging over time. By doing so, other vernal pool species that may be considered common today, and additional species that have not yet been identified or described, will be adequately conserved so that they will not need the protection of the Endangered Species Act.

Downlisting Criteria for Contra Costa Goldfields
The suitable percentage of habitat to be protected in Table 3 includes both occupied and suitable habitat. Suitable habitat that is not currently known to be occupied must be protected to provide for corridors and dispersal habitat, support metapopulation dynamics, provide for

reintroduction/introduction sites, and to protect currently undiscovered populations.
To prevent the decline of Contra Costa goldfields due to loss of pollinators, research is needed to determine whether the species is insect-pollinated. If insects are found to be important to pollination and therefore to seed production, their habitat must be protected in each core area to contribute to the recovery of the species.

The recovery priority number for Contra Costa goldfields is 5C (based on a 1 to 18 ranking system where 1 is the highest recovery priority and 18 is the lowest). This number indicates that Contra Costa goldfields is a species facing a high degree of threat and has a low potential for recovery. The "C" indicates that the species faces conflict with development projects or other ground-disturbing activities.

Table 3. Suitable percentage of habitat to be protected for Contra Costa goldfields.

Percent occurrences to protect	**Suitable percentage of habitat to be protected**		**Collection sources for seed banking**
90	**Central Coast**		Each vernal pool region
	Fort Ord	85	
	SE San Francisco Bay	85	
	Lake-Napa		
	Berryessa	95	
	Napa River	85	
	Solano-Colusa		
	Jepson Prairie	95	
	Suisun Marsh	85	
	Rodeo Creek	85	

Monterey Gilia
Monterey gilia was listed as a federally endangered subspecies on June 22, 1992 (Service 1992). Critical habitat has not been designated for this subspecies. Information contained in this account was obtained primarily from the Monterey gilia (*Gilia tenuiflora* ssp. *arenaria*) 5-Year Review: Summary and Evaluation (Service 2008c).

Monterey gilia is an annual herbaceous plant in the phlox family (Polemoniaceae), endemic to the Monterey Bay and Peninsula dune complexes. Individual plants are less than 7 inches tall, with a basal rosette of leaves and white and purple funnel-shaped flowers. Fifteen known natural occurrences are distributed in discontinuous populations from Spanish Bay on the Monterey Peninsula north to Moss Landing. Monterey gilia is typically associated with sandy soils of dune scrub, coastal sage scrub, and maritime chaparral vegetation types in the coastal dunes of Monterey County, California. The species is thought to be primarily self-pollinating based on its stamens not protruding from the flower, no observations of pollinators, and very viable seed (Service 1998a).

There are likely 24 currently extant occurrences of Monterey gilia; 7 occurrences were known at the time the subspecies was listed. Since listing, 11 additional inland occurrences of Monterey gilia have been located, 12 coastal occurrences have been located, and 5 occurrences have likely been extirpated. One occurrence was extirpated prior to listing. Although these inland occurrences may constitute a range extension from what was known at the time of listing, the overall range of the taxon is still limited. It is unclear as to where the range of the subspecies *Gilia tenuiflora* ssp. *arenaria* ends and the range of *Gilia tenuiflora* ssp. *tenuiflora* begins. There is an additional possibility that some cross-breeding is occurring on the boundary between these subspecies. Genetic analyses should be undertaken to confirm the range extents within this species.

The primary threats to Monterey gilia are habitat destruction due to development and an increase in cover by invasive, nonnative plant species (which inhibits its ability to germinate and colonize). The interior sites are generally more at risk than coastal populations. The coastal populations of Monterey gilia on State Park lands are relatively more protected than interior sites at this time, although nonnative plant control is required at virtually all sites and repeated out-plantings have been necessary to maintain numbers and expand population areas. Because invasive species are a concern throughout the Monterey Bay region, it is likely that they pose a threat to Monterey gilia on private parcels in this area as well; however, little information is available regarding the status of occurrences on private lands along the coast.

The status of Monterey gilia since the time of listing has likely improved at some sites by virtue of current or planned management for conservation. Along the coast, acquisition of one private parcel by Big Sur Land Trust and management activities within the State Park units have been a benefit to the long-term conservation of the taxon. At inland sites, the current and future transfer of lands from former Fort Ord to the University of California and BLM will also potentially benefit the long-term conservation of the taxon; however, planned losses of habitat along the western edge of former Fort Ord via land transfers to local agencies for development, and likely future development of other private lands along the coast, will likely result in direct losses of populations, secondary impacts to a portion of the remaining populations, and increased fragmentation of remaining habitat (particularly between the coastal and inland populations). For all remaining populations, both coastal and inland, threats due to invasive species will persist and will likely require management in perpetuity (Bossard et al. 2000).

Recovery Objectives

The immediate objective of the Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan (Service 1998a) is to minimize the threats to the species and the habitats upon which they depend. The plan's primary objective is to delist taxa covered by the plan in a minimum of 20 years. This recovery plan includes recovery criteria for both Monterey gilia and Monterey spineflower.

Monterey gilia can be considered for delisting when habitat throughout its range in the Monterey Bay Dunes from Moss Landing to about Sand City, and from dunes in and near Asilomar State

Park on the Monterey Peninsula, is protected from encroachment of non-native species, recreational activity (including off-road vehicles and horses), and development; restored to native vegetation at proper densities to allow natural colonization; monitored sufficiently to assure that local threats are spotted promptly; and has enough plants at enough locations within the protected vegetation to reasonably assure the viability of the species. Specific numbers at each location can be found in the recovery plan for the species.

The recovery priority number for Monterey gilia is 9. This number indicates that Monterey gilia is a subspecies that faces a moderate degree of threat and has a high potential for recovery.

Monterey Spineflower

The Monterey spineflower was listed as a federally threatened subspecies on February 4, 1994 (Service 1994), and 11,055 acres of critical habitat was designated on January 9, 2008 (Service 2008d). Information contained in this account was obtained primarily from the Monterey Spineflower (*Chorizanthe pungens* var. *pungens*) 5-Year Review (Service 2009b).

Monterey spineflower is a prostrate annual species in the buckwheat family (Polygonaceae). It has long, somewhat wiry branching stems supporting aggregates of small white to pinkish flowers. Seeds typically germinate after the onset of winter rains and plants can be found above ground as early as December (Fox et al. 2006). Flowering occurs from late March to June, depending on weather patterns, and seed is dispersed in mid-summer.

At the time of listing, Monterey spineflower in the Monterey Bay area was known from scattered populations along the immediate coast, in the Prunedale Hills at Manzanita Park, in the coastal and inland areas of former Fort Ord, and from historical collections described as east of Watsonville and near Mission Soledad in the Salinas Valley. Since its listing, additional populations of Monterey spineflower have been discovered in the Prunedale Hills of Monterey County and interior areas of Santa Cruz County.

Monterey spineflower is currently known to be extant in southern Santa Cruz and northern Monterey Counties. The distribution of Monterey spineflower extends from Santa Cruz County south along the Monterey Bay to the Monterey Peninsula. Two historical collections were made farther south, in southern Monterey County in 1935 and in northern San Luis Obispo County in 1842. The CNDDB lists 29 extant occurrences of Monterey spineflower in this range (CNDDB 2013b). Populations also occur inland in Monterey County in the Prunedale Hills and at former Fort Ord. One population has also been located in the Soledad area of the Salinas Valley (Reveal and Hardham 1989, CNDDB 2013b).

As an annual species, Monterey spineflower responds strongly to annual precipitation patterns and amounts, resulting in large fluctuations in the population of plants visible above-ground from year to year. Many populations support large numbers of individuals (thousands or tens of thousands of plants) scattered in openings among the dominant perennial vegetation (CNDDB 2013b).

Researchers recently investigated the phylogenetic relationships of various members of the genus *Chorizanthe*, subsection *Pungentes*, including Monterey spineflower (Brinegar 2006, Baron and Brinegar 2007, Brinegar and Baron 2008). Results from the first phase of the molecular study, using ribosomal DNA internal transcribed spacer (ITS) sequencing, indicate that Monterey spineflower and robust spineflower appear to be more closely related to one another than to the other subspecific taxa in the *C. pungens* and *C. robusta* complex. In a second phase of analysis, researchers sequenced chloroplast DNA to determine if it was possible to further differentiate Monterey spineflower from robust spineflower based on these genetic techniques. Results indicated that: (1) there is a general agreement between the results of the ITS sequencing and the DNA phylogenies for the *C. pungens/C. robusta* complex, while results for the other *Pungentes* taxa are often inconsistent with their position in the ITS-based phylogeny; (2) there is a general biogeographical pattern to this phylogeny with regard to the *C. pungens/C. robusta* complex; and (3) there is genetic diversity between populations of Monterey spineflower. While the researchers suggest that a taxonomic revision of the *Pungentes* complex may be in order, no changes are being proposed at this time (S. Baron, botanic consultant, in litt. 2008).

Monterey spineflower readily grows where suitable sandy substrates occur and, like other *Chorizanthe* species, where competition with other plant species is minimal (Harding Lawson Associates 2000; Reveal 2001). Studies of the soil requirements and shade tolerances of a related taxon, Scotts Valley spineflower (*Chorizanthe pungens* var. *hartwegiana*), concluded that this taxon is restricted to openings in sandy soils primarily due to its intolerance of shade produced by competing vegetation, rather than its restriction to the specific soil type (McGraw and Levin 1998).

Where Monterey spineflower occurs within native plant communities, along the coast as well as at more interior sites, it occupies microhabitats found between shrubs where there is little cover from other herbaceous species. In coastal dune scrub, shifts in habitat composition caused by patterns of dune mobilization that create openings suitable for Monterey spineflower are followed by stabilization and successional trends that result in increased vegetation cover over time (Barbour and Johnson 1988). Accordingly, over time there are shifts in the distribution and size of individual colonies of Monterey spineflower found in the gaps between shrub vegetation.

Human-caused disturbances, such as scraping of roads and firebreaks, can reduce the competition from other herbaceous species and consequently provide favorable conditions for Monterey spineflower, as long as competition from other plant species remains minimal. This has been observed at former Fort Ord, where Monterey spineflower occurs along the margins of dirt roads and trails and where it has colonized disturbances created by military training (Corps 1992, BLM 2003). However, such activities also promote the spread and establishment of nonnative species, can bury the seedbank of Monterey spineflower, and do not result in the cycling of nutrients and soil microbial changes that are associated with some large-scale natural disturbances, such as fires (Stylinski and Allen 1999, Keeley and Keeley 1989).

The primary threats to the Monterey spineflower identified at the time of listing were development for human uses, recreation, and encroachment of invasive nonnative species into its habitat. While these are still occurring and diminishing occurrences of Monterey spineflower, other lands that support this taxon have been purchased by conservation-oriented organizations and are preserved (e.g., Long Valley in the Prunedale Hills) or have the potential for long-term preservation (e.g., Caltrans lands). Within its range, numerous occurrences are on lands being restored or enhanced (e.g., State Beaches, Naval Post-Graduate School) or are planned for restoration and enhancement (e.g., former Fort Ord). A primary component of these programs is the removal of nonnative invasive species that compete with Monterey spineflower. Monterey spineflower appears able to recolonize sites where nonnative species have been removed (Service 2009b).

Recovery Objectives

The Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan (Service 1998a) outlines recovery criteria for Monterey spineflower. Monterey spineflower can be considered for delisting when the following criteria have been met:

1. the Fort Ord disposal and reuse process has led the management agencies to develop, fund, and implement permanent protection plans for the species' habitat including permanent iceplant suppression programs; and
2. beach-dune occurrences on State Park and private lands throughout its current range from Santa Cruz to the Monterey Peninsula are covered under a permanent protection plan. Plans to conserve roughly 60 percent of Fort Ord appear sufficient for recovery of the interior occurrence. A reassessment would be made should plans call for conservation of less habitat. Existing management along the coast at the State Parks units needs to be supplemented with protection and management on private lands (management to be determined after a thorough analysis of the beach populations).

The recovery priority number for Monterey spineflower is 15. This number indicates that Monterey spineflower is a subspecies facing a low degree of threat and has a high potential for recovery.

Monterey Spineflower Critical Habitat

Critical habitat for Monterey spineflower was designated in a revised rule on January 9, 2008, on a total of 11,055 acres within 9 critical habitat units in Santa Cruz and Monterey Counties, California (Service 2008d).

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12, in determining which areas to designate as critical habitat within the geographical area occupied by the species at the time of listing, we considered the physical and biological features that are essential to the conservation of the species to be the primary constituent elements laid out in the appropriate quantity and spatial arrangement for conservation of the species. These include, but are not limited to: space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter;

sites for breeding, reproduction, or rearing (or development) of offspring; and habitats that are protected from disturbance or are representative of the historic, geographical, and ecological distributions of a species.

The primary constituent element of critical habitat for Monterey spineflower is a vegetation structure arranged in a mosaic with openings between the dominant elements (e.g., scrub, shrub, oak trees, or clumps of herbaceous vegetation) that changes in spatial position as a result of physical processes such as windblown sands and fire and that allows sunlight to reach the surface of the following sandy soils: coastal beaches, dune land, Baywood sand, Ben Lomond sandy loam, Elder sandy loam, Oceano loamy sand, Arnold loamy sand, Santa Ynez fine sandy loam, Arnold-Santa Ynez complex, Metz complex, and Metz loamy sand (Service 2008d).

Smith's Blue Butterfly

The Smith's blue butterfly was listed as endangered by the Service on June 1, 1976. A recovery plan was published in 1984 (Service 1984). Critical habitat has not been designated. Detailed information regarding the biology of the Smith's blue butterfly can be found in Arnold (1978, 1980, 1983), Mattoni (1954, 1977), and Langston (1975).

The Smith's blue butterfly is dependent upon its host plant species, coast buckwheat and seacliff buckwheat (*Eriogonum latifolium* and *E. parvifolium*), during all life stages, except that adults may also feed on nectar from naked buckwheat (*E. nudum*). Smith's blue butterflies co-occur with coast and seacliff buckwheat plants that grow in coastal dune, cliffside chaparral, coastal scrub, and coastal grassland communities from the mouth of the Salinas River in Monterey County to San Carpoforo Creek in northern San Luis Obispo County. Smith's blue butterflies are notably absent from the Monterey Peninsula, although, historically, they have been observed just to the north at the Naval Postgraduate School and the south at Point Lobos State Reserve. Long-term monitoring has not occurred for any population of the Smith's blue butterfly. Most of our knowledge of the distribution of the Smith's blue butterfly is the result of singular observations made in the past 30 years. Therefore, the number, size, and persistence of colonies throughout the range of the subspecies are poorly understood.

Synchronous with peak flowering of its buckwheat hosts, adult Smith's blue butterflies emerge from their pupal cases for a single flight season extending from mid-June to early September. Individual adults live for about 1 week, during which time they locate mates, court, and copulate. Females oviposit singly in individual flower heads. Larvae hatch 4 to 8 days after oviposition and feed on buckwheat flowers as they grow and molt through five instars. Between mid-August and early September, larvae pupate. The location where pupation occurs has not been adequately documented. Researchers have surmised that pupation occurs in the heads of flowers, adjacent to leaf or stem axils, in the duff, or several inches below the soil surface (Arnold 1980, Shields 1975). Larvae overwinter as pupae and emerge as adults the following flight season.

Like many other lycaenid butterflies, Smith's blue butterfly larvae are tended by ants during the third through fifth instars. The larvae produce a sugary secretion upon which the ants feed. In

return, the ants are presumed to provide the larvae with protection from predation or parasitism. The importance of such ant associations to the Smith's blue butterfly is currently unknown.

Vegetation within the range of the Smith's blue butterfly is very dynamic, especially where stands of seacliff buckwheat occur. Seacliff buckwheat seedlings depend upon disturbances such as landslides and other erosional features for the development of site conditions favorable for germination and establishment. Landslides and mass wasting are common along the Monterey County coast and provide the disturbances required by seacliff buckwheat; conversely, these geologic activities can also destroy existing stands of seacliff buckwheat. The Smith's blue butterfly may benefit from some human disturbances when they mimic natural processes. The quality of habitat likely changes over relatively brief periods due to natural successional processes and, increasingly, due to the invasion of non-native plants. Over time, especially when disturbances are rare, stands of seacliff buckwheat are likely to be displaced by larger native shrubs on all but the harshest sites.

The role of dynamic processes in creating and maintaining habitat for the Smith's blue butterfly is poorly understood. Most likely, Smith's blue butterflies abandon areas where seacliff buckwheat is replaced by other vegetation. Adults would be expected to disperse and colonize new areas that contain adequate patches of host buckwheat plants. Arnold (1991) found that the density and age class distribution of seacliff buckwheat and coast buckwheat appear to be important determinants for the establishment and persistence of Smith's blue butterfly populations in some locations. Adult Smith's blue butterflies are neither strong nor active fliers; therefore, colonies may become isolated if suitable habitat is not available nearby for dispersal and colonization.

The decline of the Smith's blue butterfly is attributed to degradation and loss of habitat as a result of urban development, recreational activities in dune habitats, sand mining, military activities, fire suppression in chaparral habitat, and encroachment of exotic plant species. Invasive, disturbance-oriented invader species such as kikuyu grass (*Pennisetum clandestinum*), pampas grass, Cape ivy (*Delairea odorata*), and French broom are found on sites otherwise suitable for seacliff buckwheat and the Smith's blue butterfly. In sand dunes along Monterey Bay, non-native iceplant has covered hundreds of acres of formerly suitable habitat for the Smith's blue butterfly. The low vagility of adults, coupled with fragmentation of suitable habitat, reduce the probabilities of colonization events and migratory exchange between populations. Due to the lack of long-term monitoring, the status of the Smith's blue butterfly must be assessed largely based on the status of habitat for the subspecies.

In the northern portion of their range, Smith's blue butterflies currently occur at the Salinas River National Wildlife Refuge, in the Marina area (including Marina State Beach), on Fort Ord, and in Sand City (Service 2006d). In the southern portion of their range, Smith's blue butterflies currently occur in Carmel Valley (including occupied sites at Garland Ranch Regional Park, the Santa Lucia Preserve, and Palo Corona Regional Park) (Service 2006d) and along the Big Sur coast, including at least 69 sites between Cooper Point (in Monterey County near the border of

Andrew Molera and Pfeiffer Big Sur State Parks) and San Carpoforo Creek (in northern coastal San Luis Obispo County) (Arnold 2002).

Several colonies of Smith's blue butterflies and some potential habitat are currently protected from at least some of the threats that led to listing. For example, large amounts of land that have supported known colonies of the Smith's blue butterfly are owned and managed by resource agencies. Along the Monterey Bay, these areas include the Salinas River National Wildlife Refuge, Monterey State Beach, Marina State Beach, and the coastal portion of the former Fort Ord. Further south, several occupied localities and at least 574 acres of habitat (Norman 1994, 1999; J. Norman, in litt. 2000; Service 2003c) have been confirmed on the Los Padres National Forest.

However, threats to the Smith's blue butterfly still exist, even at many of the sites that are protected from development pressures. Much of the subspecies' habitat has been invaded and, in some cases, overtaken by invasive plants. At least 70 non-native plant species introduced during the past 200 years threaten habitat for the Smith's blue butterfly in both protected and unprotected areas throughout the subspecies' range.

Urban development, recreational activities, and other activities continue to result in habitat loss and degradation. Urban development, introduction of invasive plant species, and recreational use have fragmented and continue to fragment habitat for the Smith's blue butterfly. This fragmentation has several ramifications for the Smith's blue butterfly. The quality of the remaining suitable habitat is reduced, the distance dispersing adults must travel to reach the next island of suitable habitat is increased, the entire metapopulation structure is potentially disrupted, and genetic diversity is reduced. Overall, groups of Smith's blue butterflies occupying smaller, more isolated stands of suitable habitat are more likely to be extirpated by stochastic or anthropogenic factors.

Recovery Objectives

The Smith's blue butterfly recovery plan was published in 1984 and is outdated. The recovery objectives in the plan focus on protection of those localities that were known when the plan was published; however, due to changes in our knowledge of the subspecies' range and the threats that it faces, the objectives are largely obsolete. The range is larger and shifted to the south, relative to what was understood in 1984, and several of the locations identified for protection in the recovery plan do not have suitable habitat or are outside the currently accepted range (Service 2003c). Of the 18 locations identified for protection in the recovery plan (Service 1984), 3 are north of the currently accepted range (Service 1986) and 1 was likely misidentified, as it is at a higher elevation than any other occupied location and has no suitable habitat (Service 2003c).

The general recovery needs of the Smith's blue butterfly include conserving and managing existing habitat, maintaining and improving connectivity between areas of habitat, and increasing the amount of occupied habitat through restoration efforts. The Smith's blue butterfly is found in

two disjunct areas and conservation of the subspecies in both will be necessary for recovery. The recovery priority number for Smith's blue butterfly is 9C. This number indicates that the Smith's blue butterfly is a subspecies facing a moderate degree of threats and has a high potential for recovery. The "C" indicates that conflict between recovery of the subspecies and development projects may occur.

Yadon's Piperia

Yadon's piperia was listed as a federally endangered species on August 12, 1998 (Service 1998b), and 2,117 acres of critical habitat was designated for the species on October 24, 2007 (Service 2007c). Information contained in this account was obtained primarily from the *Piperia yadonii* (Yadon's Piperia) 5-Year Review (Service 2009c).

Yadon's piperia is a slender perennial herb in the orchid family (Orchidaceae). As in other orchids, germination of Yadon's piperia seeds probably involves a symbiotic relationship with a fungus. Following germination, orchid seedlings typically grow below ground for one to several years before producing their first basal leaves. Plants may produce only vegetative growth for several years, before producing flowers. In mature plants of Yadon's piperia, the basal leaves typically emerge sometime after fall or winter rains and wither by May or June, when the plant produces a single flowering stem. The blooming season of Yadon's piperia is fairly short; the first flowers are dependent on age and/or tuber size and will open in late June with blooming completed by early August and fruits maturing from August to early October. The plant is dormant until the winter rains stimulate root and leaf bud development. Pollinators include nocturnal moths, bumblebees, and infrequent midges and mosquitoes (Doak and Graff 2001).

Yadon's piperia has been found in two primary habitat types: Monterey pine forest with an herbaceous, sparse understory; and ridges in maritime chaparral growing beneath dwarfed Hooker's manzanita (*Arctostaphylos hookeri*) shrubs in shallow soils (Morgan and Ackerman 1990, Allen 1996, Doak and Graff 2001). In the Monterey pine forest habitat, the species grows through pine needle duff among sparse herbaceous vegetation. Yadon's piperia grows in filtered sun on soils (sandy, podzolic, or decomposed granite when associated with Monterey pine and manzanitas) with a shallow clay hard pan that becomes very dry during the flowering season. Overall, this species favors a well-drained sandy soil substrate with podzolic conditions; areas that retain moisture during the rainy season but are not subject to inundation (V. Yadon, Pacific Grove Museum of Natural History, in litt. 1997). In some Monterey pine forest locations, Yadon's piperia plants occur among dense stands of the nonnative annual quaking grass (*Briza maxima*) (Doak and Graff 2001). In maritime chaparral habitat in northern Monterey County, plants grow on sandstone ridges where soils are shallow. They are commonly found under the edges of prostrate mats of Hooker's manzanita. Yadon's piperia can occur in some locations where disturbance has occurred in the past 10 to 15 years and continue to be affected by limited recreation, development, and landscaping, such as abandoned dirt roads or cut slopes created by road construction (Allen 1996). Like other orchid species, Yadon's piperia does not appear to be an early successional species, but is able to colonize trails and road banks within dwarf maritime

chaparral or Monterey pine forest after a decade or more has passed and if light and moisture regimes are favorable (Allen 1996; Yadon, in litt. 1997).

The center of distribution for Yadon's piperia is the Monterey Peninsula where plants are found throughout the larger undeveloped tracts of Monterey pine forest. To the north, the range of Yadon's piperia extends to the Los Lomas area, near the border of Santa Cruz County (Allen 1996; Yadon, in litt. 1997). Since preparation of the listing rule, Yadon's piperia has been found at one location south of the Monterey Peninsula near Palo Colorado Canyon in maritime chaparral (Norman, in litt. 1995). Yadon's piperia has been found only 4 to 6 miles inland (Allen 1996; Yadon, in litt. 1997) despite searches of lands farther east (Allen 1996). The final recovery plan lists five geographic areas important for recovery of the species: Monterey Peninsula, the interior of Monterey Peninsula, north County/Elkhorn/Prunedale, Point Lobos, and Palo Colorado Canyon.

The Pebble Beach Company funded intensive surveys for Yadon's piperia, focusing on the Monterey Peninsula in 1995 and beyond the Peninsula in western Monterey County in 1996. Yadon's piperia plants have been counted at known sites, approximately 346 acres, throughout the range of this species since 1990 (Morgan, in litt. 1992; Uribe and Associates 1993; Norman, in litt. 1995; Allen 1996; Jones and Stokes 1996). During the 1995 surveys, the greatest concentrations of Yadon's piperia, approximately 57,000 plants, or 67 percent of all known plants, were found scattered throughout much of the remaining Monterey pine forest owned by the Pebble Beach Company and the Del Monte Forest Foundation on the Monterey Peninsula (Allen 1996). About 8,500 of these plants were in designated open space areas (Allen 1996). Another 2,000 plants, 2 percent of all known, occurred on remnant patches of Monterey pine forest in parks and open space areas of Pacific Grove and Monterey (Allen 1996; Jones and Stokes 1996). During a 2004 follow-up survey in known occupied habitat, 129,652 plants, a 240 percent increase from the previous surveys, were identified on lands owned by Pebble Beach Company (Zander Associates 2004).

East of the Monterey Peninsula, individuals were identified on or near the Monterey Peninsula Airport, but the population appears to have been greatly reduced in certain areas of the airport (B. Leitner, Environmental Science Associates, in litt. 2001; CNDDB 2013c). More than 2,350 plants have been identified at the Naval Postgraduate School/Navy Golf Course in Monterey where they continue to be discovered and are expanding due to management efforts (Greening Associates 1999). At the former Fort Ord site, Yadon's piperia was only known to occur in the extreme northern and southern boundaries until surveys conducted in 2009 identified at least 340 flowering Yadon's piperia in 118 locations on approximately 47 acres (Service 2009c, Army 2011). The remaining populations occur on properties owned by the Pebble Beach Company, Del Monte Forest Foundation, U.S. Department of Defense, County of Monterey, City of Carmel, Monterey Peninsula Regional Park District, and an undetermined number of other private landowners (Jones and Stokes 1996). The largest populations occur on property owned and managed by the Pebble Beach Company (Jones and Stokes 1996). Several of the privately-owned populations continue to be threatened by development. Although some of the populations

are protected from development, threats to their long-term survival include nonnative species and recreational activities.

Inland to the north of the Monterey Peninsula, about 18,000 Yadon's piperia plants, or 21 percent of all known plants, have been found on the chaparral-covered ridges north of Prunedale (Allen 1996). South of the Peninsula, about 7,500 plants have been found on State Parks properties at Point Lobos Ranch (Big Sur Land Trust, in litt. 1997) and in a smaller parcel that is in private ownership. Considering the current abundance of Yadon's piperia in the remaining large tracts of Monterey Forest, this species probably occurred throughout the Peninsula when Monterey pine forests were much more extensive before urbanization.

South of Carmel Highlands, near Palo Colorado Canyon, 38 plants were observed in 1995. Plants were identified but not quantified on a return visit to the site in 2004. This site, in private ownership, was noted to be high quality chaparral with a unique assemblage of species (CNDDB 2013c).

At the time of listing in 1994, habitat fragmentation and development were named as threats to Yadon's piperia. Much of the habitat fragmentation occurred in the past and the resulting effects are still a threat. The potential for further fragmentation of the remaining populations continues to be a threat to the species. Other threats to habitat for Yadon's piperia at the time of listing, and that continue, include competition from nonnative plants, mowing of vacant properties, roadside maintenance, and a fire directive allowing mowing within 6 to 8 inches of the ground surface of habitat along roadways in the Pebble Beach area (Yadon, in litt. 2002, M.R. Stromberg, U.C. Hastings Reserve, in litt. 2002). The potential loss of viable habitat due to changes in vegetative structure within sites following fire suppression (Graff 2006) and loss of plants from potential improvement projects at the Monterey Peninsula Airport may also threaten the species. Large portions of the existing population at the airport may be lost from proposed future projects. Since the time of listing, the threat of development and habitat fragmentation has been reduced somewhat; in particular, some of the densest populations of Yadon's piperia on Monterey Peninsula have been set aside in designated Open Space areas by Pebble Beach Company and will likely not be developed in the future. In addition, according to the 5-year review, there are plans to acquire populations of Yadon's piperia in the near future for conservation and they will receive an additional level of protection through implementation of management plans. Since the time of listing, extensive surveys have detected an expanded known range, additional populations, and higher numbers of individuals; however, a number of factors have been shown to reduce the reproductive potential of the species. Recent research has shown high rates of herbivory have significantly affected the populations of Yadon's piperia over time by reducing the ability of individual plants to survive and reproduce (Doak and Graff 2001). Research has also elucidated the importance of pollinators to achieving viable seed set, which is also crucial for long-term persistence (Doak and Graff 2001). Therefore, although the known range is larger and the number of populations and individuals now known is higher than at the time of listing, threats including herbivory, disease, and low rates of seed set may be decreasing the long-term persistence of the species.

Recovery Objectives

The current recovery objective for Yadon's piperia is reclassification to threatened status. Further loss of existing plants and the species' habitat should be avoided, and threats to its survival should be eliminated. Recovery criteria will be revised and delisting criteria will be developed after management is underway and specific data become available relating to population size and viability, habitat requirements, and fragmentation effects (Service 2004b).

Downlisting Criteria for Yadon's Piperia

Downlisting for Yadon's piperia can be considered when all of the following criteria have been achieved (summarized from the recovery plan (Service 2004b)):

1. Secure and protect areas throughout the present range of Yadon's piperia that contain populations of sufficient size to ensure the long-term survival and recovery of the species.
2. Protected areas are adequately maintained, such that encroachment by nonnative plants, excessive herbivory (from deer and rabbits), edge effects from road maintenance, fuel modification activities, or other threats do not directly or indirectly adversely affect Yadon's piperia and its habitat.
3. Results of monitoring activities have determined that the protected populations of Yadon's piperia are of adequate size to be self-sustaining and to ensure their long-term persistence. Because this species is a perennial that exhibits dormancy, spending an undetermined period underground between seed germination and emergence of first leaf aboveground, it is likely that a minimum of 10 to 15 years of monitoring will be needed in order to define a population trend.

The recovery priority number for Yadon's piperia is 2C. This number indicates that the taxon is a species that faces a high degree of threat and has a high potential for recovery. The "C" indicates conflict with construction or other development projects or other forms of economic activity.

ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) define the action area being addressed in a consultation as the area that may be directly or indirectly affected by the proposed action and not merely the immediate area involved in the action (50 CFR 402.02). For this biological opinion, the action area is defined as all lands on former Fort Ord and/or under the purview of the Army that would be affected by the Army's cleanup and transfer actions, as described in the description of the proposed action.

The Army has been conducting cleanup actions at former Fort Ord since 1989. These actions have resulted in the excavation of over 12 million anomalies while searching for unexploded ordnances; installation of more than 437 groundwater monitoring, extraction and injection wells; construction of more than 10 miles of groundwater treatment pipeline, and; excavation of approximately 2 million cubic yards of contaminated soil. Potential impacts to HMP species and their habitat as a result of future Army actions are described below and in Table 1.

The range of topographic, climatic, and soil conditions at the former Fort Ord have resulted in unique biological communities including diverse flora and many locally endemic species. Coastal fog affects the gently rolling hills of the near-shore communities while the inland areas, sheltered by steeper hills, are hotter and drier. Much of Fort Ord is underlain by sand deposits of Pleistocene origin. The southeastern portion is dominated by clay pan soils on Paso Robles sandstone. Several of Fort Ord's unique biological communities are associated with these substrates.

More than 450 plant taxa occur at Fort Ord in four significant habitat types: central maritime chaparral, coastal oak woodland, wetland and vernal ponds, and mixed species grasslands. Ten species of plants known from Fort Ord are endemic to northern coastal Monterey County and adjacent coastal Santa Cruz County, mostly in maritime chaparral and vernal pond habitats. Diverse habitat conditions at Fort Ord support a broad array of wildlife species. Wildlife surveys have identified over 260 vertebrate species on Fort Ord. Several of these species are adapted to specific conditions on the California coast and are endemic to the area (Army and Shaw 2009).

California Tiger Salamander Survey History

California tiger salamanders occur in many of the ponds and vernal pools on former Fort Ord. While most of the vernal pools on former Fort Ord are located adjacent to grassland and oak savannah habitats, many of the pools and ponds are surrounded by maritime chaparral, or coastal scrub habitat (Appendix M). Adult salamanders have occasionally been found on Fort Ord in cool, damp areas within man-made structures such as a tool shed and a utility box.

Wetland wildlife surveys were conducted for salamanders and other aquatic fauna in April 1992 as part of the Fort Ord flora and fauna baseline study. Surveys resulted in the identification of California tiger salamander larvae at 8 of the 26 surveyed locations.

Additional wetland surveys have been conducted in vernal pools and ponds in support of the Army's munitions response actions. Results of these surveys are described in annual habitat monitoring reports provided to the Service since 1994. Results of wetland surveys since the initial baseline study have found California tiger salamander larvae present in two additional vernal pools (Pool 5 in 1995 and Pool 42 in 2000) where larvae were not found during the 1992 baseline surveys. California tiger salamander larvae were found in Pool 5 during a munitions response baseline survey. California tiger salamander larvae were also found in Pool 42 following the completion of a prescribed burn and a munitions response action.

In 2003, students and faculty from the University of California Davis surveyed for California tiger salamanders in 14 locations on BLM Public Lands at former Fort Ord. Machine Gun Flats, Lower Machine Gun Flats, and Pool 36 (Appendix N), were estimated to contain 318, 324, and 156 California tiger salamander larvae, respectively (BLM 2003).

A total of 27 locations on approximately 56 acres of former Fort Ord are known California tiger salamander breeding sites (Appendix N). Of the locations known to support California tiger

salamander populations, 10 of these areas may represent a "metapopulation" in the Hennekens Ranch Road area (Pools 5, 42, 56, 57, 58, 59, 60; Machine Gun Flats, 101 East and 101 West). A metapopulation is a set of local populations or breeding sites within an area, where migration from one local population or breeding site to other areas containing suitable habitat is possible, but not routine.

The Service published an interim California tiger salamander survey protocol in the fall of 2003 (Service 2003d). The protocol requires two years of larval surveys and an upland drift fence survey to be conducted between the two larval surveys before absence can be determined; therefore, California tiger salamander presence is assumed in all potentially suitable habitats on Army owned lands unless absence has been ascertained using this protocol. The total acreage of occupied California tiger salamander habitat is 56 acres (Appendix N).

As discussed in the status of the species, a recovery plan has not been prepared for the California tiger salamander; however, the Service believes that protection and recovery of the species will require reduction of the threats from: destruction, fragmentation, and degradation of wetland and associated upland habitats due to urban development; conversion of habitat to intensive agriculture; predation by nonnative species; disease; contaminants; rodent and mosquito control; road-crossing mortality; hybridization with nonnative tiger salamanders; some livestock grazing practices; and pesticide drift (Service 2004a).

Annual biological monitoring reports issued by the Army include reports of surveys and implementation of minimization measures. Table 4 outlines California tiger salamander encounters, circumstances of the encounters, and actions taken, between 2006 and 2013 (Army 2007b, 2015; Shaw 2008b, 2010, 2011, 2012; Denise Duffy and Associates 2013, 2014).

Table 4. California tiger salamander encounters during Army cleanup activities 2006-2014. (We do not have California tiger salamander encounter data pre-2006 as the species was listed in 2004 and the Army reinitiated formal consultation that resulted in a biological opinion issued by the Service in 2005).

Year	Number encountered/ life stage	Circumstances	Action taken
2014	1 juvenile	Found alive and uninjured during erosion control activities	relocated
2013	1 adult	Found alive and uninjured inside a building	relocated
	1 adult male	Found during erosion control activities	relocated

2012	1 adult	Found alive and uninjured in a stockpile during excavation	relocated
2011	1 juvenile	Found alive and uninjured in a soil stockpile during excavation	relocated
	2 adults	Found alive and uninjured in excavation area	relocated
	1 juvenile	Found alive and uninjured during a sweep for unexploded ordnance of a soil stockpile following truck transport from an excavation area	relocated
2010	1 adult	Found alive and uninjured in excavation areas	relocated
2009	none	N/A	N/A
2008	none	N/A	N/A
2007	1 adult	Found alive and uninjured crawling inside of a building after a rain event	relocated
	1 juvenile	Found alive and uninjured under a log during preparation for MEC removal	relocated
2006	3 adults	1 adult was found in a concrete maintenance bay approximately 1.2 miles from the nearest known breeding pond. (No information available on the circumstances for the other 2 adults).	all relocated

Contra Costa Goldfields Habitat Survey History

The first known occurrence of this species in Monterey County was discovered on Fort Ord lands in June 1998. Baseline biological surveys conducted in 1992 found no Contra Costa goldfields populations on Fort Ord. In June 1998, BLM botanist, Bruce Delgado and member of the California Native Plant Society, Vern Yadon, first discovered Contra Costa goldfields in vernal pond areas of Fort Ord. In June and July of 1998, the Army conducted targeted surveys of potential Contra Costa goldfields habitat. A total of four populations of Contra Costa goldfields occupying approximately 5 acres have been identified on former Fort Ord (Appendix O). These populations occur within vernal pool habitats and in Mima mound topography (undulating terrain consisting of small mounds and inter-mound depressions). Two of the four populations are located within munitions response Site 10B and have been monitored by the Army to determine whether impacts to the Contra Costa goldfields populations have occurred as a result of munitions response actions. Another Contra Costa goldfields population occurs on munitions response Site 58, which is located just north of Eucalyptus Road adjacent to BLM Headquarters.

The fourth Contra Costa goldfields population occurs adjacent to Trail 19 that is located on land already transferred to the BLM (Appendix O).

In May 2004, the Army contracted the services of MACTEC Engineering and Consulting, Inc. to conduct a watershed analysis of vernal pools located in the area previously designated by the Service as Contra Costa goldfields critical habitat at the former Fort Ord. The watershed analysis identifies the upland portions of Contra Costa goldfields habitat that contribute to vernal pools' ability to fill or dry. The watershed map was used in conjunction with predisposal project area maps and property transfer maps to determine the amount of Contra Costa goldfields suitable habitat.

There are 1,987 acres containing suitable habitat that could support populations of Contra Costa goldfields occurring in the dry upland habitat portions of the vernal pool watersheds (Appendix O). Approximately 1,931 acres may be affected by munitions response activities. All four populations currently known at the former Fort Ord are located on lands that have been or will be transferred to the BLM's NRMA in vernal pool or wet meadow areas that receive ephemeral drainage. Potential habitat for Contra Costa goldfields occurs in the NRMA in the form of vernal pools, seasonal ponds, wet meadows, and grassy areas with mima mounds. Protection of these populations and potential habitat on the NMRA would contribute to meeting interim and overall objectives of the recovery plan to: stabilize and protect populations; ameliorate or eliminate threats to the species; and promote natural ecosystem processes and functions by protecting and conserving intact vernal pools and vernal pool complexes within the recovery planning area to maintain viable populations of listed species and species of concern, and prevent additional threats from emerging over time.

Monterey Gilia Survey History

The first basewide survey including the Monterey gilia was conducted by Jones and Stokes Associates (Jones and Stokes) in 1992 and 1993 (Jones and Stokes 1992, 1993). The survey provided data on the general distribution and estimated abundance of Monterey gilia on Fort Ord. The report estimates approximately 3,756 acres of Monterey gilia habitat occur on Fort Ord.

The HMP requires surveys to document Monterey gilia abundance and distribution at all sites designated as future habitat reserve land where Army actions may affect the populations. Since the 1992 and 1993 surveys, additional data have been collected on such sites. These data are published in annual biological monitoring reports that are submitted by the Army every year that biological monitoring is conducted anywhere where cleanup actions occurred. More than 860 acres of Monterey gilia has been mapped since 1992 and 1993 with more than 510 acres of Monterey gilia populations identified outside of the Monterey gilia habitat polygons mapped by Jones and Stokes. Monterey gilia distribution is shown in Appendix P.

Human-caused factors that could affect the inland occurrences at former Fort Ord are vegetation management activities that fail to create or maintain the open, sandy conditions necessary for

continued survival and colonization by Monterey gilia. These include the elimination of fire from chaparral communities, poorly timed (e.g., wet season) prescribed fires, the use of pre-fire treatments that result in increases in nonnative species, and the use of mechanical vegetation clearing that leaves the chipped vegetation on the soil surface (Zander Associates 2007).

The largest acreages of Monterey gilia are located within former Fort Ord, primarily within the 8,000-acre impact area. Though the population size is not exactly known, Fort Ord is thought to support 50 to 70 percent of the total range of Monterey gilia. Smaller populations occur nearby within other habitat reserves on Fort Ord, the University of California's Fort Ord Natural Reserve, and in Sand City (Army and Shaw 2009). Post-cleanup restoration and monitoring activities on Fort Ord would contribute to meeting recovery objectives described in the recovery plan to: protect habitat from encroachment of non-native species, recreational activity, and development; restore habitat to native vegetation at proper densities to allow natural colonization; monitor sufficiently to assure that local threats are spotted promptly; and ensure there are enough plants at enough locations within the protected vegetation to reasonably assure the viability of the species.

Monterey Spineflower Survey History

The first basewide biological survey that included Monterey spineflower was first conducted by Jones and Stokes in 1992 (Jones and Stokes 1992). The survey provided data on the general distribution and estimated abundance of Monterey spineflower throughout Fort Ord. A total estimate of 10,456 acres of Monterey spineflower habitat was identified in this report. Significant populations of Monterey spineflower occur on lands of former Fort Ord (Jones and Stokes 1992). Within grassland communities, Monterey spineflower occurs along roadsides, in fuel breaks, and in other disturbed sites; while in oak woodland, chaparral, and scrub communities, they occur in sandy openings between shrubs. In older stands with high shrub cover, the plant is limited to roadsides, fuel breaks, and trails that bisect these communities. At former Fort Ord, the highest densities of Monterey spineflower are located in the inland ranges where moderate disturbance has been the most frequent. This pattern of distribution and density of Monterey spineflower on former Fort Ord indicates that the type of activity conducted by the Army, such as fire and other light to moderate disturbance of Monterey spineflower habitat have created the open conditions that result in high densities of the species. Prior to onset of human use of this area, Monterey spineflower may have been limited primarily to openings created by wildfires within these communities.

Since the 1992 survey, additional data have been collected on all sites where Army remedial actions have been conducted. The HMP requires documenting Monterey spineflower abundance and distribution at all sites designated as future habitat where Army actions may affect the populations. More than 886 acres of Monterey spineflower populations have been identified since the Jones and Stokes surveys were conducted in 1992 with more than 183 acres of Monterey spineflower occurring outside of the Jones and Stokes polygons. These data are submitted in annual biological monitoring reports each year when biological monitoring is

conducted. All Monterey spineflower habitat and locations on former Fort Ord are shown in Appendix Q.

Post-cleanup habitat restoration; monitoring; and transfer to lands designated as habitat reserve, habitat corridor, and development with reserve or restrictions, would contribute to meeting recovery objectives described in the recovery plan to: lead management agencies to develop, fund, and implement permanent protection plans for Monterey spineflower habitat post-transfer, including permanent iceplant suppression programs; and conserve roughly 60 percent of Fort Ord, which may be sufficient for recovery of the interior occurrence of Monterey spineflower. Sixty-seven percent of Fort Ord is currently comprised of habitat reserve, habitat corridor, and development with reserves or restrictions.

Monterey Spineflower Critical Habitat Background

On January 9, 2008, the Service published a revision of designated critical habitat for the Monterey spineflower. Nine critical habitat units comprising approximately 11,055 acres in Santa Cruz and Monterey counties were designated.

Monterey spineflower critical habitat Unit 8 on former Fort Ord comprises 9,432 acres of grassland, maritime chaparral, coastal scrub, and oak woodland. Approximately 87 percent of this critical habitat unit is Federal land (8,172 acres) managed by the Army, 6 percent is State land (606 acres), and 7 percent is under local jurisdictions (654 acres). Portions of Fort Ord have been transferred to BLM; University of California, California State University at Monterey Bay; and local (city and county) jurisdictions. All of the lands included in this unit are designated as current or future habitat reserves under the Army's habitat management plan (Corps 1997). About one-half of Unit 8 still must be cleaned of environmental contaminants by the Army before it can be transferred to BLM.

Unit 8 contains space for individual and population growth, including sites for seed dispersal and germination; provides the basic requirements for growth; and includes soils in the Arnold-Santa Ynez complex, Baywood sand, and Oceano loamy sand series (Soil Conservation Service 1978). Lands in this unit are intended to be managed at a landscape scale, using prescribed fire, as needed, to maintain a range of different-aged maritime chaparral stands (Corps 1997), and by doing so preserve substantial populations of rare maritime chaparral species. This unit was occupied at the time of listing (Service 1994) and is currently occupied. This unit is essential because it currently supports multiple large populations of Monterey spineflower and it is one of only five units that include maritime chaparral and oak woodland habitats more representative of hotter, interior sites. The features essential to the conservation of the species may require special management considerations or protection in this unit due to threats from invasive species that crowd out Monterey spineflower, munitions cleanup methods on former ranges that remove and chip all standing vegetation, and recreational activities and road and trail maintenance that could trample plants (Service 2008d).

A portion of the 881 acre Marina Unit 3 is also within the boundaries of former Fort Ord. This unit was occupied at the time of listing and it is currently occupied (CNDDB 2013b; State Parks 2006; Service 2002c). Unit 3 is comprised of State lands. This unit is essential because it supports a population of Monterey spineflower that numbers in the thousands in some years (CNDDB 2013b; Service 1998a); it is the southernmost of the Monterey Bay area coastal populations; and it may provide connectivity between the populations along the coast and the more interior populations found at former Fort Ord.

Critical habitat Unit 8 is the largest critical habitat unit for Monterey Spineflower and the majority of the unit is under Federal jurisdiction. Because Federal agencies must utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species and all of Unit 8 is designated as current or future habitat reserves, critical habitat on former Fort Ord will play a large role in the recovery of the Monterey spineflower.

Smith's Blue Butterfly Survey History

Initial surveys for Smith's blue butterfly on former Fort Ord occurred during the 1992 baseline surveys conducted at the time of the base closure. At that time, the butterfly was found throughout the coastal dunes portion of the Army owned lands, and it was estimated that there were approximately 180 acres of potential habitat. The areas of former Fort Ord that make up the butterfly's habitat were transferred in 2008, and are now known as the Fort Ord Dunes State Park.

Subsequent surveys following the initial 1992 baseline survey have been performed in support of the MEC investigation and soil remediation activities that involved extensive surface excavation of dune soils. Results from surveys conducted in 2008 indicated the Smith's blue butterfly was doing well at Fort Ord State Park. The survey results indicated that the butterfly had reoccupied all but two of the areas that were occupied prior to the remediation of contaminated soils and were continuing to expand into restored dune habitat (Arnold 2008, Army 2009).

The habitat restoration and monitoring conducted by the Army contributes to fulfilling recovery needs, particularly: identifying areas to be rehabilitated, controlling off-road vehicle use of dunes, removing exotic plants and replacing with native plants, and revegetating existing blow-out areas with native plants. Much of the restoration needed at Fort Ord has been completed and the Army continues to oversee monitoring in a non-remediated 2-acre site. Appendix R shows a summary of all known Smith's blue butterfly occurrences, as well as seacliff and coast buckwheat distributions. Survey results from 2008 are also included in Appendix R.

Yadon's Piperia Survey History

The first basewide biological survey that included Yadon's piperia was first conducted by Jones and Stokes in 1992. The survey identified Yadon's piperia on four parcels in the northwest corner of the installation (parcels E2a, E4.1, L7.1, and S4.1.3). These parcels occupy approximately 13 acres.

Since the 1992 survey, additional populations of Yadon's Piperia have been found in various locations. In 2004, approximately 12 flowering Yadon's piperia were discovered by local naturalists on the 0.65-acre development parcel, E29b.3.1. The area was surveyed again by volunteers in 2008, 2009, and 2010, resulting in 34, 50, and 70 flowering Yadon's piperia found, respectively. On July 1, 2009, a naturalist conducting plant inventories in areas approved for public access discovered one Yadon's piperia in full bloom along Eucalyptus Road just inside the Impact Area fence, east of the BLM headquarters. In June of 2010, California Native Plant Society volunteers discovered 340 flowering Yadon's piperia in 118 locations on approximately 47 acres, primarily in the southern portion of the Impact Area along fuel break roads Nowhere Road, Orion Road, Evolution Road, Darwin Road, Mercury Road, and Wildcat Ridge Road. In contrast to Yadon's piperia habitat found in the moist Monterey pine forests, nearly all of the Yadon's piperia located in the Impact Area were found in sparsely vegetated chaparral on rocky ridge tops. Many of the 70 or more plants in bloom along Wildcat Ridge Road grew where there appeared to be only a small amount of soil between the bare sandstone of the ridge top. The inventory was restricted to cleared access roads due to explosive risks, and it is likely that additional individuals and populations of Yadon's piperia occur outside of the cleared access roads. Currently there are approximately 60 acres of Yadon's piperia habitat on former Fort Ord (Army 2011). Figure 20 depicts the currently known distribution of Yadon's piperia on former Fort Ord.

The discovery of additional Yadon's piperia and the likelihood of more individuals and populations occurring outside of accessible areas on Fort Ord; post-cleanup habitat restoration; monitoring; and transfer to lands designated as habitat reserve, habitat corridor, and development with reserve or restrictions; would contribute to meeting recovery objectives described in the recovery plan to: secure and protect areas throughout the present range of Yadon's piperia that contain populations of sufficient size; adequately maintain protected areas from encroachment by nonnative plants, excessive herbivory, edge effects from road maintenance, fuel modification activities, or other threats; and monitoring populations to determine protected populations are of adequate size to be self-sustaining and to ensure long-term persistence.

EFFECTS OF THE ACTION

Cleanup actions may temporarily affect listed HMP species. However, implementation of the resource conservation and management requirements described below and in the HMP would ensure their continued conservation on former Fort Ord.

1.0 General Impacts to California Tiger Salamander

Uninformed workers could disturb, injure, or kill California tiger salamanders. The potential for this to occur would be reduced by holding an environmental training that includes a description and photo presentation of HMP species, including federally listed plant and wildlife species, that could be encountered in the project area and the environmental laws related to the conservation of these species, guidelines and specific minimization measures that personnel must follow to

reduce or avoid impacts to federally listed species or habitat; and appropriate points of contact to report impacts on listed species and/or encounters with California tiger salamanders.

Although survivorship for translocated California tiger salamanders has not been estimated, survivorship of translocated wildlife, in general, is reduced due to intraspecific competition, lack of familiarity with the location of potential breeding, feeding, and sheltering habitats, and increased risk of predation. Observations of diseased and parasite-infected amphibians are now frequently reported. Releasing amphibians following a period of captivity, during which time they can be exposed to infections of disease agents, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried between habitats on the hands, footwear, or equipment of fieldworkers, which can spread them to localities containing species which have had little or no prior contact with such pathogens or parasites. Chytrid fungus is a water-borne fungus that can be spread through direct contact between aquatic animals and by a spore that can move short distances through the water. The fungus only attacks the parts of an animal's skin that have keratin (thickened skin), such as the mouthparts of tadpoles and the tougher parts of adults' skin, such as the toes. It can decimate amphibian populations, causing fungal dermatitis, which usually results in death in 1 to 2 weeks. Infected animals may spread the fungal spores to other ponds and streams before they die. Once a pond has become infected with chytrid fungus, the fungus stays in the water for an undetermined amount of time. Relocation of individuals captured from the project area could contribute to the spread of chytrid fungus. In addition, infected equipment or footwear could introduce chytrid fungus into areas where it did not previously occur; however, the Army has proposed to conduct work in California tiger salamander habitat in accordance with the Declining Amphibian Populations Task Force Fieldwork Code of Practice, which would greatly reduce the potential for contamination.

Trash left during or after vegetation clearance activities could attract predators to work sites, which could, in turn, prey on California tiger salamanders. For example, raccoons (*Procyon lotor*), coyotes (*Canis latrans*), and feral cats (*Felis catus*) are attracted to trash and also prey opportunistically on California tiger salamanders.

Accidental spills of hazardous materials or careless fueling or oiling of vehicles or equipment could degrade water quality or upland habitat to a degree where California tiger salamanders are adversely affected or killed. The Army has proposed to restrict the footprint of work areas, excavations, staging and road access areas to extent possible; delineate access, refueling, and work areas to limit unnecessary impacts to HMP species and habitat, and have spill control materials available, which will minimize effects.

During erosion control activities, application of corrective measures could potentially harm, injure, or kill California tiger salamanders if plastic monofilament netting or similar material is used and California tiger salamanders become entrapped in the material. Table 1 outlines the number of acres of California tiger salamander habitat that may be impacted, resulting in adverse

effects to individuals occupying the habitat, by the proposed manual/mechanical vegetation clearance activities.

Chemicals used for weed control could harm, injure, or kill California tiger salamanders and/or degrade their habitat. The Army proposes to use a low-toxicity herbicide and surfactant and will implement avoidance and minimization measures to reduce impacts to the species. The effects of herbicide use are discussed further in section 7.0 below.

Baseline surveys and follow-up monitoring for California tiger salamander, (and Contra Costa goldfields), and their habitat, will be conducted following response actions in occupied wetlands to assess the reestablishment of wetland habitat for these species. Measurements include: wetland function, as measured by the parameters of hydrologic conditions (inundation area and depth, pH, dissolved oxygen levels, turbidity); wildlife usage, specifically California tiger salamander larval presence and abundance, plant cover and wetland plant species diversity and dominance; and Contra Costa goldfields presence and abundance. If success criteria are not met after 5 years, corrective measures will be implemented. These surveys and measures are intended to ensure California salamander habitat will be functional and restored to pre-disturbance conditions and will minimize impacts incurred from remediation activities.

2.0 Munitions Response Action Impacts

Appendix A identifies approximately 2,815 acres requiring munitions response investigations and/or removals of munitions and explosives of concern. Listed species and critical habitat found within these munitions response sites may be affected during munitions response actions. These actions may result in direct mortality or temporary impacts to listed species and critical habitat (Table 1).

2.1 Vegetation Clearance Impacts

As described previously, vegetation clearance is necessary prior to the excavation and removal of munitions and explosives of concern. Vegetation clearance is primarily conducted using prescribed fire in maritime chaparral within habitat reserves; however, manual and mechanical vegetation clearance methods are also used where necessary and/or when the presence of high-explosive projectiles precludes safe burning.

2.1.1 Prescribed Burning

Effects to California Tiger Salamander

Prescribed fire is the primary method of vegetation removal proposed for chaparral vegetation. More than half the potential breeding habitat for California tiger salamanders at former Fort Ord is surrounded by chaparral, often with a narrow ring of grassland immediately around the wetland (maps from Army 2004). Prescribed fires would be limited to the period from July 1 to December 31, and would occur before substantial winter rains, while vegetation moisture content is still low. Prescribed fire is not proposed as a method to clear grassland

vegetation surrounding wetlands, but these areas may burn when prescribed fire is used to clear surrounding maritime chaparral.

All California tiger salamanders that occur in the prescribed burn areas could be adversely affected. California tiger salamanders may be injured or killed by dry season burns. Newly metamorphosed California tiger salamanders may be injured or killed by prescribed burning, if the fire occurs adjacent to breeding areas in the summer or fall months, when they are emerging from breeding ponds and taking refuge in shallow burrows or soil cracks. California tiger salamanders may also be injured or killed by the deployment of foams or fire retardants at prescribed burn boundaries, through direct contact or contamination of their breeding sites. Ammonia is recognized as a potentially toxic component of fire retardants, although the corrosion inhibitor sodium ferrocyanide may also contribute to toxicity. Sodium ferrocyanide toxicity has shown to increase following exposure to ultraviolet light (Calfee and Little 2003). Calfee and Little (2003) found that one fish and frog species exposed to fire retardants were more sensitive to fire retardants containing sodium ferrocyanide and both species experienced increased mortality when exposed to these in the presence of ultraviolet light.

Effects to California tiger salamanders due to prescribed burning would be avoided or minimized by implementation of the following conservation measures proposed by the Army: (1) the Army will only use phosphate based foams, gels, or fire retardants that will not contain sodium ferrocyanide, (2) if foams, gels, or fire retardants must be used, the Army will deploy them no closer than 300 feet from any wetland (Presidio of Monterey Fire Department 2012) (with the exception of the instance of a fire emergency) and will conduct habitat monitoring following their deployment for effects on plant communities and affected wetlands; and (3) work within known or potential breeding habitat will be conducted during the dry season. Authorized biologists will record all relevant information in the event of any encounters with California tiger salamanders during work activity, and report any injury or death.

Effects to Contra Costa Goldfields, Monterey Spineflower, Monterey Gilia, and Yadon's Piperia

All prescribed burning activities may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia. Removal of vegetation by burning could result in erosion, sedimentation, and changes in the hydroperiod of vernal pools. Burning could create opportunities for invasive and/or nonnative species to colonize. The use of fire retardants at prescribed burn boundaries may cause adverse effects by injuring native vegetation and by adding nitrogen to the soil to the extent that nonnative invasive grasses increase. The use of fire retardants and

fire suppressant foams has been documented to cause temporary (less than one growing season) declines in plant species richness in other plant communities (Larson et al. 1999) and in other cases to have a fertilizing effect which can promote the growth of nonnative grasses (Finger (undated)). A 3-year comparison of fuel breaks where retardants were applied on former Fort Ord suggested that invasive annual grasses increased greatly following fire retardant applications, especially in the presence of annual mowing and where sources of nonnative grasses were present nearby (Parsons 2004). The addition of nitrogen could also increase the density of established native vegetation making areas for germination less available.

Cutting primary fuel breaks up to 320 feet in width may result in adverse effects to listed plant species. Please see the Manual and Mechanical Vegetation Clearance effects section below for a detailed summary of potential effects and proposed minimization measures for primary fuel break cutting.

Small excavations to remove unexploded ordnance may cause temporary disturbance to habitat and seedbanks and could potentially remove and kill individual plants. Large areas of disturbance associated with deeper excavations or large detonations may cause soil conditions to become unsuitable for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia, and may remove and kill individual plants. Small excavations are not expected to be detrimental, in the long-term, to Monterey gilia and Monterey spineflower because these subspecies normally occur in disturbed soils. The persistence of Monterey gilia and Monterey spineflower within the inland ranges through years of live fire training and the subsequent wild fires and soil disturbance indicate that the restoration techniques being proposed are not likely to result in long-term adverse effects. The Army will limit any given remediation area to 562 acres in size, with no more than 800 acres being burned per year, to create a mosaic of burned patches of different ages; this type of burning may have a positive effect because the maritime chaparral community that supports these species and subspecies is adapted to occasional natural fires. Burning is expected to benefit habitat by creating open areas and/or reducing nonnative or invasive plants.

<u>Effects to Monterey Spineflower Critical Habitat</u>

Munitions response activities, may impact approximately 2,666 acres of Monterey Spineflower critical habitat. The 2,666 acres contain one or more components of the PCE for critical habitat and the proposed prescribed burning could alter the PCE in the project area. Prescribed burning can result in erosion and provide open areas that can be invaded by nonnative plant species. As discussed in the previous section, the use of fire retardants and fire suppressant foams has been documented to result in adverse effects to habitats and species. Although there may be some adverse effects to critical habitat due to prescribed burning,

Monterey spineflower habitat on former Fort Ord is intended to be managed at a landscape scale, using prescribed fire as needed to maintain a range of different-aged maritime chaparral stands (Army 1997a). Prescribed burning in support of MEC clearance is expected to be ultimately beneficial to Monterey spineflower critical habitat by providing necessary habitat openings, facilitating nutrient recycling, and by permitting the regeneration of the native plant community.

In summary, all prescribed burning activities may result in direct mortality or temporary impacts to Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia; and could have adverse effects on Monterey spineflower critical habitat. These effects would be avoided or minimized by implementation of the following conservation measures: (1) no more than 800 acres of maritime chaparral will be burned in one year to ensure a mosaic of different aged stands to provide optimum diverse habitat; (2) if foams and fire retardants must be used, the Army will deploy them no closer than 300 feet from any wetland and will conduct habitat monitoring for effects of chemical fire retardant and foams on plant communities and in affected wetlands; and (3) flagging and/or mapping of populations of listed plant species to the extent possible, to avoid and/or reduce unnecessary disturbances. In addition, maritime chaparral and wetland habitats that may be impacted by munitions response actions will have a baseline survey for HMP species and habitat and follow-up monitoring will occur per the established vegetation and wetland monitoring plans to document reestablishment of the species and habitat. After the completion of the final monitoring period for each of the species or the critical habitat of concern, species reestablishment will be considered successful according to criteria established in monitoring plans, and corrective measures will be implemented as necessary (Burleson 2006; Tetra Tech and EcoSystems West 2015b). These measures implemented by the Army are expected to minimize or avoid adverse effects due to prescribed burning activities.

2.1.2 Manual and Mechanical Vegetation Clearance

Periodic impacts of manually and mechanically clearing vegetation would occur within existing fuel breaks approximately 240 acres (40 miles by 50 feet wide divided by 43,560 square feet/acre) of habitat reserve containing HMP species and critical habitat. In addition to the 40 miles of regularly maintained fuel breaks, the expansion of primary containment lines up to 320 feet wide would impact approximately 841 acres that may need to be cut, and 709 acres that may need to be re-masticated in order to support the prescribed burn and munitions response actions (Table 2).

The discovery of high-explosive projectiles precluding a safe prescribed burn may also necessitate manual or mechanical removal of vegetation within units in lieu of prescribed burning; these acreages will vary depending on the size of the unit.

Effects to California Tiger Salamander

All California tiger salamanders that occur in the vegetation clearance areas could be adversely affected by manual and/or mechanical vegetation removal activities. Disturbance from vegetation clearing may result in mortality or injury from crushing by equipment or vehicles and worker foot traffic. Work activities, including noise and vibration, may cause California tiger salamanders to leave the work areas. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. These effects would be avoided or minimized by implementation of the following conservation measures proposed by the Army: (1) limiting vegetation removal work in wetland and vernal pool areas to the dry part of the year, (2) limiting mechanical mowing around ephemeral California tiger salamander breeding ponds to only where the vegetation is too dense to safely locate and remove MEC; (3) implementation of the Wetland Restoration Plan (Burleson 2006) when conducting erosion control activities during rainy periods; and (4) the presence of a Service-approved biologist overseeing activities and relocating individuals as necessary.

Effects to Contra Costa Goldfields, Monterey Gilia, Monterey Spineflower, and Yadon's Piperia

All manual and mechanical vegetation clearance activities may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia. Removal of vegetation could result in direct removal or cutting of listed plants, crushing or trampling by heavy equipment or personnel; erosion; and inadvertent introduction or promotion of invasive/nonnative species. Additionally, the manual and/or mechanical vegetation clearance may reduce or eliminate seed reproduction and/or resprouting of species within central maritime chaparral habitat, as indicated in the study conducted by Ahtna Government Services Corporation (Ahtna) (2002). These effects would be greater for Monterey gilia, Monterey spineflower**,** and Yadon's piperia, which are seed reproducing species, if vegetation removal activities are conducted prior to seed set. Reproduction may also be reduced or inhibited if chipped material is left on the site. Leaving chipped material behind has been observed to reduce germination by shrub and herbaceous species, influencing subsequent species composition to favor only a few shrub species capable of regenerating in such areas (Harding Lawson Associates 1999b). Leaving chipped material on the ground has been known to reduce cover of live vegetation, either by chemical or physical inhibition (Ahtna 2002) and has been identified as a threat to Monterey spineflower and Monterey gilia, as the chipped material eliminates open, sandy conditions necessary for these species (Zander Associates 2007, Service 2008d). Repeated or dense layers of chipped material may also eventually alter the nature of the sandy soils as the woody matter slowly decays. Results of burning after cutting in the Parker Flats

prescribed burn experiment on former Fort Ord (Pierce et al. 2010) demonstrate that though the cover of species that vegetatively regenerate (resprouters) has decreased, the cover of plant species that regenerate from seed (obligate seeders) at Parker Flats has increased, and species diversity in treated (cut, crushed, or chained) burned plots was greater than in untreated burned plots and double that of unburned plots. Overall, the study concludes that the 2005 prescribed burning post-vegetation treatment has enhanced the cover of obligate-seeding plant species, the diversity of plant species, and the densities of HMP plant species at Parker Flats in 2010 relative to pre-burn conditions (Pierce et al. 2010).

Table 1 outlines the number of acres of Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia that may be adversely affected by the proposed manual/mechanical vegetation clearance activities.

Effects to Monterey Spineflower Critical Habitat

Manual and mechanical vegetation clearance could adversely affect 1,758 acres of Monterey spineflower critical habitat. The 1,758 acres of Monterey spineflower critical habitat contain one or more components of the PCE for critical habitat and the proposed manual and/or mechanical vegetation clearance could alter the PCE in the project area. Manual and mechanical clearing of vegetation could have adverse impacts on Monterey spineflower critical habitat by altering the vegetation structure and openings that change in spatial position as a result of physical processes such as windblown sands and fire and that allow sunlight to reach the surface of sandy soils where Monterey spineflower occurs. Worker and vehicle traffic could crush or trample plants in occupied areas of critical habitat.

Both prescribed burning and cutting can result in erosion and provide open areas that can be invaded by nonnative plant species; however, Monterey spineflower is able to colonize disturbed soils. Thus, with implementation of the proposed minimization measures, we expect these effects to be temporary. Maintenance and use of dirt fire roads and fuel breaks on former Fort Ord could have both beneficial and adverse effects on the PCE of Monterey spineflower critical habitat. Openings within native plant communities where there is little competition with other plant species has been identified as a component of the PCE for the critical habitat. Because Monterey spineflower is able to colonize disturbed soils, removal of a roadside strip of dense maritime chaparral to bare soil should create the appropriate elements of critical habitat for the species. These open fuel break strips are adjacent to more advanced successional vegetation stages which provide habitat for the pollinators, seed dispersers, and other native species which are important elements of Monterey spineflower critical habitat. While opening of the vegetation canopy benefits Monterey spineflower critical habitat, leaving chipped material on-site can reduce habitat values as discussed above. At former Fort Ord, the Army plans to maintain

vegetation in fuel breaks at 1 to 2 feet in height; therefore, the chipped layer should be sparse and the adverse effects of coverage temporary in these areas. Monterey spineflower has been found growing in cut areas where the chipped material was sparse. Fuel break and road maintenance activity and use can also facilitate erosion and invasion by nonnative plant species, the seeds of which may be spread by vehicles and equipment.

In summary, all manual and mechanical vegetation clearance activities may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia, and could have adverse impacts on Monterey spineflower critical habitat due to their presence in the action area, the potential for damage to plants and habitat by worker and vehicle traffic, and the less favorable effects of cutting rather than burning on central maritime chaparral species. However, the Army has proposed to implement avoidance and minimization measures during vegetation clearance activities, and will apply prescribed burning to most of the cut areas once cleanup actions have been completed and the vegetation has regrown for approximately 5 years or has grown sufficiently to carry a fire. Although burning is the preferred method of vegetation clearance prior to cleanup activities, prescribed burning after cutting and cleanup activities was shown to be a restorative tool in Parker Flats on former Fort Ord in 2005. Burning after manually/mechanically removing vegetation is a suitable measure when burning alone is deemed unsafe or infeasible under certain circumstances; this method is preferred over not burning at all. Adverse effects to Monterey spineflower critical habitat would be avoided or minimized by implementation of the extensive conservation measures proposed by the Army.

2.2 Munitions and Explosives of Concern (MEC) Investigation and Removal Impacts

Effects to California Tiger Salamander

All California tiger salamanders that occur in the MEC excavation and removal areas could be adversely affected by MEC excavation and removal activities. Excavations and in situ detonations to remove ordnance in upland habitat for California tiger salamanders may cause adverse effects to California tiger salamanders by damaging or collapsing their burrows or by noise, vibration, and disturbance causing them to disperse. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. California tiger salamanders may also be injured or killed if they fall into and become trapped in deep excavations and become vulnerable to desiccation, starvation, and predation.

Excavations in the watersheds of aquatic habitat could also cause erosion and increased sedimentation in pools and changes in vegetation density, diversity, and

small mammal activity, affecting subterranean shelter and food sources for California tiger salamanders. Excavations and *in situ* detonations in wetlands could cause adverse effects to eggs, larvae, and adult breeding California tiger salamanders, and indirect adverse effects due to pond sedimentation, and altered water quality and quantity. These could influence population size and density, future reproductive capacity of the population, and recolonization of upland habitats disturbed by other pre-disposal actions. Deep excavations and detonations could reduce or eliminate the water-holding capacity of a wetland if it disrupts the impermeable soil layer, which promotes water ponding. Although excavations could range in size from a single cubic foot to several thousands of cubic feet, MEC items at former Fort Ord are typically encountered at depths less than their calculated maximum penetration depths (based on Fort Ord-specific MEC penetration data). Approximately 97 percent of items recovered at the former Fort Ord have been found within the top 2 feet of the surface. Throughout the Army's munitions response activities at former Fort Ord since 1993, no California tiger salamanders have been documented being injured or killed during the excavation of over 13 million unexploded ordnances. The adverse effects to California tiger salamanders are anticipated to be minimal. Impacts on California tiger salamanders from MEC excavation and removal activities would be avoided or minimized by implementation of the extensive conservation measures proposed by the Army.

Effects to Contra Costa Goldfields, Monterey Gilia, Monterey Spineflower, and Yadon's Piperia

As discussed above, excavation and *in situ* detonations in wetlands could adversely affect the water-holding capacity of vernal pools, as well as remove native vegetation, increase sediment in the pools, cause erosion, remove the seedbank of native species, introduce nonnative species to the pool environment, disrupt floral displays that attract pollinators, and change the microtopography of pool contours. In the upland watersheds of vernal pools, excavations could also result in erosion followed by increased sedimentation into pools and could provide establishment sites for nonnative species.

Excavations necessary for investigation and removal of subsurface MEC may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower, and Yadon's piperia. If MEC is found inside a vernal pool or pond, *in situ* detonation of the ordnance may disrupt a significant portion of the soil in the area and could potentially destroy the capacity of the pool or pond to hold water, remove native vegetation, increase sediment in the pools, cause erosion, remove the seedbank of native species, and/or introduce nonnative species to the pool environment. Adverse effects and conservation measures to address impacts for small and large excavations,

discussed in the effects analysis for prescribed burning above, also apply to these activities and are incorporated here by reference.

Follow-up surveys of HMP species at munitions response sites showed the populations of HMP annual plant species have improved following munitions response actions at several sites. (MACTEC 2005, Parsons 2005). Based on the Army's history of conducting munitions response activities at former Fort Ord, adverse effects to listed species and their habitats are expected to be minimal. Munitions response actions have been ongoing since 1993 and monitoring reports show no significant impacts to HMP species or populations have occurred.

Effects to Monterey Spineflower Critical Habitat

As detailed in the above effects analyses, munitions response activities, including MEC investigation and removal, may impact approximately 2,666 acres of Monterey spineflower critical habitat. The 2,666 acres of Monterey spineflower critical habitat contain one or more components of the PCE for critical habitat and proposed excavations and detonations to remove MEC could alter the PCE in the project area. Excavations and detonations to remove MEC could have adverse impacts on Monterey spineflower critical habitat; however, because Monterey spineflower is able to colonize disturbed soils, we anticipate these effects would be temporary and minimized by the proposed conservation measures.

In summary, all MEC investigation and removal activities may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia, and could have adverse impacts on Monterey spineflower critical habitat. These effects would be avoided or minimized by implementation of the extensive conservation measures proposed by the Army.

2.3 MEC Saturated Removal Impacts

The Army anticipates the need to excavate and sift sensitively fuzed munitions from an additional 85 acres in the Impact Area (Appendix A). This has increased the number of acres affected from 75 acres to 160 acres within munitions response and contaminated soil areas within habitat reserve parcels. Table 1 identifies HMP species and critical habitat that may be affected during remediation of MEC saturated areas. Adverse effects from MEC saturated removal activities on California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, and Monterey spineflower critical habitat, and conservation measures to address these impacts, are analogous to those analyzed for MEC excavation and are incorporated here by reference.

2.4 ESCA Impacts

The Army is overseeing the remedial actions conducted under the ESCA. The ESCA cleanup activities occur primarily in development parcels (1,921 acres) where no HMP

conservation measures are required; however, munitions response actions may occur on approximately 1,359 acres designated as habitat reserve, habitat corridor, habitat corridor with development allowances, development with restrictions, or development with reserve areas. Remediation is being performed in accordance with CERCLA and the Army has retained its lead Federal agent authority under CERCLA and its consultation responsibilities pursuant to section 7 of the Act for remediation of parcels occurring post-transfer. Adverse effects from ESCA munitions response activities on California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, and Monterey spineflower critical habitat, and conservation measures to address these impacts, are analogous to those analyzed for munitions response activities and are incorporated here by reference. Areas impacted from ESCA cleanup activities are included within the munitions response remediation acreages in Table 1.

3.0 Contaminated Soil Remediation Impacts

Appendix D identifies areas that may require excavation of contaminated soils. The Army estimates that no more than 75 acres of maritime chaparral in habitat reserve would be temporarily impacted by contaminated soil remediation activities.

Effects to California Tiger Salamander

As outlined in the description of the proposed action, special considerations will be made to minimize destruction of potential California tiger salamander habitat. All California tiger salamanders that occur in the contaminated soil remediation areas could be adversely affected by remediation activities. Adverse effects from contaminated soil remediation activities on California tiger salamander, and conservation measures to address these impacts, are analogous to those analyzed for MEC investigation and removal activities and are incorporated here by reference. Impacts to California tiger salamanders within degraded habitat are expected to be minimal.

Effects to Smith's Blue Butterfly

Soil remediation and restoration activities could affect a Smith's Blue butterfly population on former Site 3, now the Fort Ord Dunes State Park, currently managed by State Parks. The Army has overseen a 2-acre habitat restoration project to (1) determine if dune scrub restoration can be self-sustaining within non-remediated areas with no deleterious effects to native dune vegetation from residual metals in soil; (2) achieve after 5 years, vegetative cover comparable to existing occurrences of dune scrub in areas without residual metals in Fort Ord Dunes State Park; and (3) achieve individual plant health and condition (using seacliff buckwheat as a model) comparable to plants growing in dune scrub in areas without residual metals (State Parks 2014).

Two sites (A and B) approximately 1 acre each, and two reference sites (Ax and Bx) were selected and monitored according to the Site 3 Habitat Restoration and

Monitoring Plan (Shaw 2008a). High planting survivorship and seedling recruitment was observed between 2009 and 2012 following initial plantings, but due to a die-off at Site B in 2012, additional plants were installed in winter of 2012/13. Results from the fifth year of monitoring demonstrate that restoration efforts have met most of the success criteria specified in the Site 3 Habitat Restoration and Monitoring Plan (Shaw 2008a). There is no evidence that residual metals in the soil inhibited restoration at Site A. Low planting survivorship at Site B can likely be attributed primarily to low precipitation and possibly to herbivory as well, because low planting survivorship was also observed at several additional local dune planting sites. The Army will conduct additional buckwheat survivorship monitoring to assess if the die-off trend is continuing (State Parks 2014).

The restoration of dune scrub is expected to provide habitat and beneficial effects to the Smith's blue butterfly. Survey results in remediated areas have indicated that the subspecies has reoccupied all but two of the nine areas that have been remediated (Arnold 2008). Monitoring conducted in 2008 indicated the butterfly population was continuing to expand into the restored dune habitat (Army and Shaw 2009).

The timing of habitat restoration monitoring activities may coincide with the flight season of the Smith's blue butterfly. All Smith's blue butterfly pupae and adults within transect and quadrat areas that are being monitored could be subject to take. Eggs, larvae, and pupae could be injured or killed if biologists are unable to detect them while taking measurements and they are accidentally wounded or killed. Adults may be adversely affected by the presence of humans in the habitat and manipulation of their host plants; however, due to the relatively unobtrusive nature of the monitoring activities, we anticipate injury or death would be very unlikely and adverse effects would be negligible. Potentially impacted acres are outlined in Table 1.

<u>Effects to Contra Costa Goldfields, Monterey Spineflower, Monterey Gilia, and Yadon's Piperia</u>

Vegetation clearance activities, soil excavation, and removal and disposal of contaminated soils may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia through removal of the seed bank and/or increasing erosion or allowing invasive species to colonize. Excavation of contaminated soils may occur within wetland basins of suitable habitat for Contra Costa goldfields or in nearby uplands. There may be an increase of sediments or erosion into basins or swales that are considered suitable habitat for Contra Costa goldfields.

Effects to Monterey Spineflower Critical Habitat

Contaminated soil remediation activities may impact approximately 55 acres of Monterey Spineflower critical habitat. The 55 acres of Monterey spineflower critical habitat contain one or more components of the PCE for this species and proposed vegetation clearance actions, soil excavation, and removal and disposal of contaminated soils, could alter the PCE in the project area by removal of the seed bank and/or increased erosion, or if nonnative grasses or other nonnative plant species colonize these areas in high densities. These activities could have adverse impacts on Monterey spineflower critical habitat; however, with the implementation of proposed conservation measures coupled with the ability of Monterey spineflower to colonize disturbed soils, we anticipate these adverse effects would be temporary.

In summary, all contaminated soil remediation activities may result in direct mortality or temporary degradation of habitat for Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia, and could have adverse impacts on Monterey spineflower critical habitat. Adverse effects from contaminated soil remediation activities on California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, and Monterey spineflower critical habitat, and conservation measures to address these impacts, are comparable to those analyzed for MEC investigation and removal activities and are incorporated here by reference. Table 1 describes the acreages of habitat affected for each species due to contaminated soil remediation activities.

4.0 Groundwater Investigation and Remediation Impacts

Well installation and demolition would result in the temporary disturbance of approximately 100 square feet per well. The following sections describe the specific on-going and anticipated future activities associated with remediation for each of the contaminated groundwater plumes.

OU-1 Impacts

There are 42 wells within habitat reserve parcels associated with the remediation of OU-1 (Appendix F). Construction of the OU-1 treatment system is complete and no additional construction is anticipated; however, once the aquifer cleanup levels have been achieved at OU-1, wells will be demolished. This is expected to result in approximately 4,200 square feet of disturbance (100 square feet per well) for well demolition (Table 1). If Monterey gilia or Monterey spineflower occur at well sites, individuals or small populations may be killed or removed due to disturbance of the area from excavating and backfilling the wells.

OU-CTP Impacts

There are currently 58 wells in habitat reserve at OU-CTP (Appendix G). Seven of eight additional wells planned would be located in habitat reserve. Constructing wells for bioremediation injections disturbs approximately 100

square feet around each installation site. Depending on data from these 8 additional wells, up to 20 more wells may be constructed for bioremediation injections, resulting in an additional 2000 square feet of temporary disturbance.

Once the remedial action objectives have been met, wells will be monitored for a period of time before they are demolished. This process involves the excavation and removal of the top 5 feet of the well casing after grouting in the well to prevent a conduit for contaminants to reach groundwater. Impacts associated with well demolition are expected to occur on approximately 100 square feet per well, resulting in 8,500 square feet of temporary disturbance. See Table 1 for anticipated impacts to HMP species and critical habitat.

OU-2/12 Impacts

The OU-2/12 Groundwater Treatment System is located on the East side of Highway 1 in a development parcel. The majority of the wells and associated pipelines are also located within development parcels. There are 11 wells and less than 1 mile of pipeline, vaults, and other groundwater remediation infrastructure associated with OU-2/12 located within development with reserves or development with restrictions parcels on the former Beach Ranges (Appendix H). As the groundwater cleanup approaches the OU-2/12 aquifer cleanup levels, one or two additional wells may be installed in development areas to optimize the groundwater remediation. Once cleanup has been completed, demolition of wells west of Highway 1 has the potential to temporarily impact approximately 1,100 square feet of Smith's blue butterfly habitat over a number of years.

OU-2 Impacts

There are 20 groundwater extraction, injection, and monitoring wells located in non-development parcels in the OU-2 treatment system (5 in habitat reserve, and 15 in development with reserve or restriction parcels). An additional nine wells are proposed during system optimization (Appendix I); only four of these would be in development with reserve or restriction parcels. Impacts to HMP species at OU-2 are limited to California tiger salamanders and their upland habitat and small populations of Monterey gilia and Monterey spineflower that occur in discrete areas between the cells. Additional contaminated soil may be excavated if discovered following the remaining MEC work. These soils would be moved to Cell E. These areas may be affected as a result of heavy equipment using the haul roads to transport the remaining contaminated soils from Site 39. In addition, relocating the OU-2 Groundwater Treatment System to Parcel E8a.1.1. may result in temporary impacts to California tiger salamander upland habitat and Monterey gilia and Monterey spineflower. Once cleanup has been completed, the wells will be demolished. This may result in temporary impacts of approximately 100 square feet per well, resulting in 2,400 square feet of temporary disturbance. See Table 1 for anticipated impacts to HMP species and critical habitat.

Effects to California Tiger Salamander

All California tiger salamanders that occur in the contaminated groundwater remediation areas could be adversely affected. Contaminated groundwater remediation activities within California salamander upland habitat could result in injury or mortality to California tiger salamanders caused by ground disturbance associated with building new roads, widening existing roads, installation or demolition of wells and pipelines, and/or crushing by equipment or vehicles and worker foot traffic. These activities may injure or kill California tiger salamanders by damaging or collapsing their burrows or by noise, vibration, and disturbance causing them to disperse, increasing the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways.

Effects to Smith's Blue Butterfly

Demolition of 11 wells west of Highway 1 has the potential to temporarily impact 100 square feet per well or approximately 1,100 square feet of Smith's blue butterfly habitat over several years. Smith's blue butterfly host plant species may be temporarily or permanently lost during well demolitions and Smith's blue butterfly eggs, pupae, larvae, and adults could be injured or killed. Adults could also be displaced due to the temporary removal of habitat. Baseline monitoring will occur prior to demolition. If disturbance to buckwheat species occurs, their reestablishment will be monitored following well destruction. Restoration of habitat would be implemented if necessary. Monitoring and restoration of Smith's blue butterfly habitat have proven to be effective in soil remediated sites in the 2-acre restoration area and would minimize adverse impacts to Smith's blue butterfly. See Table 1 for anticipated impacts to HMP species and critical habitat.

Effects to Monterey Gilia and Monterey Spineflower

Contaminated groundwater remediation activities may result in direct mortality or temporary degradation of habitat for plants if they are crushed or killed by foot traffic, equipment, vehicles, or from ground disturbance associated with building new roads, widening existing roads, and/or from installation or demolition of wells and pipelines. These activities may result in removal of the seed bank and/or increased erosion or invasive species to colonization. Well installation and demolition impacts may result in the temporary disturbance of approximately 100 square feet per well.

Effects to Monterey Spineflower Critical Habitat

Contaminated groundwater remediation activities may impact approximately 14,000 square feet (0.32 acres) of Monterey spineflower critical habitat. These 14,000 square feet of Monterey spineflower critical habitat in the action area contain one or more components of the PCE for this species and proposed well installation and demolition and burial of pipelines could alter the PCE in the project area by removal of the seed bank and/or increased erosion, or if nonnative

grasses or other nonnative plant species colonize these areas in high densities. These activities could have adverse effects on Monterey spineflower critical habitat; however, with the implementation of the proposed conservation measures coupled with the ability of Monterey spineflower to colonize disturbed soils, the small, temporary, soil disturbances caused by groundwater remediation activities should only have temporary adverse effects on Monterey spineflower critical habitat.

Impacts from groundwater remediation on the California tiger salamander, Smith's blue butterfly, Monterey gilia, and Monterey spineflower and its critical habitat, would be avoided or minimized with the implementation of the extensive measures proposed by the Army.

5.0 Landfill Closure and Maintenance Impacts

The HMP established that the Army is not responsible for implementing conservation measures during closure and maintenance activities at the former landfill and we do not anticipate adverse impacts for the remaining work. However, as described in the conservation measures, any potential impacts to Monterey gilia and Monterey spineflower would be avoided or minimized by implementation of measures proposed by the Army.

6.0 Property Disposal Impacts

Reuse of property at the former Fort Ord, which is an action to be undertaken by land recipients and not the Army, is analyzed as an indirect or secondary effect of the Army's proposed disposal actions. Transfer actions that would affect California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, Monterey Spineflower critical habitat, Smith's blue butterfly, and Yadon's piperia are addressed below and in Table 1.

All California tiger salamanders and all Smith's blue butterflies that occur on or adjacent to disposed properties could be adversely affected. The disposal and reuse activities described in the Description of the Proposed Action, section 1.6.6., may result in injury or death. Individuals may be affected directly or indirectly through loss of habitat or from continued human disturbance adjacent to protected areas.

Effects to California Tiger Salamander

California salamanders could be injured or killed due to property disposal during development activities such as soil excavation or grading; placement of fill material; removal of vegetation; destruction of mammal burrows; conversion of biological communities to structures, roads, and landscaping; or inadvertent introduction or promotion of invasive/nonnative species. California tiger salamanders may be displaced due to temporary or permanent habitat loss or from disturbance from development. Additional impacts in and adjacent to developed areas may include predation by domestic pets or other predators attracted to human environments; disturbance to wildlife and habitats by human use; soil erosion resulting in loss of plant habitat or degradation of wetlands; or disturbance

due to reuse of parcels adjacent to protected parcels. Habitats may become fragmented by developed areas. Lands designated as habitat reserves are expected to provide beneficial effects for California tiger salamanders by preserving, enhancing, and maintaining habitat values for the species. Habitat corridors are also expected to provide beneficial effects by connecting preserved areas with other conserved lands. Other land use designations may provide beneficial effects when portions of parcels are conserved as reserves; however, other portions of these parcels may be subject to the adverse effects of development.

Effects to Smith's Blue Butterfly

All life stages of the Smith's blue butterfly could be injured or killed due to property disposal during development activities such as soil excavation or grading; placement of fill material; removal of vegetation; conversion of biological communities to structures, roads, and landscaping; or inadvertent introduction or promotion of invasive/nonnative species. Smith blue butterfly adults may be displaced due to temporary or permanent habitat loss or from disturbance from development. Additional impacts in and adjacent to developed areas may include predation by domestic pets or other predators attracted to human environments; disturbance to wildlife and habitats by human use; soil erosion resulting in loss of plant habitat; or disturbance due to reuse of parcels adjacent to protected parcels. Habitats may become fragmented by developed areas. Lands designated as habitat reserves are expected to provide beneficial effects for Smith's blue butterfly by preserving, enhancing, and maintaining habitat values for the subspecies. Habitat corridors are also expected to provide beneficial effects by connecting preserved areas with conserved lands. Other land use designations may provide beneficial effects when portions of parcels are conserved as reserves; however, other portions of these parcels may be subject to the adverse effects of development.

Effects to Contra Costa Goldfields, Monterey gilia, Monterey spineflower, Yadon's piperia, and Monterey Spineflower Critical Habitat

All disposal and reuse activities may result in direct mortality, and temporary or permanent loss of Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** and Yadon's piperia and their habitat. Disposal and reuse would also result in both temporary and permanent impacts to Monterey spineflower critical habitat. Extensive soil excavation or grading and placement of fill material could result in trampling, removal, and/or killing of plants; the conversion of biological communities to structures, roads, and landscaping; or inadvertent introduction or promotion of invasive/nonnative species. Soil erosion resulting in loss of plant habitat or degradation of wetlands may also occur from property disposal activities. Some of the proposed land uses, like those expected in the development parcels, are expected to eliminate all biological resources within the

land use footprint; however, land uses such as habitat reserves and habitat corridors could provide benefits to species and habitats by preserving, enhancing, and maintaining habitat values for the species and by connecting preserved areas with other conserved lands.

Appendix S depicts acreages of Monterey spineflower critical habitat and associated land use designations. The majority of land within Monterey spineflower critical habitat would be designated as habitat reserves, though a number of acres would be designated as development, development with reserves or restrictions, habitat corridor, and habitat corridor with development (Table 1). Monterey spineflower critical habitat on former Fort Ord contains one or more components of the PCE for this species and impacts from disposal and reuse could result in alteration of the PCE or complete loss of critical habitat by direct removal and loss of habitat or individuals, removal of the seed bank, increased erosion, and colonization of nonnative grasses or other nonnative plant species.

Development is expected to result in the loss of habitat and indirect impacts of human disturbance to listed species and their habitats. The majority of transferred acres of land would be conserved as habitat reserve. Impacts from disposal and reuse on the California tiger salamander, Smith's blue butterfly, Monterey gilia, Yadon's piperia, and Monterey spineflower and its critical habitat, would be further minimized with the implementation of the extensive measures proposed by the Army.

7.0 Herbicide Use Impacts

The Army uses a low toxicity glyphosate herbicide (Rodeo) with the surfactant Agri-Dex. All herbicide applications are conducted according to requirements specified on the label and in accordance with BLM's Integrated Weed Management Program for former Fort Ord.

Glyphosate (Rodeo)

Glyphosate is a non-specific post emergent systemic herbicide that kills both broadleaf and grass plant species; it is highly toxic to plants but has low toxicity to birds, fish, and mammals. Rodeo is a glyphosate herbicide labeled for use in aquatic habitats and does not include surfactants in its formulation. Rodeo is reported to be "practically non-toxic" to birds and aquatic organisms (Dow AgroSciences 2004).

Laboratory studies show glyphosate transforms primarily by microbial degradation. Under aerobic conditions, the half-life of glyphosate in soil ranges from 1.8 to 5.4 days, and in aerobic water-sediment systems, 7 days. Glyphosate metabolism is limited under anaerobic conditions; however, with a half-life of 8 to 199 days in anaerobic water-sediment systems. Dissipation of half-lives in the field was noted at 2.4 to160 days. Dissipation appeared to correlate with

climate, glyphosate being more persistent in colder climate conditions (U.S. Environmental Protection Agency (EPA) 2008)

In the absence of robust toxicity data for amphibians in aquatic habitats, the EPA uses fish toxicity as a surrogate. In a 2008 study, EPA compiled toxicity studies for technical glyphosate (formulated without a surfactant) on species deemed suitable to act as surrogates for the federally threatened California red-legged frog (*Rana draytonii*). Results ranged from practically nontoxic to slightly toxic with the lowest (most conservative) acute toxicity LC50 value (the lethal concentration of a chemical causing 50 percent mortality of test animals) of 43 milligrams active ingredient per liter (mg/L), and the lowest no observed adverse effect concentration was 30.6 mg/L (EPA 2008).

Table 5. Categories of acute toxicity for aquatic organisms.

LC50 (mg/L=mg/kg= ppm)	**Toxicity Category**
< 0.1	Very highly toxic
> 0.1 – 1	Highly toxic
> 1 – 10	Moderately toxic
> 10 - 100	Slightly toxic
> 100	Practically nontoxic

Glyphosate toxicity data for amphibians that inhabit terrestrial environments is also lacking. EPA uses toxicity data from avian receptors as a surrogate for California red-legged frogs in terrestrial environments (EPA 2008). These studies showed that glyphosate is slightly toxic to the selected avian species with the lowest LD50 value (dose required to kill 50 percent of a population of test animals) reported as ingestion of greater than 3,196 mg of active ingredient per kilogram of body weight (EPA 2008), although no mortalities occurred in any of the studies so this number is likely to be strongly conservative. Based on these conservative numbers, EPA used a modeling approach to further understand risk to California red-legged frogs from glyphosate exposure in terrestrial habitats. EPA determined that California red-legged frogs may be at risk of some toxic effects if glyphosate is applied at an application rate of 5.5 pounds acid equivalent (a.e.) per acre. The maximum application rate according to Rodeo's label is 8 quarts of Rodeo product or 8 pounds a.e. of glyphosate acid per acre per year (Dow AgroSciences 2014); therefore, some toxic effects to terrestrial amphibians are possible if Rodeo is applied in its maximum application strength in terrestrial environments.

The Service analyzed the effects of pesticides on a number of taxa in the Recommended Protection Measures for Pesticide Applications of Region 2 of the U.S. Fish and Wildlife Service (White 2007). In this report, protective measures

are based on a screening-level hazard assessment for pesticide ecotoxicity. Pesticides are rated by a classification system that categorizes the level or type of protection to be given for a particular pesticide with respect to ecotoxicity. Glyphosate is classified as Class 0; this class includes pesticides that are practically nontoxic to a specific group of animal species that have similar toxicological responses (e.g., fungicidal toxicity for large mammal species).

Class 0 pesticides ordinarily do not require protection measures for animal species.

Application of Rodeo on Army lands occurs at approximately 1.5 percent concentration in a solution; this concentration requires 2 ounces of Rodeo per gallon of solution (B. Kowalski, BRAC, in litt. 2015). Rodeo is 58.3 percent glyphosate. In 2014, the Army used 1,150 gallons of Rodeo on 1,769 acres of Fort Ord (Army 2015). This calculates to 0.65 gallons of Rodeo per acre, converting to 2.6 quarts per acre, which is much less than the label's maximum application rate of 8 quarts per acre of Rodeo per year. (Incidentally, 58.3 percent of 2.6 quarts equals 1.5 quarts of glyphosate per acre; this is not a conversion for pounds a.e.).

Surfactant Agri-Dex

Surfactants are used to improve the effectiveness of herbicides by reducing surface tension and increasing chemical penetration into the plant tissue. Some surfactants have been shown to be toxic to fish and aquatic species. The surfactant polyethoxylated tallowamine (POEA) found in Roundup has been linked with higher amphibian mortality rates than with surfactant-free glyphosate (Perkins et al. 2000).

Several studies suggest that the toxicity of glyphosate products is linked with the surfactant, and not the glyphosate. Howe et al. (2004) compared the toxicity of glyphosate alone, to glyphosate with POEA surfactant, and POEA alone, on green frogs (*Rana clamitans*). Results indicated the toxicity of glyphosate with POEA surfactant was similar to the POEA surfactant alone, which was much greater than glyphosate alone, indicating that the POEA was responsible for the toxic effects. In a comprehensive review of studies involving the effects of glyphosate on amphibians Govindarajulu (2008) concluded that the toxic effect of glyphosate products containing POEA are due to the POEA rather than the active glyphosate ingredient.

Agri-Dex ingestion and dermal toxicity to mammals is reported to be low (Helena Chemical Company 2012). In a review of 36 nonionic surfactants used with glyphosate, the Service noted Agri-Dex showed the least acute toxicity to aquatic invertebrates and fish and does not contain suspected endocrine disruptors

(Service Undated). Based on this information and implementation of avoidance and minimization measures for herbicide and surfactant use, we anticipate effects to California tiger salamanders and the listed plant species on Fort Ord to be minimal.

Effects to California Tiger Salamander

The use of glyphosate and surfactants in California tiger salamander habitat may cause toxic adverse effects to the species by direct contact; or contact with soil, vegetation, or run-off to waterbodies where the chemicals have been applied; potentially leading to injury or death. Based on results of research conducted on other amphibians and surrogates for amphibians, the low toxicity levels of Rodeo and Agri-Dex evaluated by the EPA and the Service, the low concentration of glyphosate and surfactants used on Fort Ord, and implementation of specific avoidance and minimization measures for herbicide use, we anticipate adverse effects to California tiger salamanders due to herbicide use would be minimal.

Effects to Contra Costa goldfields, Monterey gilia, Monterey spineflower, Yadon's piperia, and Monterey Spineflower Critical Habitat

The use of herbicides and surfactants could kill individual plants if applied in sensitive habitat; however, the intent of their use is to eliminate invasive weeds on Fort Ord. Invasive and nonnative weeds are a known threat to listed plant species. Removal of these weeds is expected to benefit plant species and their habitats. Based on years of survey data for the Contra Costa goldfields, Monterey gilia, Monterey spineflower, and Yadon's piperia, and implementation of specific avoidance and minimization measures for herbicide use, effects of herbicides to remove weeds on Fort Ord are expected to result in overall beneficial effects to these species and Monterey spineflower critical habitat.

8.0 Summary of Effects to Covered Species

In determining whether a proposed action is likely to jeopardize the continued existence of a species, we consider the effects of the action with respect to the reproduction, numbers, and distribution of the species. The following paragraphs summarize the effects of the proposed Army actions on federally listed species.

California Tiger Salamander

Reproduction: Twenty-seven locations on approximately 56 acres of former Fort Ord are known California tiger salamander breeding sites. An additional 27 acres of potential breeding habitat are currently unoccupied. The Army has proposed measures to avoid and minimize impacts to California tiger salamander breeding and upland habitat; to survey, monitor, and restore impacted habitats; restrict timing and work footprints when possible; and/or implement surveying, monitoring, and salvage and relocation of larvae. Based on the proposed conservation measures by the Army, the numbers of known breeding locations on

former Fort Ord, and critical habitat in the area, we conclude that the overall breeding and reproduction capacity of the California tiger salamander would not be appreciably reduced by the Army's activities.

Number: Estimating the number of California tiger salamanders in the action area and that may be affected by the Army's actions is difficult; however, there are 27 known breeding sites on 56 acres of breeding habitat and 27 acres of potential breeding habitat have been identified within Fort Ord. In 8 years of monitoring, 0 to 4 California tiger salamanders have been encountered annually during Army cleanup activities. This number does not indicate how many actual California tiger salamanders are taken each year, as we assume more are actually taken than observed; but, these numbers are an indication of the approximate number that could be encountered during future activities. Based on these relatively low numbers of observed California tiger salamanders in contrast to the amount of known occupied breeding habitat available on Fort Ord, nearby critical habitat, and implementation of avoidance and minimization measures proposed by the Army, we anticipate that impacts from activities on former Fort Ord would not appreciably reduce the overall numbers of the California tiger salamander.

Distribution: In the Central Valley and surrounding Sierra Nevada foothills and Coast Range, the central distinct population segment of California tiger salamander occurs from northern Yolo County southward to northwestern Kern County and northern Tulare and Kings Counties (Service 2004a). Up to 27 known breeding sites on 56 acres of breeding habitat, 27 acres of potential breeding habitat, and up to approximately 16,000 acres of upland habitat may be affected during the Army's cleanup and transfer activities. These actions would occur in their respective discrete locations on Fort Ord over the course of several years to several decades. California tiger salamanders may be temporarily displaced during these activities; however, the majority of the affected habitat will be restored and monitored post-cleanup and implementation of the Army's proposed conservation measures would avoid and/or minimize impacts to the species. Based on this information, we conclude that the overall distribution of the California tiger salamander would not be appreciably reduced by the Army's activities.

Recovery: Protection and recovery of the California tiger salamander will require reduction of the threats from destruction, fragmentation, and degradation of wetland and associated upland habitats due to urban development, conversion of habitat to intensive agriculture, predation by nonnative species, disease, contaminants, agricultural and landscaping contaminants, rodent and mosquito control, road-crossing mortality, hybridization with nonnative tiger salamanders, some livestock grazing practices, and reduction from pesticide drift. Though the Army's proposed activities on former Fort Ord are likely to adversely affect

California tiger salamanders, minimization and avoidance measures have been proposed and we consider them adequate in protecting the species to the extent feasible during cleanup operations. Restoration and monitoring of habitat after cleanup activities will help to ensure California tiger salamanders are not adversely affected for the long-term. Over 14,000 acres of upland habitat and 80 acres of breeding habitat will be designated as habitat reserve and approximately 250 as habitat corridor; this, compared to the number of acres of habitat to be designated as habitat corridor with development (~140 acres upland, 0 breeding), development with reserve or restrictions (~250 acres upland, 0 breeding), and development (~2,970 acres upland, 1 acre breeding), will largely benefit the California tiger salamander. The more than 14,000 acres of habitat reserve will be protected from the majority of threats listed above and other land designations that incorporate reserves will also provide some conservation of habitat for the species. Based on these factors, we conclude the recovery of the California tiger salamander will ultimately benefit from habitat restoration and conservation of lands on former Fort Ord.

Smith's Blue Butterfly

Reproduction: All life stages of the Smith's blue butterfly depend on their buckwheat host plants. Demolition of wells west of Highway 1 has the potential to temporarily impact approximately 3,600 square feet of Smith's blue butterfly habitat over a number of years. This habitat is essential for Smith's blue butterfly reproduction; however, these activities would temporarily impact approximately 100 square feet of habitat at a time and baseline surveys prior to demolition, habitat monitoring after demolition, and implementation of habitat restoration, if necessary, would minimize impacts to the habitat. Monitoring and restoration has proven effective in areas where soil remediation has occurred. The restoration of dune scrub after well demolition and soil remediation is expected to improve and provide habitat for the Smith's blue butterfly. Monitoring activities in the 2-acre non-remediated area may also impact breeding habitat for the Smith's blue butterfly; however, these impacts are expected to be minimal. The transfer of lands may lead to loss of breeding habitat; however, lands designated for development were not considered high-quality habitat for species and there has been far more high-quality habitat restored and conserved. Based on this information, we conclude that overall breeding habitat and reproduction of the Smith's blue butterfly would likely be improved and would not be appreciably reduced by the Army's activities.

Number: Estimating the number of Smith's blue butterflies in the action area and that may be affected by the Army's actions is difficult; approximately 3,600 square feet of Smith's blue butterfly habitat may be affected by well demolition activities and 2 acres of habitat may be affected by restoration activities. In addition, 2 acres of habitat would be transferred for development and 37 acres as

development with restrictions (Table 1). Appendix R represents 112 acres of Smith's blue butterfly habitat surveyed in 2008. A total of 214 female and 198 male butterflies were counted in this area. Arnold (2008) surveyed Fort Ord Dunes State Park in June and July of 2008 and counted 654 adults; 214 females and 440 males. Based on the anticipated increase of habitat, removal of invasive plant species, and monitoring activities conducted by the Army, we anticipate that Army activities would not appreciably reduce the overall numbers of the Smith's blue butterfly.

Distribution: The most current information on historical and recent localities indicates that the Smith's blue butterfly's historical range includes two areas within an approximately 80-mile linear strip along the California coast, including dune habitats along Monterey Bay from the Salinas River south to the City of Monterey and the coast of Monterey and northern San Luis Obispo Counties, from the Carmel River area south to San Carpoforo Creek (including inland in the Carmel Valley at least 10 miles) (Service 2003c). Smith's blue butterflies in the northern portion of the range along Monterey Bay occupy approximately 15 percent (as measured linearly along the coast) of the range and use different habitat relative to those in the southern portion of the range (dune versus chaparral, scrub, and grassland). The Smith's blue butterfly population that could be affected by the Army occurs on former Site 3, now the Fort Ord Dunes State Park land managed by State Parks where the Army has conducted soil remediation on Fort Ord Dunes State Park and is overseeing an associated 2-acre restoration project, will demolish groundwater wells over a number of years, and will monitor and restore habitat as necessary after well demolitions are complete. Survey results in this area indicate that the Smith's blue butterfly has reoccupied all but two of the nine areas that were occupied prior to the remediation of contaminated soils. Monitoring conducted in 2008 indicated the Smith's blue butterfly was doing well at the Fort Ord Dunes State Park and that remediation efforts did not appear to negatively impact the subspecies in the long-term (Arnold 2008). Annual monitoring has shown that the 2-acre restoration project met most of the success criteria (State Parks 2014). We expect that monitoring and restoration that occurs post-well demolition would have similar results. The Army has also proposed to transfer lands which include Smith's blue butterfly habitat; however; as mentioned previously, lands designated for development were not considered high-quality habitat for species and there has been far more habitat restored and conserved. Based on these factors, we anticipate the Army's activities would not appreciably reduce the overall distribution of the Smith's blue butterfly.

Recovery: The recovery plan for the Smith's blue butterfly was issued in 1984. Although the recovery plan is generally outdated, it outlined a specific recovery objective for former Fort Ord lands managed by State Parks. This objective was

to develop and implement a management plan for Fort Ord Military Reservation with the following components: (1) identify area to be rehabilitated, (2) control off-road vehicle use of dunes, (3) remove exotic plants and replace with native plants, and (4) revegetate existing blow-out areas with native plants. In the HMP, approximately 970 total acres were designated to be transferred to State Parks. Initial surveys for Smith's blue butterfly on former Fort Ord during the 1992 baseline surveys estimated that there were approximately 180 acres of potential Smith's blue butterfly habitat on Army owned lands. These lands were transferred in 2008 and are now known as Fort Ord Dunes State Park. As described in the HMP, State Parks lands have allowances for some development; though, most of the land was restored to coastal strand and coastal scrub habitat after remediation. In 2007, the Army began to oversee a restoration project in a 2-acre unremediated area of Fort Ord Dunes State Park. Exotic plant control began in 2007 and native revegetation efforts followed in 2008. Success criteria have been met annually in this 2-acre area (State Parks 2014) and Smith's blue butterflies have been observed reoccupying most of the formerly occupied areas, continuing to expand into restored dune habitat in remediated areas (Arnold 2008, Army 2009). Based on these factors, we conclude the recovery of Smith's blue butterfly will not be appreciably reduced by the Army's proposed actions.

Contra Costa Goldfields, Monterey Spineflower, Monterey Gilia, and Yadon's Piperia

Reproduction: The reproductive capacity of the listed plants could be adversely affected by complete loss or temporary degradation of habitat and/or loss of individuals, removal of the seed bank, increased erosion, and colonization of nonnative grasses or other nonnative plant species. The Army has proposed to avoid and/or minimize adverse effects to listed plants. Surveying, monitoring, restricting timing and duration of activities in sensitive habitat, flagging and avoidance of populations, controlling invasive weeds and erosion, and restoring habitat, would minimize the potential for disruption to the reproductive cycle. In addition, prescribed burns, conducted by the Army during munitions response actions to manage maritime chaparral habitat, provide beneficial effects. Based on the Army's proposed conservation measures and implementation of prescribed burning, we conclude that the reproductive capacity of the listed plants on former Fort Ord would not be appreciably reduced by the Army's actions.

Numbers and Distribution: Determining the number of plants for each of the listed plant species on Fort Ord is difficult; however, the Army has provided information on the area of occupied or suitable habitat for the species.

- There are 1,987 acres containing suitable habitat that could support populations of Contra Costa goldfields occurring in the dry upland habitat portions of the vernal pool watersheds (Appendix O).

- The first basewide survey for the Monterey gilia was conducted by Jones and Stokes in 1992 and 1993 (Jones and Stokes 1992, 1993) and estimated approximately 3,756 acres of Monterey gilia habitat on Fort Ord. More than 860 acres of Monterey gilia have been mapped since 1992 and 1993 with more than 510 acres of Monterey gilia populations identified outside of the Jones and Stokes polygons.
- The 1992 Jones and Stokes survey estimated 10,456 acres of Monterey spineflower habitat on Fort Ord. Since the 1992 survey, more than 886 acres of Monterey spineflower populations have been identified with more than 183 acres of Monterey spineflower occurring outside of the Jones and Stokes polygons (Appendix Q). Critical habitat for Monterey spineflower on former Fort Ord comprises 9,432 acres.
- The 1992 survey identified Yadon's piperia on four parcels in the northwest corner of the installation on approximately 13 acres. Since the 1992 survey, additional populations of Yadon's piperia have been found in various locations. Currently, there is approximately 60 acres of Yadon's piperia habitat on former Fort Ord.

Temporary and permanent loss of individual plants and associated habitat is anticipated. The implementation of conservation measures and conducting prescribed burns in the central maritime chaparral habitat would avoid and/or minimize adverse effects to Contra Costa goldfields, Monterey spineflower, Monterey gilia, Yadon's piperia, and Monterey spineflower critical habitat, and in some cases provide beneficial effects. Based on the conservation measures proposed and the current status and distribution of listed plants on former Fort Ord, we conclude that the overall numbers and distribution of Contra Costa goldfields, Monterey spineflower, Monterey gilia, and Yadon's piperia would not be appreciably reduced by the Army's activities.

Recovery:

Contra Costa goldfields

In the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon, we outline general recovery objectives and downlisting criteria for Contra Costa goldfields. Overall objectives include ameliorating or eliminating the threats that caused the species to be listed/affect the species, ameliorating any other newly identified threats, promoting natural ecosystem processes and functions by protecting and conserving intact vernal pools and vernal pool complexes within the recovery planning area, and preventing additional threats from emerging over time. Downlisting criteria include preservation of specific percentages of habitat for Contra Costa goldfields occurrences. For the Fort Ord occurrence, 85 percent of habitat is to be preserved to meet this criterion. Currently, two of four Contra Costa goldfields populations are located within habitat reserves on former Fort Ord. Although some of the Army's activities may

result in adverse effects to Contra Costa goldfields, once remediation is complete and lands are transferred, all of the known occurrences of Contra Costa goldfields on former Fort Ord will be located within habitat reserve and managed by the BLM. These populations will be protected from threats and vernal pools and vernal pool complexes will be conserved, as the management goal of habitat reserves is conservation and enhancement of threatened and endangered species. Based on these factors, we conclude Army's activities are contributing to meeting recovery objectives and downlisting criteria outlined in the recovery plan and will not appreciably reduce the recovery of Contra Costa goldfields.

Monterey Spineflower and Monterey Gilia

The immediate objective of Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan (Service 1998a) is to minimize the threats to the species and the habitats upon which they depend. The plan's primary objective is to delist taxa covered by the plan in a minimum of 20 years. This recovery plan includes recovery criteria for both Monterey gilia and Monterey spineflower.

Since the recovery plan was issued, the 970 acres of land designated for State Parks in the HMP were transferred and Fort Ord Dunes State Park was established. State Parks has undergone the environmental review process for the State of California and is managing and preserving the park for public use and conservation of sensitive species and their habitats (Environmental Science Associates 2004). As discussed in the Effects of the Action, the Army's activities have the potential to adversely affect Monterey spineflower and designated critical habitat; however, post-cleanup habitat restoration; monitoring; and transfer to lands designated as habitat reserve, habitat corridor, and development with reserve or restrictions; would contribute to meeting recovery objectives and/or delisting criteria described in the recovery plan. According to the recovery plan, Monterey spineflower can be considered for delisting when the Fort Ord disposal and reuse process has led the management agencies to develop, fund, and implement permanent protection plans for Monterey spineflower habitat post-transfer, including permanent iceplant suppression programs; and conserve roughly 60 percent of Fort Ord, which may be sufficient for recovery of the interior populations of Monterey spineflower. Sixty-seven percent of Fort Ord is currently comprised of habitat reserve, habitat corridor, and development with reserves or restrictions. Based on these factors, we conclude the Army's activities will not appreciably reduce the recovery of Monterey spineflower or designated critical habitat.

Fort Ord is thought to support 50 to 70 percent of the total range of Monterey gilia. As discussed in the Effects of the Action, the Army's activities have the potential to adversely affect Monterey gilia and its habitat; however, post-cleanup habitat restoration; monitoring; and transfer to lands designated as habitat reserve,

habitat corridor, and development with reserve or restrictions; would contribute to meeting recovery objectives described in the recovery plan to protect habitat from encroachment of non-native species, recreational activity, and development; restore habitat to native vegetation at proper densities to allow natural colonization; monitor sufficiently to assure that local threats are spotted promptly; and ensure there are enough plants at enough locations within the protected vegetation to reasonably assure the viability of the species. Based on these factors, we conclude the Army's activities will not appreciably reduce the recovery of Monterey gilia.

Yadon's Piperia

The current recovery objective for Yadon's piperia is reclassification to threatened status; avoiding further loss of existing plants and the species' habitat; eliminating threats to its survival; and revision of recovery criteria and development of delisting criteria after management is underway and specific data become available relating to population size and viability, habitat requirements, and fragmentation effects (Service 2004b).

The discovery of additional Yadon's piperia and the likelihood of more individuals and populations occurring outside of accessible areas on Fort Ord; post-cleanup habitat restoration; monitoring; and transfer to lands designated as habitat reserve, habitat corridor, and development with reserve or restrictions; would contribute to meeting recovery objectives and downlisting criteria described in the recovery plan to: (1) secure and protect areas throughout the present range of Yadon's piperia that contain populations of sufficient size; (2) adequately maintain protected areas from encroachment by nonnative plants, excessive herbivory, edge effects from road maintenance, fuel modification activities, or other threats; and (3) monitoring populations to determine protected populations are of adequate size to be self-sustaining and to ensure long-term persistence. Based on these factors, we conclude the Army's activities will not appreciably reduce the recovery of Yadon's piperia.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Currently, a habitat conservation plan is in development for lands on former Fort Ord that have been or will be transferred to non-Federal entities. Table 1 outlines the acreages of listed species' habitat that may be affected by future land transfers. Effects of these land transfers could be both beneficial and adverse to federally listed species. Development parcels will have

no resource management restrictions; though, habitat reserves will not be developed and will be managed with the goal of conservation and enhancement of threatened and endangered species. Habitat corridors are lands between major reserve areas, to be managed to promote connections between conservation areas. Development with reserve areas or development with restrictions will be slated for development but will contain inholdings of reserve or require specific restrictions to protect biological resource values; management of reserve inholdings must match those for habitat reserves, while management in developable areas must proceed with certain specific restrictions identified in the HMP (Corps 1997).

CONCLUSION

After reviewing the current status of the California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, Smith's blue butterfly, Yadon's piperia, and Monterey spineflower critical habitat; the environmental baseline for the action area; the effects of the proposed actions; and the cumulative effects; it is the Service's biological opinion that the Army's actions, as proposed, are not likely to jeopardize the continued existence of the California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, Smith's blue butterfly, and Yadon's piperia; and are not likely to destroy or adversely modify designated Monterey spineflower critical habitat.

Our conclusion is based on the following:

1. The Army will implement conservation measures to avoid and/or minimize impacts to California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower**,** Smith's blue butterfly, Yadon's piperia, and their associated habitats. These measures will be effective in avoiding or minimizing adverse effects to listed species.
2. Army activities would occur in their respective, discrete locations on Fort Ord over the course of several years to several decades and the majority of the affected habitats will be monitored or restored and monitored post-cleanup. Following the monitoring period, restoration of species will be held to success criteria provided in the relevant habitat restoration plans. If success criteria are not achieved, the Army will investigate the causes of failure on a case-by-case basis and develop corrective measures.
3. Nine years of monitoring reports indicate that relatively low numbers of California tiger salamanders have been encountered during Army activities in contrast to the amount of known occupied breeding habitat available on Fort Ord. These California tiger salamanders were found unharmed and were relocated. The Army will continue to implement avoidance and minimization measures while working in California tiger salamander habitat and relocate individuals as necessary.
4. Surveys indicate that the Smith's blue butterfly has reoccupied the majority of formerly occupied areas following the remediation of contaminated soils and the population has continued to expand into restored dune habitat. Although the Smith's blue butterfly may be impacted by Army activities, monitoring and restoration conducted by the Army,

restoration of host plant habitat, and removal of invasive plant species, are expected to provide some beneficial effects.

5. Conducting prescribed burns in central maritime chaparral habitat is a requirement of the HMP and is beneficial to the habitat that supports Monterey gilia, Monterey spineflower, Yadon's piperia, and Monterey spineflower critical habitat. The Army will continue to utilize prescribed burning to clear vegetation for munitions response actions. Areas of vegetation that need to be cut instead of burned for safety reasons, or cut for the widening of fuel breaks, will be prescribed burned in the future after enough vegetation has grown back to carry a fire.
6. Of the 19,275 acres of property transferred to date, 9,065 acres have been transferred as habitat reserve, where no development is allowed, and the management goal of these parcels is conservation and enhancement of threatened and endangered species. The Army intends to transfer 7,737 additional acres as habitat reserve. A total of 1,661 acres have been transferred as development with reserve areas or development with restrictions parcels, where development will contain inholdings of reserve or require specific restrictions to protect biological resource values; management of reserve inholdings would match that for habitat reserves, and development areas have no management restrictions; however, some plans for salvage of biological resources may be specified.
7. All factors considered in the Description of the Proposed Action, Status of the Species, Environmental Baseline, Effects of the Action, Cumulative Effects, and Summary of Effects; ensure the overall breeding and/or reproduction capacity, numbers, distribution, and the recovery of the California tiger salamander, Contra Costa goldfields, Monterey gilia, Monterey spineflower, Smith's blue butterfly, Yadon's piperia, and Monterey spineflower critical habitat will not be appreciably reduced by the Army's activities. Although species and habitats may be adversely affected, activities such as prescribed burning, habitat restoration, monitoring, management, and conservation of lands, are expected to result in long-term beneficial effects for species and habitat, helping to further meet, and not hinder, recovery criteria or goals.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened wildlife species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the

Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species; however, limited protection of listed plants is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

This biological opinion does not exempt any activity from the prohibitions against take contained in section 9 of the Act that is not incidental to the action as described in this biological opinion. Take that occurs outside of the action area or from any activity not described in this biological opinion is not exempted from the prohibitions against take described in section 9 of the Act.

The measures described below are non-discretionary, and must be undertaken by the Army so that they become binding conditions for the exemption in section 7(o)(2) to apply. The Army has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Army (1) fails to assume and implement the Terms and Conditions, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Army must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement. [50 CFR 402.14(i)(3)]

This Incidental Take Statement applies to actions that the Army will be undertaking. The process of transferring lands will not directly result in take; therefore, no exemptions from take as a result of those processes will be made; however, once land is transferred, certain activities, including development and recreational uses, may result in take. The Service has determined that the level of take that would occur with the implementation of the disposal and reuse activities described in the Apri11997 HMP would not jeopardize the continued existence of the California tiger salamander and Smith's blue butterfly. The entities responsible for transferred lands or that would be responsible for actions that may result in take after transfer from the Army will need to obtain take exemption from the Service before proceeding. The Installation-Wide Multispecies Habitat Conservation Plan for the Fort Ord Reuse Authority is currently in development and will provide this exemption for lands no longer managed or owned by the Army or the BLM.

Smith’s Blue Butterfly

The Service anticipates all Smith’s blue butterflies and all life stages of the Smith’s blue butterfly may be subject to take due to the Army’s monitoring activities in the 2-acre restoration area, in approximately 1,100 square feet of Smith’s blue butterfly habitat where demolition of 11 wells west of Highway 1 would occur over several years, and in lands that have been proposed for transfer. Smith’s blue butterfly host plant species and surrounding habitat may be disturbed during monitoring activities or temporarily degraded or permanently lost during well demolitions

and land transfer activities. Smith's blue butterfly eggs, pupae, larvae, and/or adults could be harmed, harassed, injured, or killed; and/or adults could be displaced due to the reduction of habitat. More specifically, all life stages of Smith's blue butterfly would be subject to the following forms of take:

1. Monitoring activities may result in harassment, injury, or death if occupied buckwheat and surrounding habitat is disrupted or destroyed by foot traffic or careless sampling.
2. Well demolitions may result in harassment, injury, or death due to ground disturbing activities, noise and vibration, use of machinery and vehicles, worker foot traffic, and/or sedimentation and erosion. Eggs, larvae, pupae, or adults may be taken if they are crushed or killed by machinery, vehicles, or worker foot traffic; if host plants are destroyed; if adults are displaced by disturbance; if habitat is compromised by sedimentation, erosion, or by accidental spills of hazardous materials, careless fueling, or oiling.
3. Property transfer and subsequent development may result in harassment, injury, or death due to displacement from loss or fragmentation of habitat; soil excavation or grading; placement of fill material; removal of vegetation; conversion of biological communities to structures, roads, and landscaping; inadvertent introduction or promotion of invasive/nonnative species; predation by domestic pets or other predators attracted to human environments; disturbance to wildlife and habitats by human use; soil erosion resulting in loss of host plant habitat; or disturbance due to reuse of parcels adjacent to protected parcels. Beneficial effects may result from lands transferred and designated as habitat reserve and habitat corridor.
4. Army activities may also result in harm if significant habitat modification or degradation from Army activities results in death or injury to any life stage of Smith's blue butterfly by significantly impairing behavioral patterns such as breeding, feeding, or sheltering.

As described above, we anticipate some Smith's blue butterfly eggs, larvae, pupae, or adults, may be killed or injured by the Army's activities. All life stages of Smith's blue butterfly present within areas of ground disturbance may adversely affected by the Army's activities.

We cannot quantify the precise numbers of Smith's blue butterflies that would be killed or injured as a result of the Army's proposed actions because of their numerous life stages, small size, and cryptic coloration. Finding dead or injured Smith's blue butterfly eggs, larvae, pupae, or adults is unlikely. Although we are unable to reasonably estimate the actual number of Smith's blue butterflies that would be taken by the proposed project, we must provide a number at which formal consultation would have to be reinitiated. The Environmental Baseline and Effects of the Action sections of this biological opinion indicate that adverse effects to Smith's blue butterflies would likely be low based on the description of proposed activities and proposed avoidance and minimization measures. Based on these factors, we can anticipate take of Smith's blue butterflies would also be low. We recognize that for any host plants destroyed or every Smith's blue butterfly found dead or injured, more individuals may be killed or injured that are not detected; therefore, when we determine an appropriate take limit, we set the number at a low

limit, anticipating that the actual take would be higher. Due to the challenges of observing and quantifying take of Smith's blue butterfly life stages, and understanding the dependency of each life stage on the subspecies' host plant, we will rely on using habitat as a surrogate for taking of the subspecies itself.

In Table 1, the Army has outlined the number of acres of Smith's blue butterfly habitat that are likely to be affected by Army activities. Monitoring activities would affect 2 acres of Smith's blue butterfly habitat. Monitoring activities are relatively benign in nature and are not expected to result in the removal or modification of habitat; however, if any buckwheat plants or surrounding habitat is destroyed or removed due to monitoring activities, if the area of impact exceeds the 2 acres specified in Table 1, if the condition of the restoration area begins to follow a downward trajectory contrary to the objectives of the restoration plan, if survey numbers of Smith's blue butterflies begin to decline significantly, or if any Smith blue butterflies are found injured or dead due to project activities, the Army must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions. Groundwater remediation is estimated to impact 1,100 square feet (0.025 acre) of Smith's blue butterfly habitat. These activities have the potential to disturb and remove buckwheat plants and surrounding habitat. The Army has estimated approximately 100 square feet of habitat for each of the 11 wells would be affected by well demolition activities. The Army will conduct baseline surveys prior to well demolition activities, monitoring post demolitions, and restoration if necessary. We expect densities of buckwheat and Smith's blue butterflies will vary between each well site; however, if any well demolition is anticipated to exceed the 100 square feet of area specified in Table 1; if habitat conditions post-well demolition do not reestablish to meet success criteria and corrective actions are not successful; if survey numbers of Smith's blue butterflies in the well demolition areas begin to decline significantly; or if any Smith blue butterflies are found injured or dead due to project activities; the Army must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

The Army transferred 2 acres of Smith's blue butterfly habitat as development parcels and 37 acres as development with reserve or restrictions. Additionally, 140 acres have been transferred State Parks as habitat reserve (Table 1). If property transfers to any designation other than habitat reserve or habitat corridor exceed what has been specified by the Army in Table 1, the Army must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

California Tiger Salamander

The Service anticipates that all California tiger salamanders within the acres described in Table 1 would be subject to take as a result of the Army's activities. All life stages of California tiger salamanders would be subject to the following forms of take:

1. Take would occur in the form of capture if California tiger salamanders are found in work areas and need to be relocated.
2. Harassment may occur during capture and relocation activities if California tiger salamanders are mishandled or overstressed and if these actions create the likelihood of injury to California tiger salamanders to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.
3. Ground disturbing activities, noise and vibration, use of machinery and vehicles, worker foot traffic, sedimentation and erosion, modifications in water quality, or prescribed fires and associated activities may also result in harassment, injury, or death of California tiger salamanders if they are not detected for relocation and remain in active work areas. California tiger salamanders may be taken if they are crushed or killed by machinery, vehicles, or worker foot traffic; if water quality is compromised by sedimentation or erosion, accidental spills of hazardous materials, careless fueling, oiling, herbicide runoff, use of fire retardants, gels or foams; if prescribed fires occur in areas where California tiger salamanders are present and cannot escape; or if a rain event occurs and California tiger salamanders are dispersing through the active work areas.
4. These activities may also result in harm if significant habitat modification or degradation from Army activities results in death or injury to California tiger salamanders by significantly impairing behavioral patterns such as breeding, feeding, or sheltering.

As described above, we expect some California tiger salamanders will be killed or injured by the Army's activities. Some California tiger salamanders within areas of ground disturbance will be killed or injured by the Army's activities because they are not likely to be detected during surveys. We anticipate all California tiger salamanders detected will be subject to take when captured and relocated, and a subset of the individuals captured may be killed or injured due to mishandling or stress.

We cannot quantify the precise numbers of California tiger salamanders that may be captured, killed, or injured as a result of the Army's proposed actions because the number of individuals in the action area will vary over the life of the project and most individuals will be underground and nearly impossible to detect for most of their lives. Other individuals may not be detected due to their cryptic nature, small size, and low mobility, and finding a dead or injured California tiger salamander is unlikely. The protective measures proposed by the Army are likely to prevent mortality or injury of most individuals.

We are unable to reasonably anticipate the actual number of California tiger salamanders that would be taken by the proposed project; however, we must provide a number at which formal

consultation would have to be reinitiated. The Environmental Baseline and Effects of the Action sections of this biological opinion indicate that adverse effects to California tiger salamanders would likely be low based on implementation of proposed avoidance and minimization measures and measures to restore, monitor, and conserve habitat. Based on these factors and what we know from annual reports of California tiger salamander encounters in the past, we can anticipate take of California tiger salamanders would also be low relative to the amount of breeding and upland habitat available on former Fort Ord. We recognize that for every California tiger salamander found dead or injured, other individuals may be killed or injured that are not detected; therefore, when we determine an appropriate take limit, we set the number at a lower limit, anticipating that the actual take would be higher.

Similarly, for estimating the number of California tiger salamanders that would be taken by capture, it is difficult to predict how many may be encountered. While the benefits of relocation (i.e., minimizing mortality) outweigh the risk of capture, we must provide a limit for take by capture at which consultation would be reinitiated. Though there are challenges to setting precise take limits, we do know how many California tiger salamanders have been encountered annually in years past (Table 3) and can anticipate similar numbers for future years.

Based on the best available information and the analyses provided in this biological opinion, we conclude if four adult, subadult, or juvenile California tiger salamanders are found dead or injured; if eight are captured and relocated within any given year (January 1 to December 31); or if any known California tiger salamander breeding sites are degraded to the degree that they cannot be restored to meet success criteria even after corrective measures have been implemented; the Army must contact our office immediately to reinitiate formal consultation. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the incidental take of the California tiger salamander and Smith's blue butterfly.

1. Biologists must be authorized by the Service before they survey for, capture, and move California tiger salamanders in the action area or before surveying for or relocating occupied Smith's blue butterfly host plants and surrounding duff
2. Effects to the Smith's blue butterfly and California tiger salamander must be minimized in the project area.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Army must comply with the following Terms and Conditions, which implement the Reasonable and Prudent Measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1[7]:
    a. Only qualified personnel authorized under this biological opinion may handle California tiger salamanders. William Collins, Jami Davis, Josh Harwayne, Matthew Johnson, and Bartholomew Kowalski, are authorized to capture, handle, and relocate California tiger salamanders during Army activities on former Fort Ord as analyzed in this biological opinion. If the Army wishes to use other biologists to capture, handle, and relocate California tiger salamanders, they must submit the credentials of the biologists who will conduct these activities to us for review and approval at least 30 days prior to the onset of any such activities.
    b. Only qualified individuals authorized by the Service will survey for Smith's blue butterfly host plants, remove plants, and collect and place duff. The Army must submit the credentials of the biologists who will conduct these activities to us for review and approval at least 30 days prior to the onset of any such activities.
    c. The authorized biologists must record all pertinent information when California tiger salamanders are relocated, including the number of individuals captured, site of capture, site of relocation, habitat at capture, and activity for which the relocation was implemented. Authorized biologists must also record all pertinent information when Smith's blue butterfly host plants and duff are relocated, including the number of plants relocated, sites removed from and relocated to, and activity for which the relocation was implemented.
2. The following terms and conditions implement reasonable and prudent measure 2:
    a. Prior to the onset of any project related activities, the Service-approved biologist must identify appropriate locations to receive California tiger salamanders from the project area in the event that they need to be relocated. These locations must be in proximity to the capture site, contain suitable habitat, must not be affected by project activities, and be free of exotic predatory species (i.e., bullfrogs, crayfish) to the best of the approved biologist's knowledge. Captured California tiger salamanders must be released as near as possible to the point of capture, in a manner that maximizes their survival. California tiger salamanders should be

[7] Please be advised that possession of a 10(a)(1)(A) permit for the covered species/subspecies does not substitute for the implementation of these measures. A section 10(a)(1)(A) recovery permit is limited to any act otherwise prohibited by section 9 of the Act for scientific purposes or to enhance the propagation or survival of the affected species. Capture and relocation of listed species can only be authorized through the incidental take anticipated by this biological opinion or through the section 10(a)(1)(B) incidental take permitting process. Authorization of Service-approved biologists is valid for the activities described in this biological opinion only.

released into the mouth of a small mammal burrow or other suitable refugia that reduces the likelihood of desiccation and predation.

b. Handling of California tiger salamanders must be done in an expedient manner with minimal harm to the individuals being handled. The hands and arms of all workers handling individuals should be free of lotions, creams, sunscreen, oils, ointment, insect repellent, or any other material that may harm California tiger salamanders.
c. When relocating California tiger salamanders, the possible spread of chytrid fungus or other amphibian pathogens and parasites must be minimized by following the Declining Amphibian Populations Task Force's Fieldwork Code of Practice (DAPTF 1998) (Appendix L).
d. If substantial rainfall (greater than 0.5 inch of rain in a 24-hour period) occurs, work activities that are in or adjacent to upland or breeding habitat must cease until the Service-approved biologist has searched the work area for dispersing salamanders. Work activities may resume once the Service-approved biologist has determined that California tiger salamanders that are likely to be killed or injured by work activities are no longer present in the work area.
e. If any Smith's blue butterfly eggs, pupae, or larvae are identified on or near host plants that are to be removed, the Army must make efforts to avoid removal of those plants. If removal cannot be avoided, a Service-approved biologist must salvage those plants and surrounding duff to place adjacent to live, undisturbed host plants.
f. Trash and other waste products must be controlled or removed daily at all work sites to avoid attracting predators.
g. For erosion control activities, plastic monofilament netting or similar material that could potentially entrap California tiger salamanders or other animals must not be used.

REPORTING REQUIREMENTS

Pursuant to 50 CFR 402.14(i)(3), the Army must report the progress of the action and its impact on the species to the Service as specified in this incidental take statement to the Service's Ventura Fish and Wildlife Office (2493 Portola Road, Suite B, Ventura, California 93003) within 60 days following completion of the proposed project. The report must describe all activities that were conducted under this biological opinion, including activities that were described in the proposed action and required under the terms and conditions. The Army must provide reports of the number of California tiger salamanders and Smith's blue butterfly host plants relocated from the project area; killed or injured during project related activities; the dates and times of capture, mortality, or injury; specific locations of capture, mortality, or injury; approximate size and age of individuals; and a description of relocation sites.

DISPOSITION OF DEAD OR INJURED SPECIMENS

As part of this incidental take statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating a dead or injured California tiger salamander, immediate notification must be made by telephone and in writing to the Ventura Fish and Wildlife Office ((805) 644-1766). The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information.

Care must be taken in handling injured animals to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible state. Injured salamanders must be transported to a qualified veterinarian. Should any treated California tiger salamanders survive, the Service should be contacted regarding the final disposition of the animals. We recommend that dead California tiger salamanders identified in the action area be tested for amphibian disease and/or undergo genetic analysis for the purpose of investigating hybridization; however, this recommendation is discretionary and to be determined by the Army upon contacting the Ventura Fish and Wildlife Office at the discovery of a dead California tiger salamander. If the Army chooses not to submit dead California tiger salamanders for testing, they must be placed with the California Academy of Sciences (Contact: Jens Vindum, Collections Manager, California Academy of Sciences Herpetology Department, Golden Gate Park, San Francisco, California, 94118, (415) 750-7037).

Upon locating a dead Smith's blue butterfly, initial notification within three working days of its finding must be made in writing to the Service's Division of Law Enforcement (370 Amapola Avenue, Suite 114, Torrance, California 90501) and by telephone and writing to the Ventura Fish and Wildlife Office. The report must include the date, time, location of the specimen, cause of death, if known and any other pertinent information.

Care must be taken in handling dead specimens to preserve biological material in the best possible state. The Army must endeavor to place the remains of Smith's blue butterflies with educational or research institutions holding the appropriate State and Federal permits. Arrangements regarding proper disposition of potential museum specimens must be made between the Army and the institution as soon as possible after receipt of this biological opinion.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that the Service-approved biologist(s) relocate any other native reptiles or amphibians found within work areas, and remove nonnative fish and bullfrogs where

they occur, using methods that will not adversely affect California tiger salamanders, if such actions are in compliance with State laws.

2. We recommend that dead California tiger salamanders identified in the action area be tested for amphibian disease and/or undergo genetic analysis for the purpose of investigating hybridization.
3. Where invasive plants occur in areas suitable for Smith's blue butterfly host plant species, invasive plants should be removed and the areas revegetated with native plants, including host plants.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request for formal consultation. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending reinitiation. If you have any questions, please call Lena Chang of my staff at (805) 644-1766, extension 302.

Sincerely,

Stephen P. Henry
Field Supervisor

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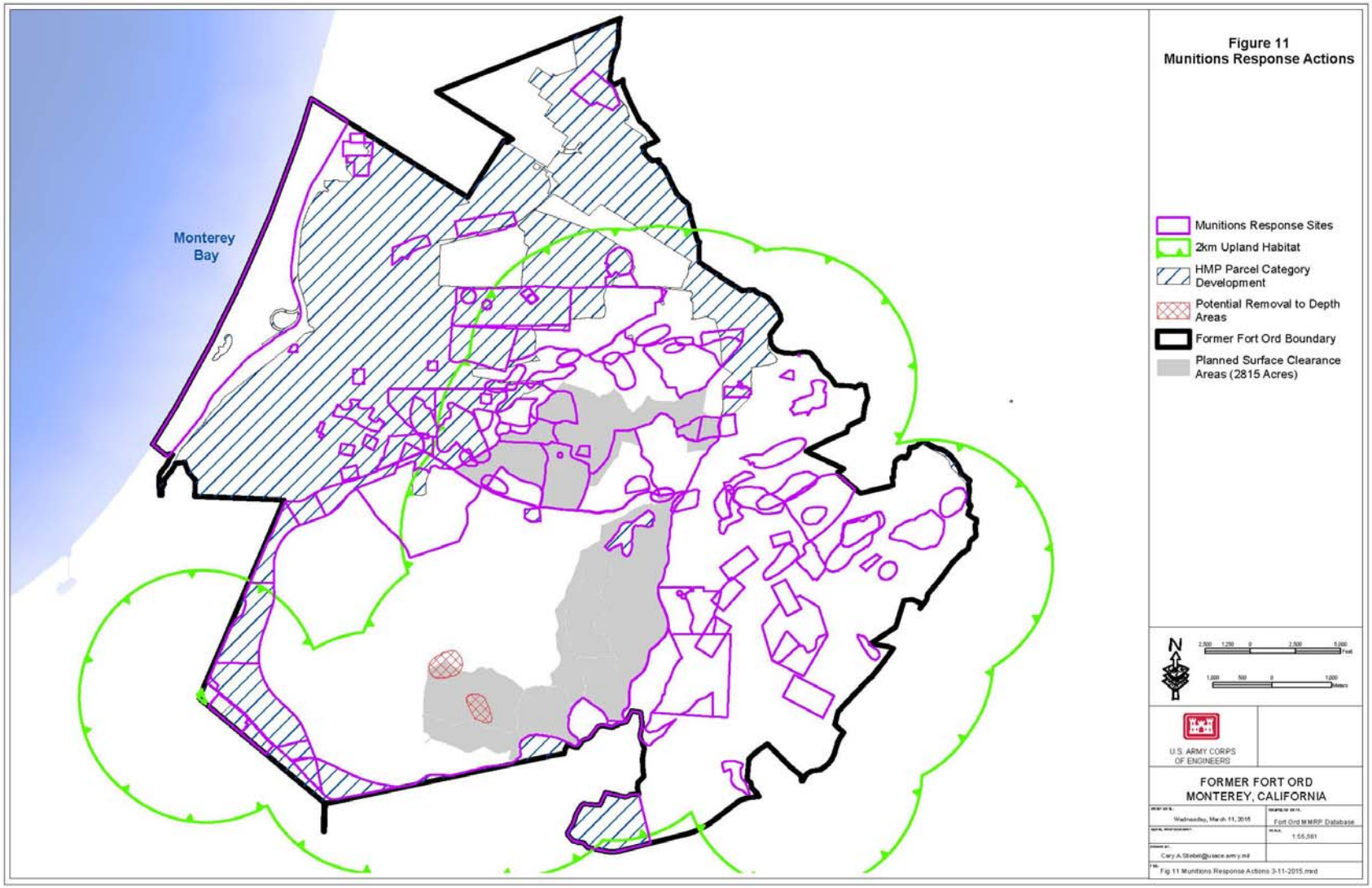
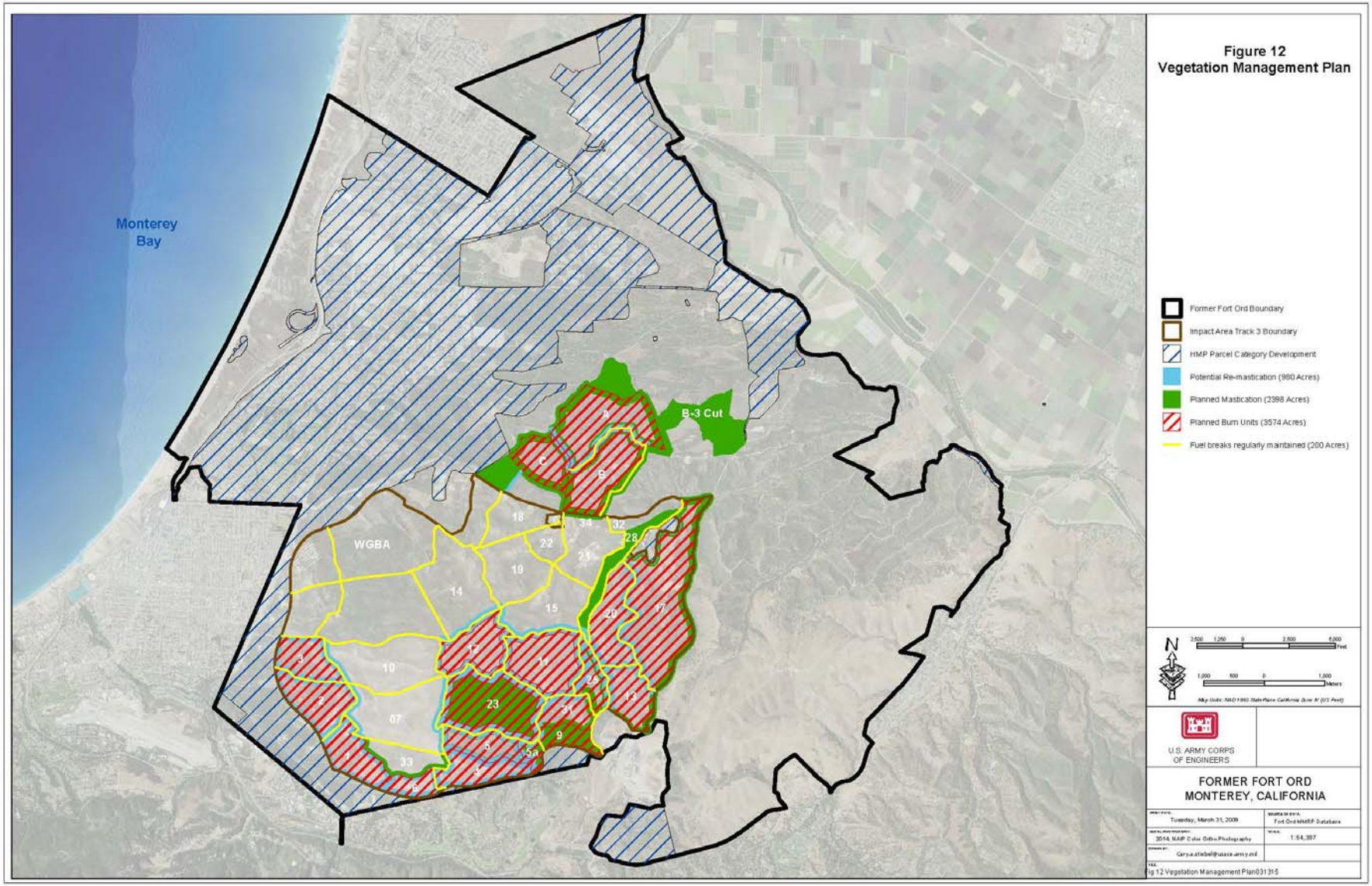
Collins, Bill. 2013. Environmental Coordinator, Army Base Realignment and Closure, Fort Ord Office. Phone conversation regarding impacts and conservation measures for Yadon's piperia with Lena Chang, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office. February 6, 2013.

APPENDICES

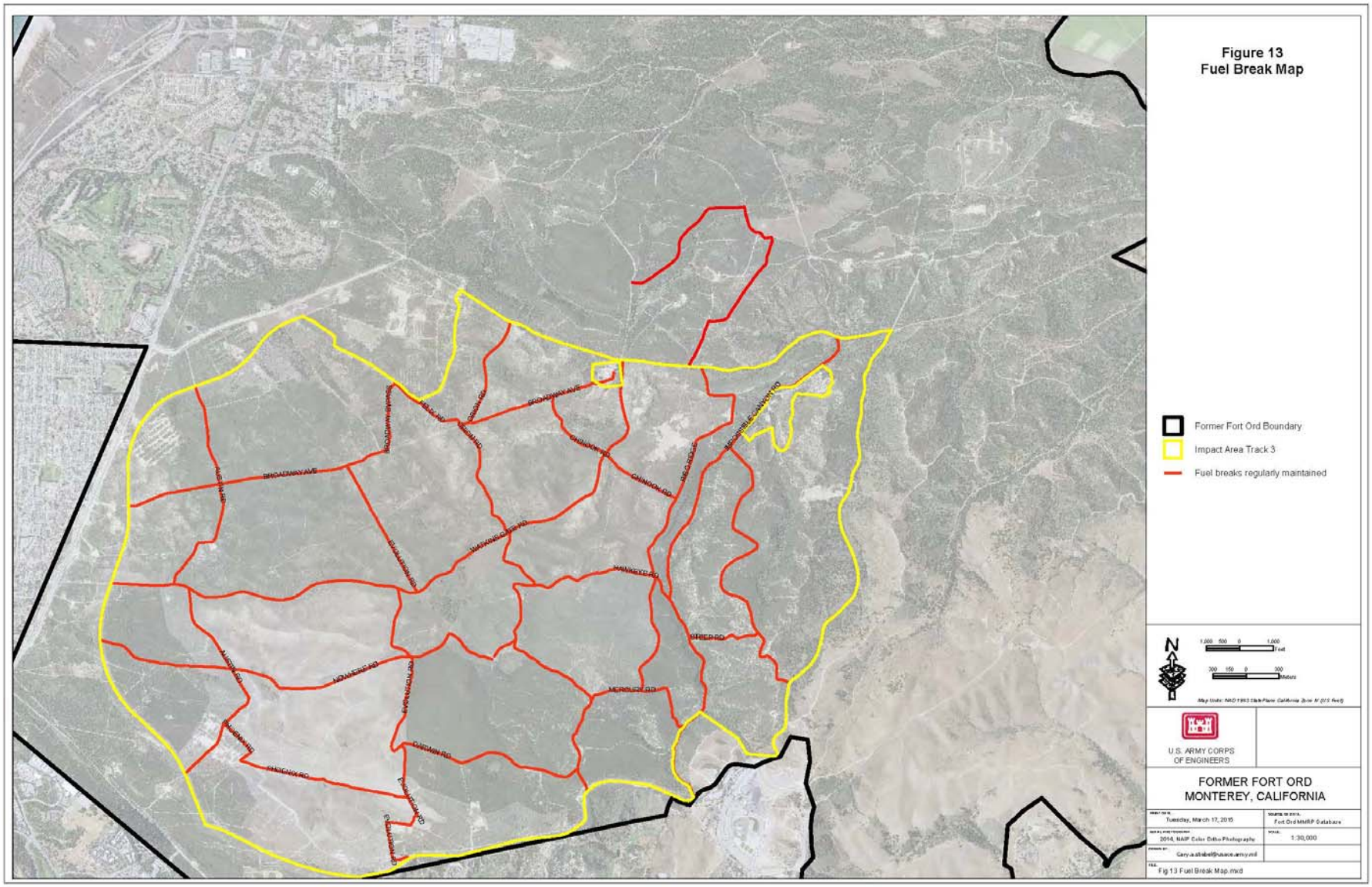
APPENDIX A. Munitions response actions.



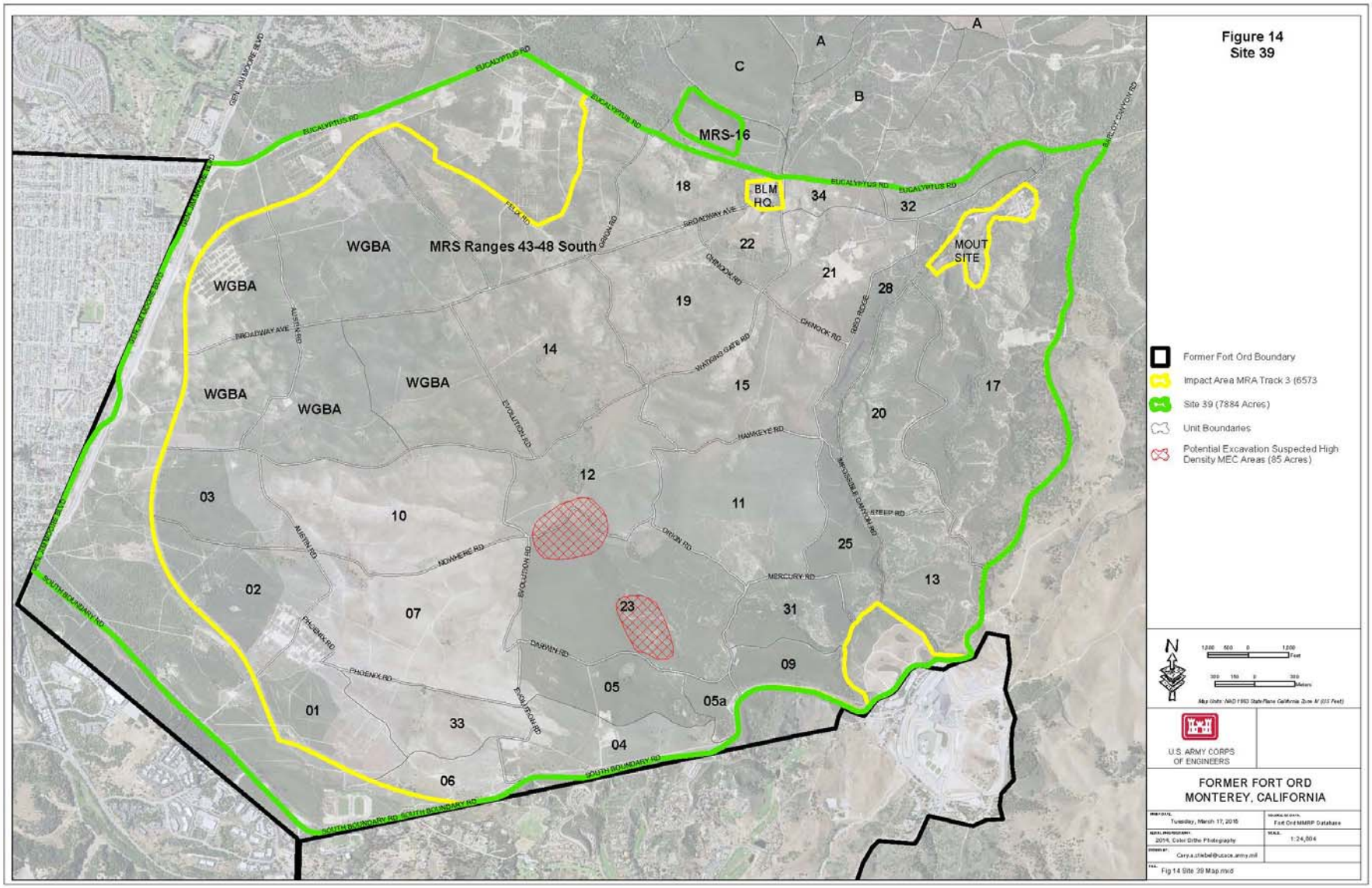
APPENDIX B. Vegetation management plan.



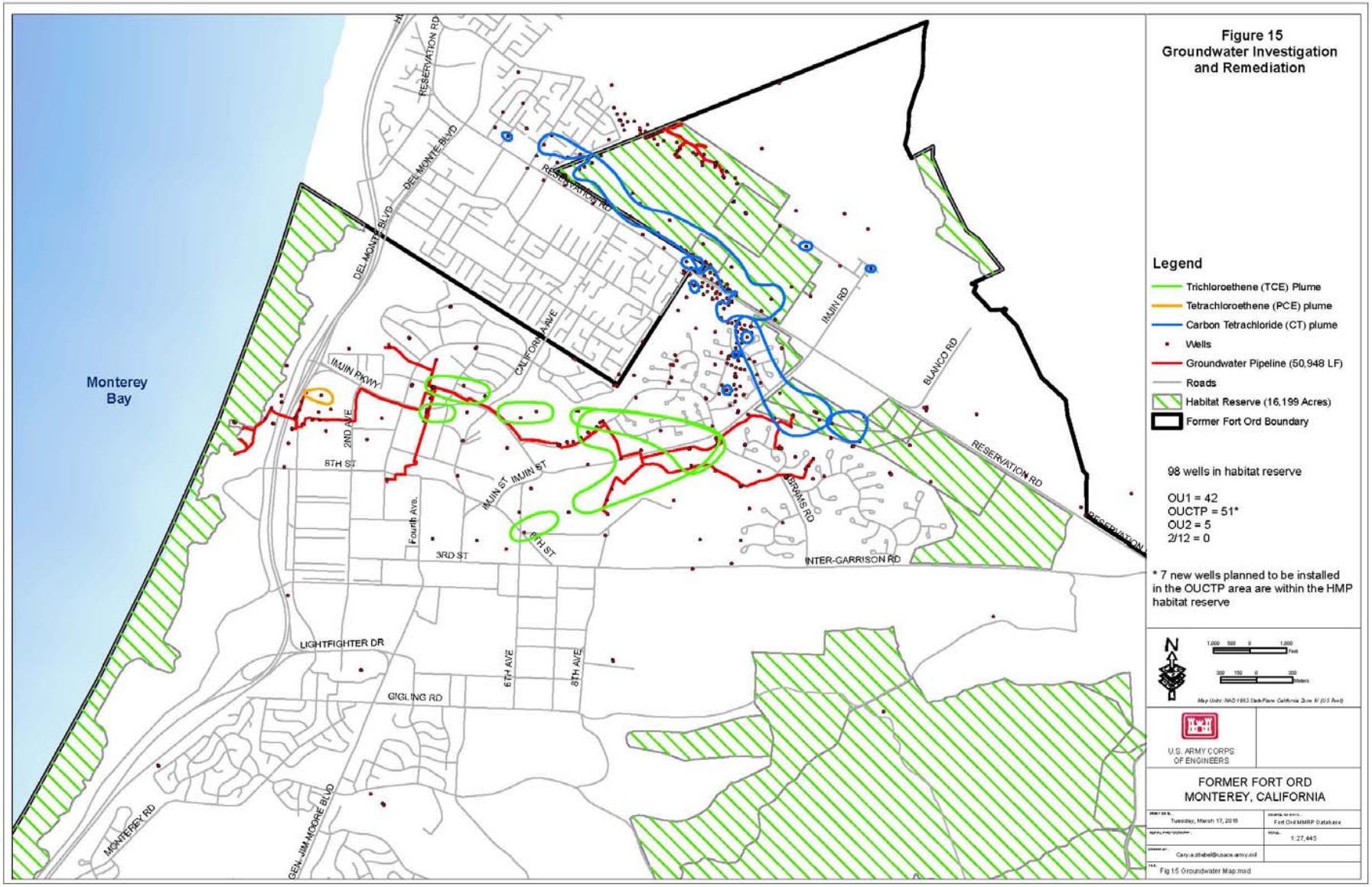
APPENDIX C. Fuel break map.



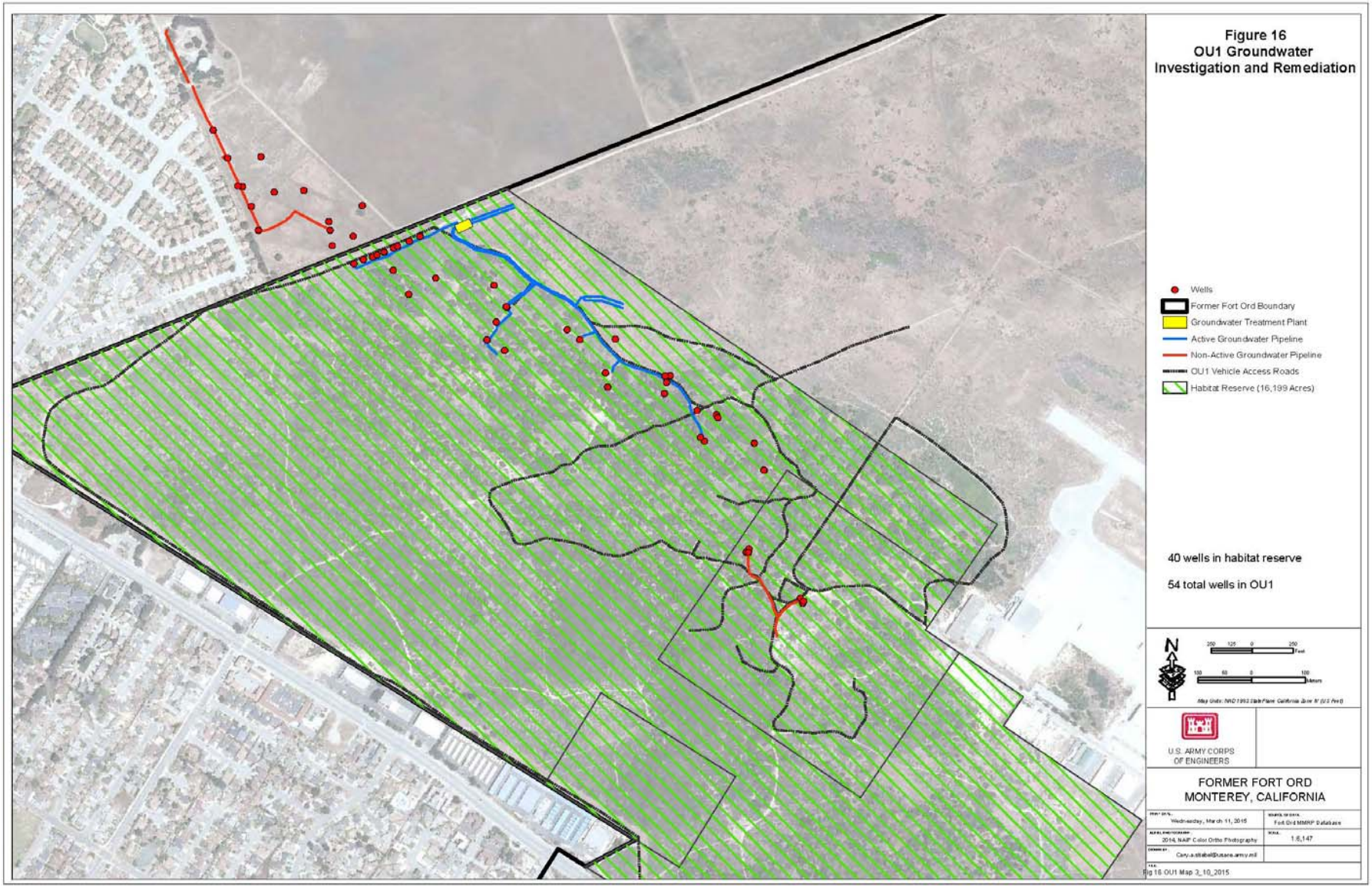
APPENDIX D. Site 39 and Track 3 excavation areas.



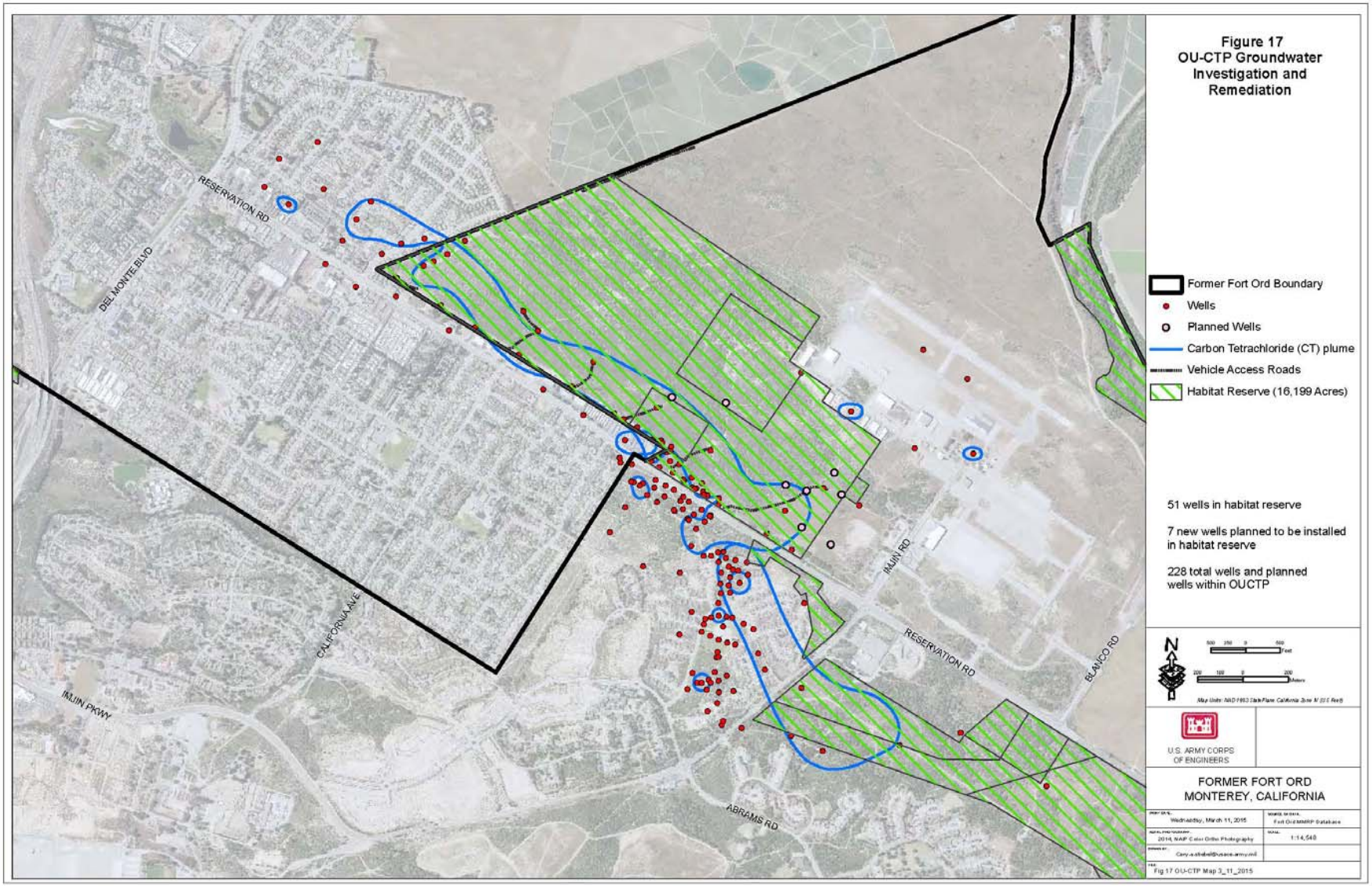
APPENDIX E. Groundwater investigation and remediation.



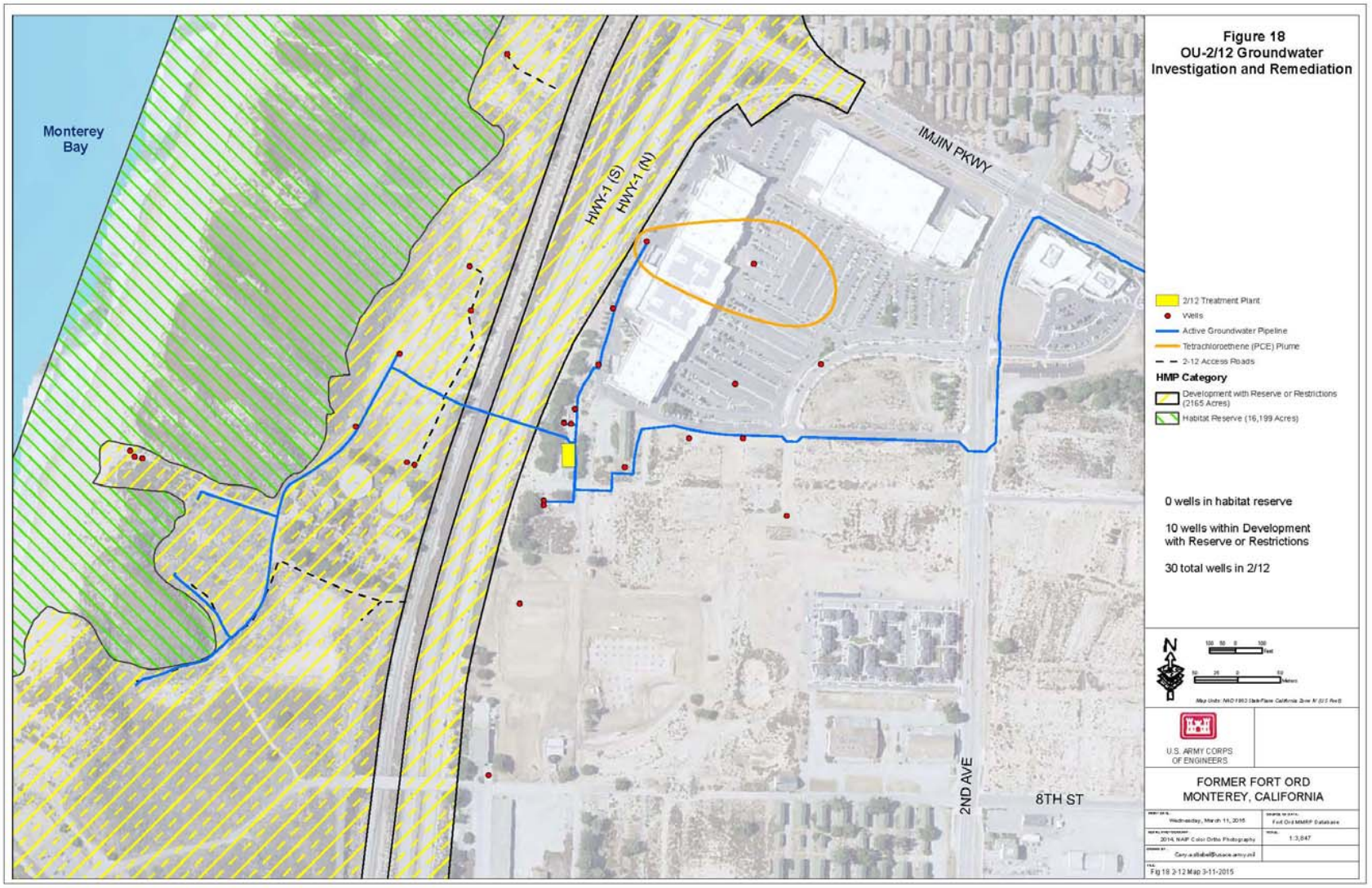
APPENDIX F. OU-1 groundwater investigation and remediation.



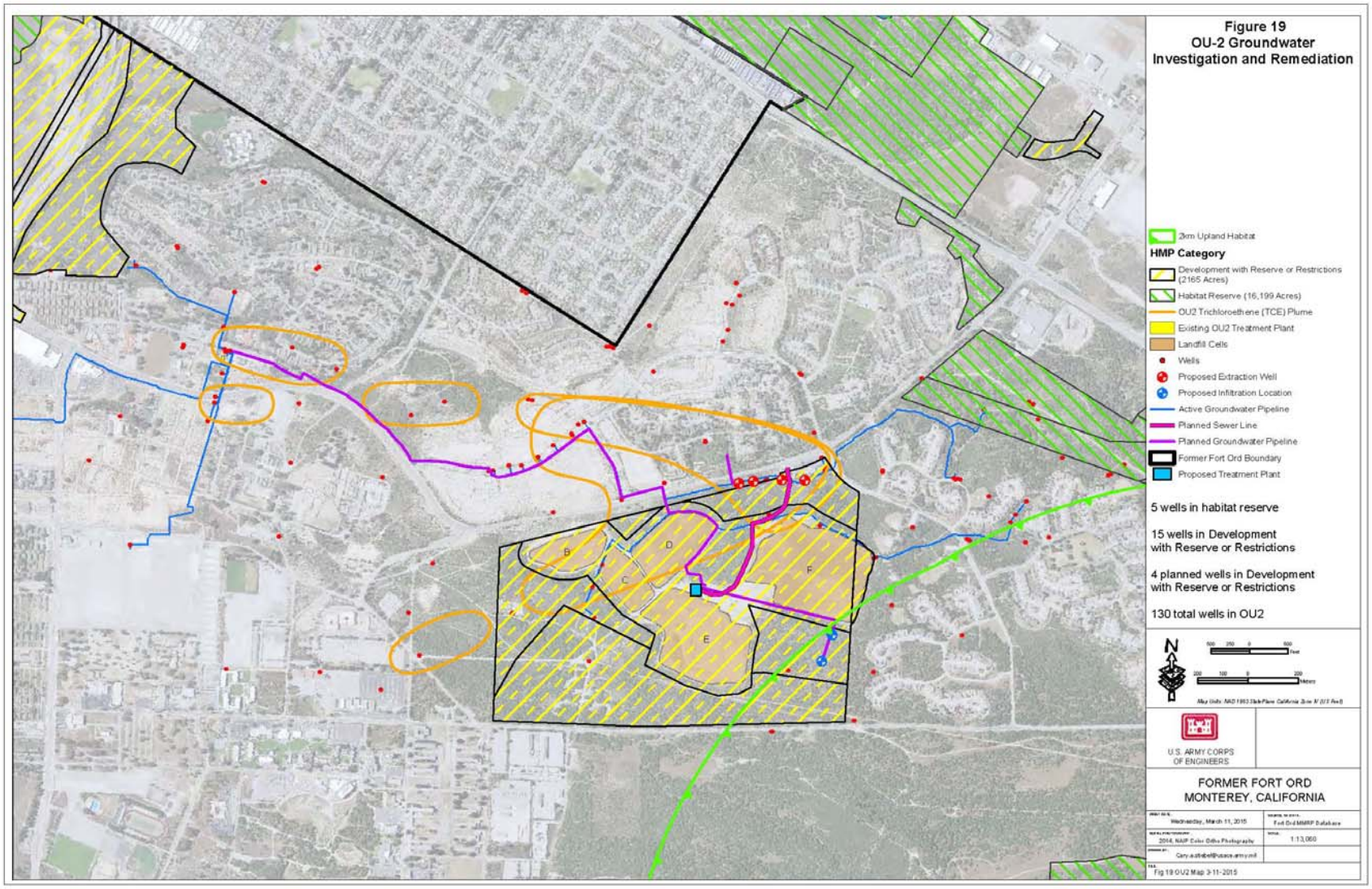
APPENDIX G. OU-CTP groundwater investigation and remediation.



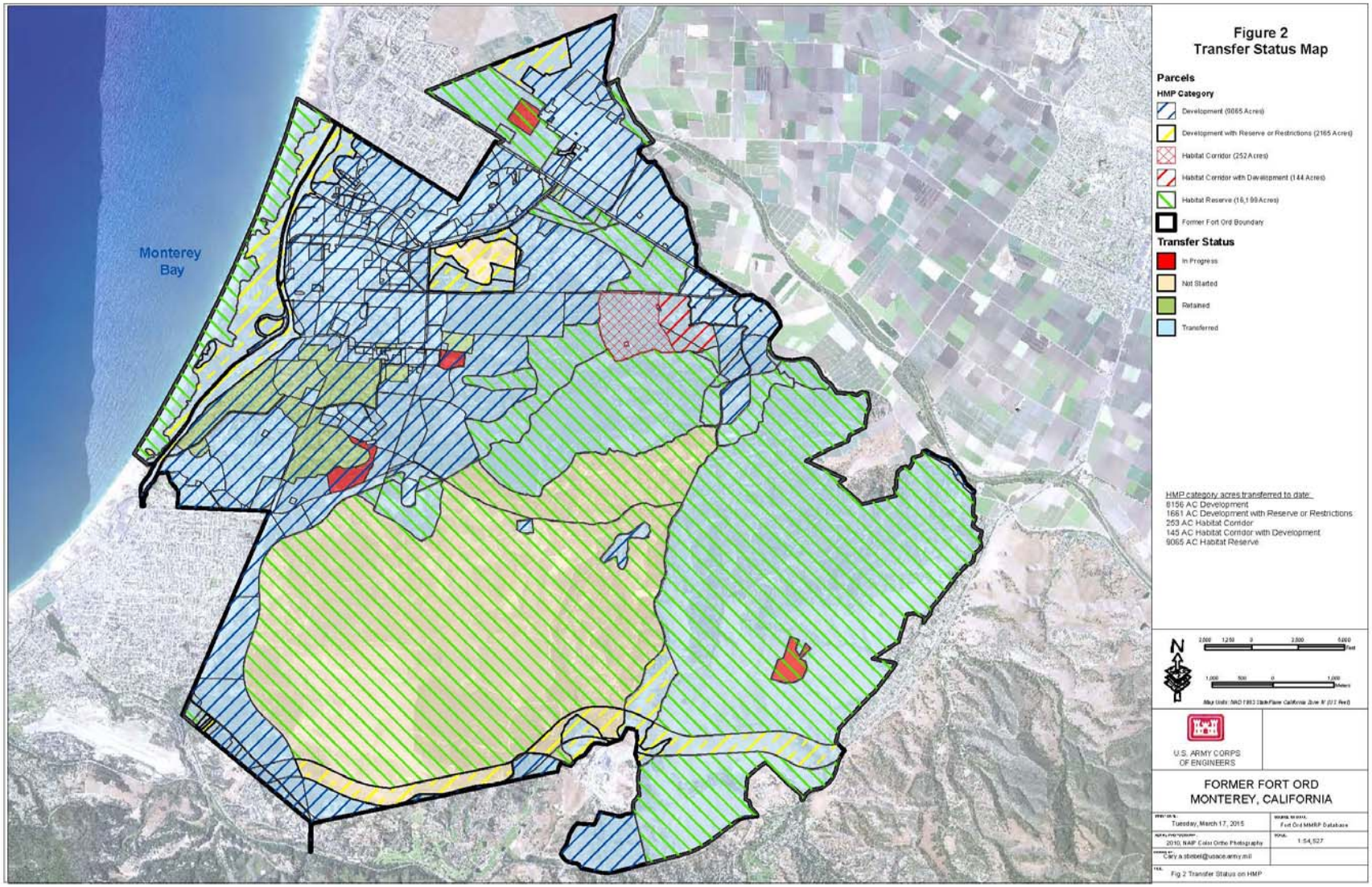
APPENDIX H. OU2/12 groundwater investigation and remediation.



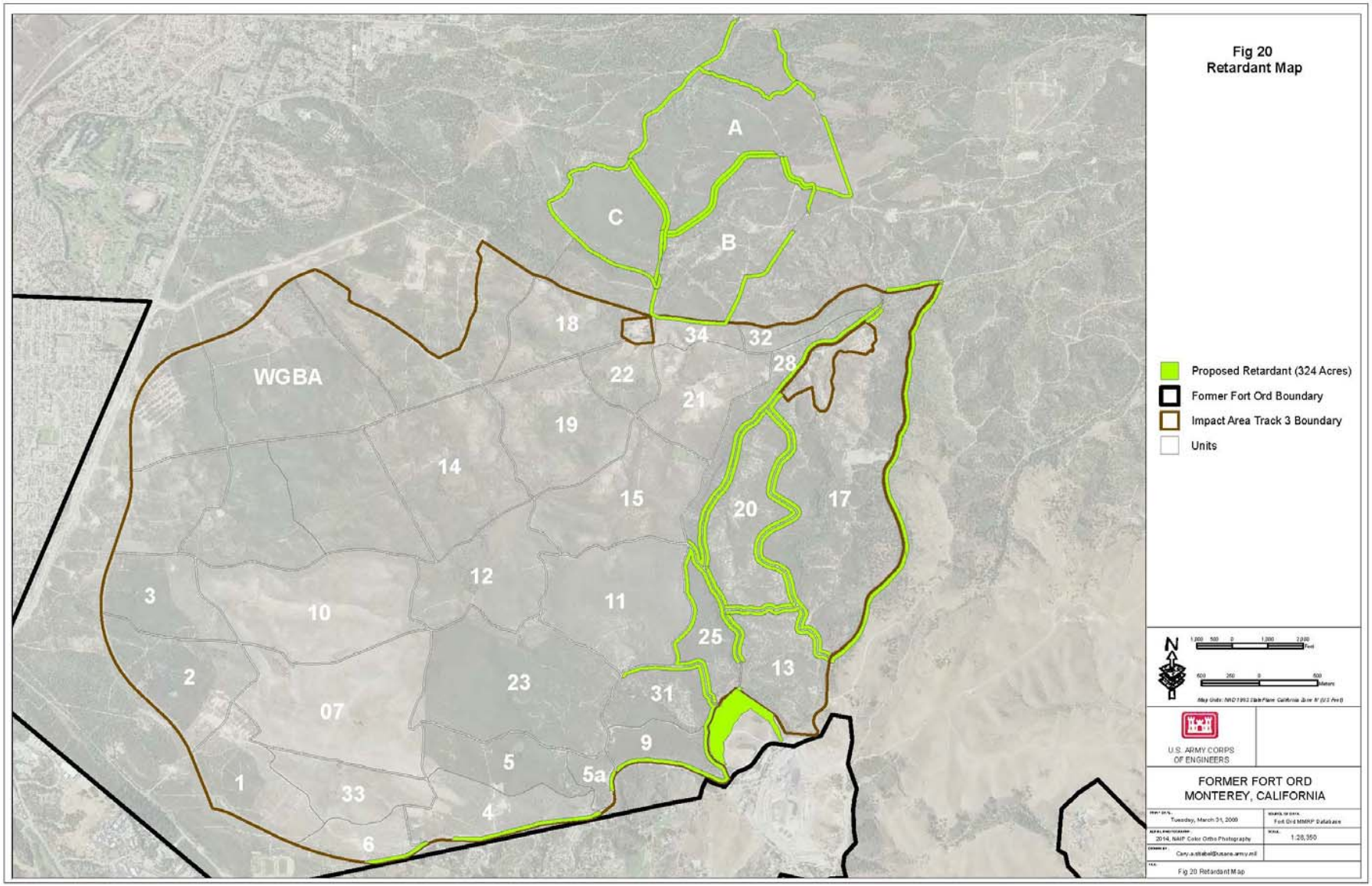
APPENDIX I. OU-2 groundwater investigation and remediation.



APPENDIX J. Transfer status map.



APPENDIX K. Fuel retardant map.



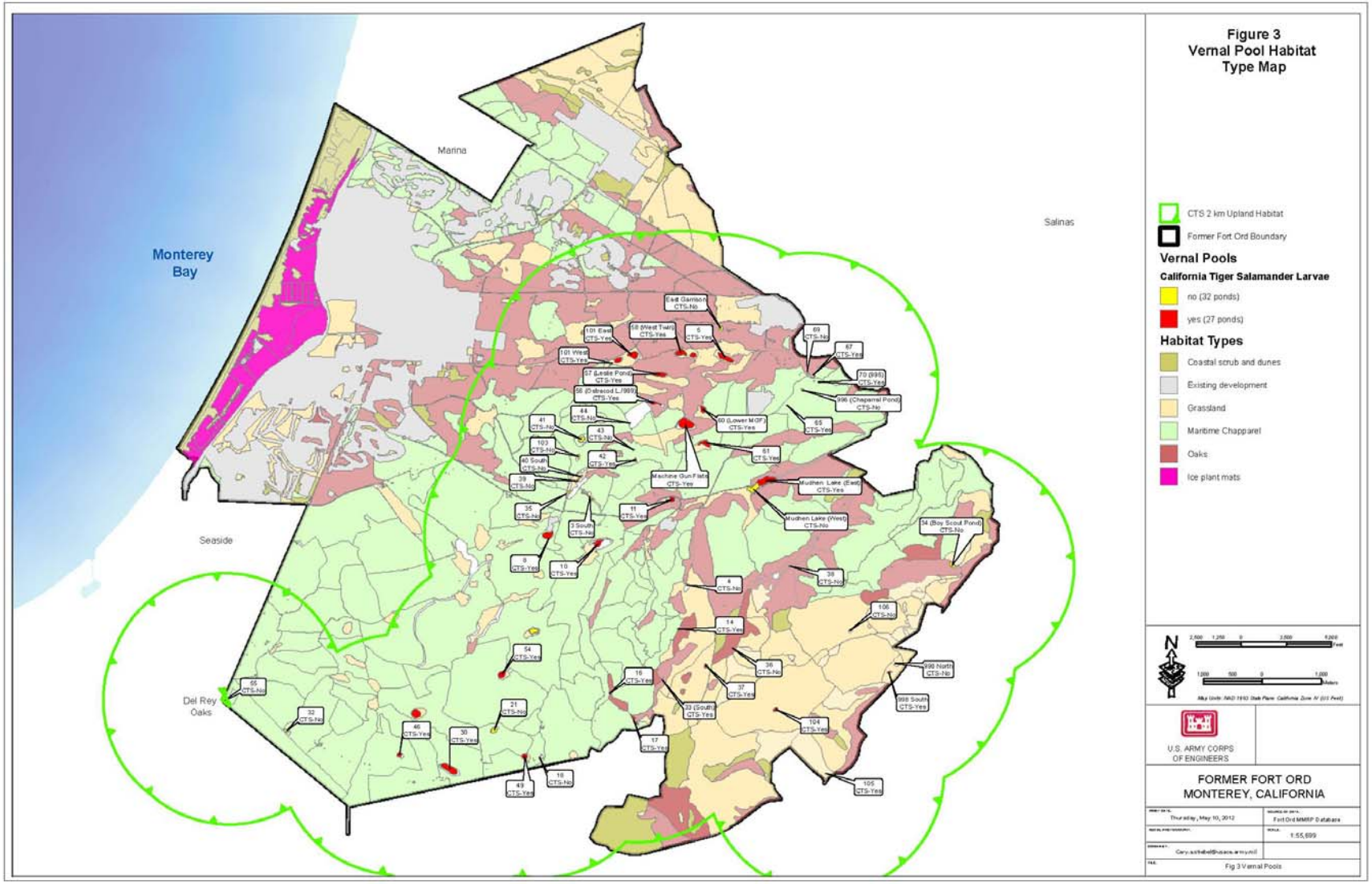
APPENDIX L. The Declining Amphibian Populations Task Force Fieldwork Code of Practice (DAPTF 1998)

A code of practice, prepared by the Declining Amphibian Populations Task Force, provides guidelines for use by anyone conducting field work at amphibian breeding sites or in other aquatic habitats. Observations of diseased and parasite-infected amphibians are now being frequently reported from sites all over the world. This has given rise to concerns that releasing amphibians following a period of captivity, during which time they can pick up unapparent infections of novel disease agents, may cause an increased risk of mortality in wild populations. Amphibian pathogens and parasites can also be carried in a variety of ways between habitats on the hands, footwear, or equipment of fieldworkers, which can spread them to novel localities containing species which have had little or no prior contact with such pathogens or parasites. Such occurrences may be implicated in some instances where amphibian populations have declined. Therefore, it is vitally important for those involved in amphibian research (and other wetland/pond studies including those on fish, invertebrates and plants) to take steps to minimize the spread of disease and parasites between study sites.

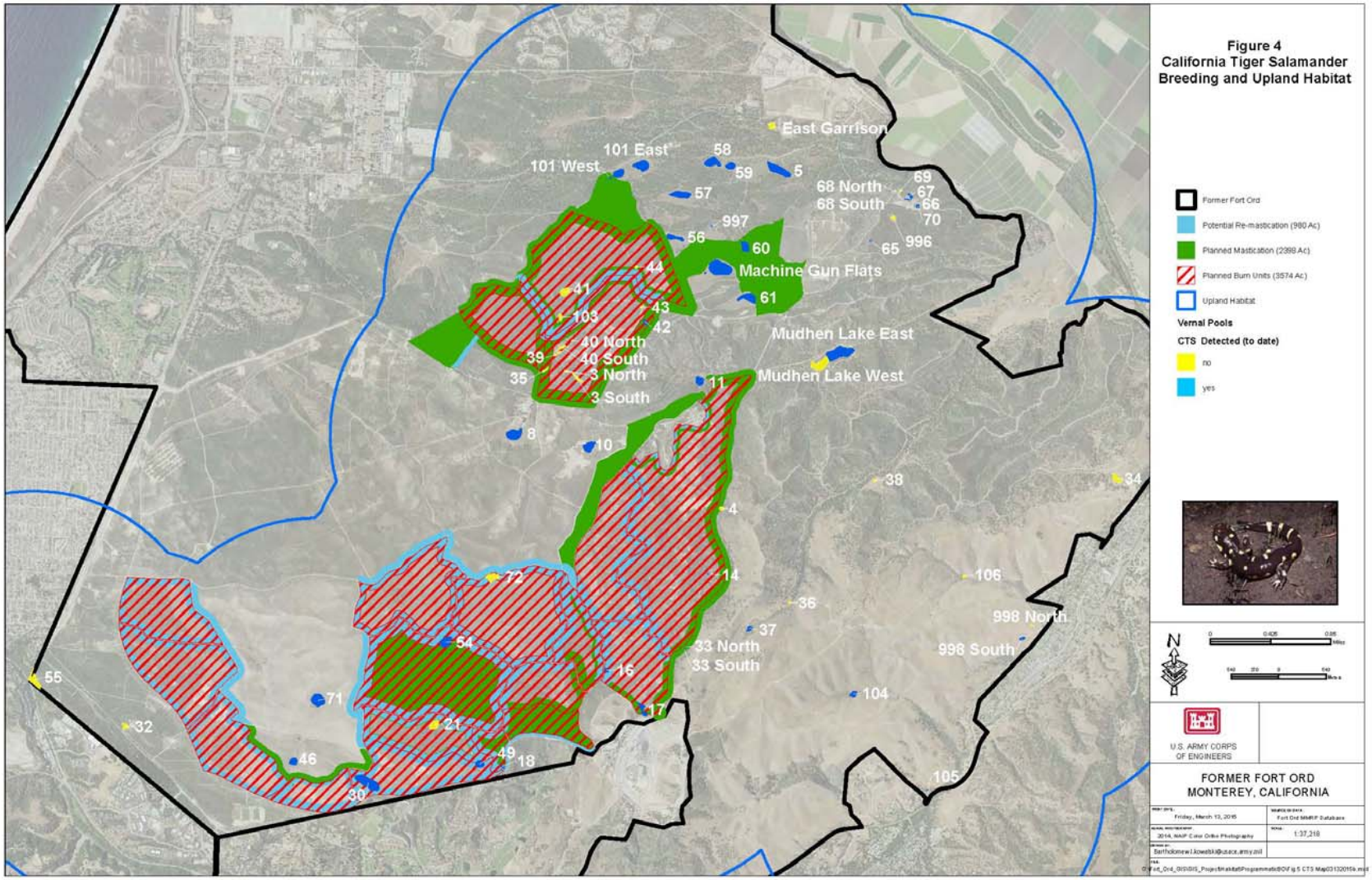
1. Remove mud, snails, algae, and other debris from nets, traps, boots, vehicle tires and all other surfaces. Rinse cleaned items with sterilized (e.g., boiled or treated) water before leaving each study site.
2. Boots, nets, traps, etc., should then be scrubbed with 70 percent ethanol solution (or sodium hypochlorite 3 to 6 percent) and rinsed clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond or wetland.
3. In remote locations, clean all equipment as described above upon return to the lab or "base camp". Elsewhere, when washing machine facilities are available, remove nets from poles and wash with bleach on a "delicates" cycle, contained in a protective mesh laundry bag.
4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolates species, wear disposable gloves and change them between handling each animal. Dedicate sets of nets, boots, traps, and other equipment to each site being visited. Clean and store them separately and the end of each field day.
5. When amphibians are collected, ensure the separation of animals from different sites and take great care to avoid indirect contact between them (e.g., via handling, reuse of containers) or with other captive animals. Isolation from un-sterilized plants or soils which have been taken from other sites is also essential. Always use disinfected/disposable husbandry equipment.
6. Examine collected amphibians for the presence of diseases and parasites soon after capture. Prior to their release or the release of any progeny, amphibians should be quarantined for a period and thoroughly screened for the presence of any potential disease agents.
7. Used cleaning materials (liquids, etc.) should be disposed of safely and if necessary taken back to the lab for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags (DAPTF 1998).

*When implementing the Declining Amphibian Populations Task Force Code of Practice, the Service-approved biologist may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care must be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

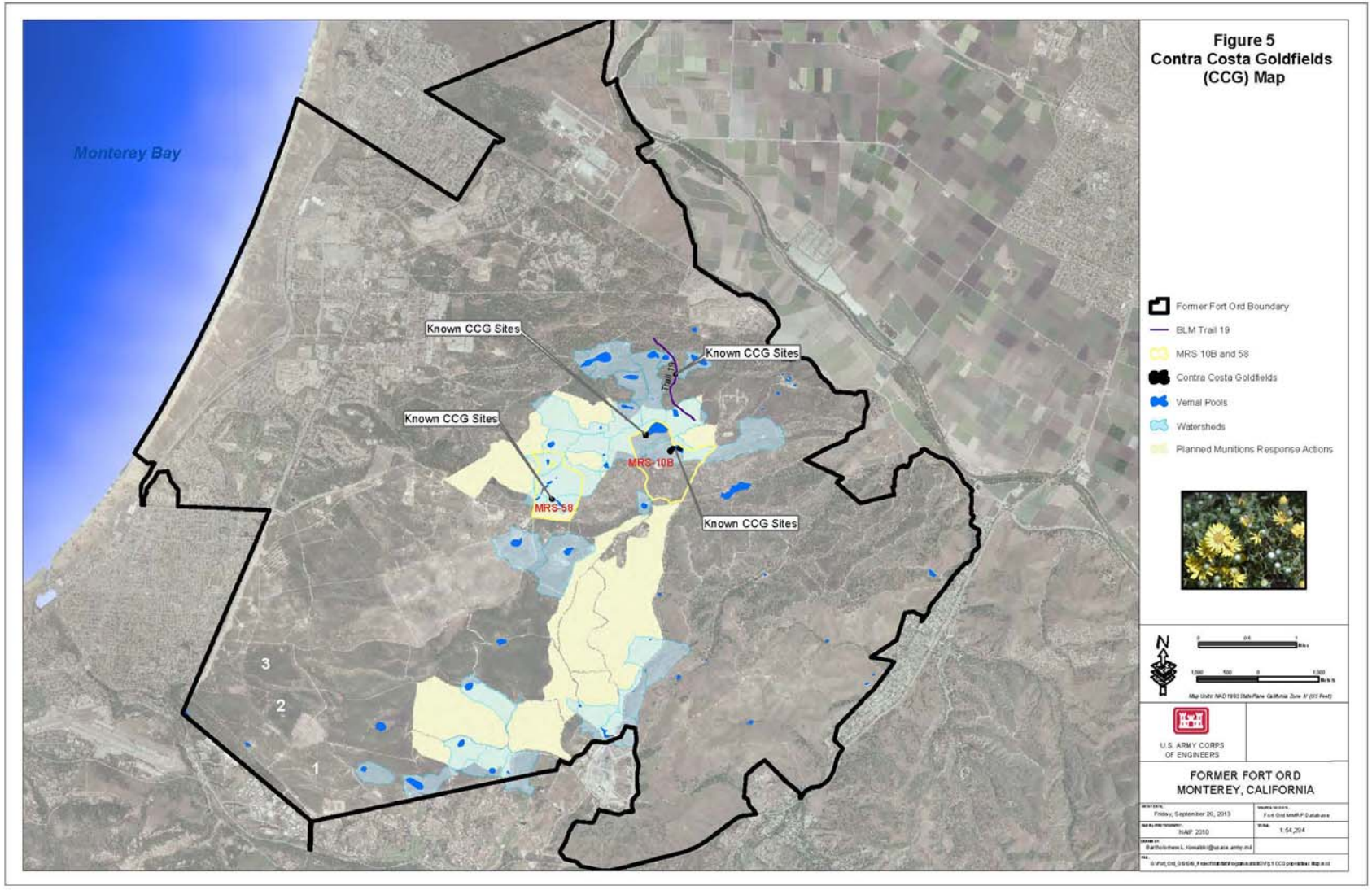
APPENDIX M. Vernal pool habitat type map.



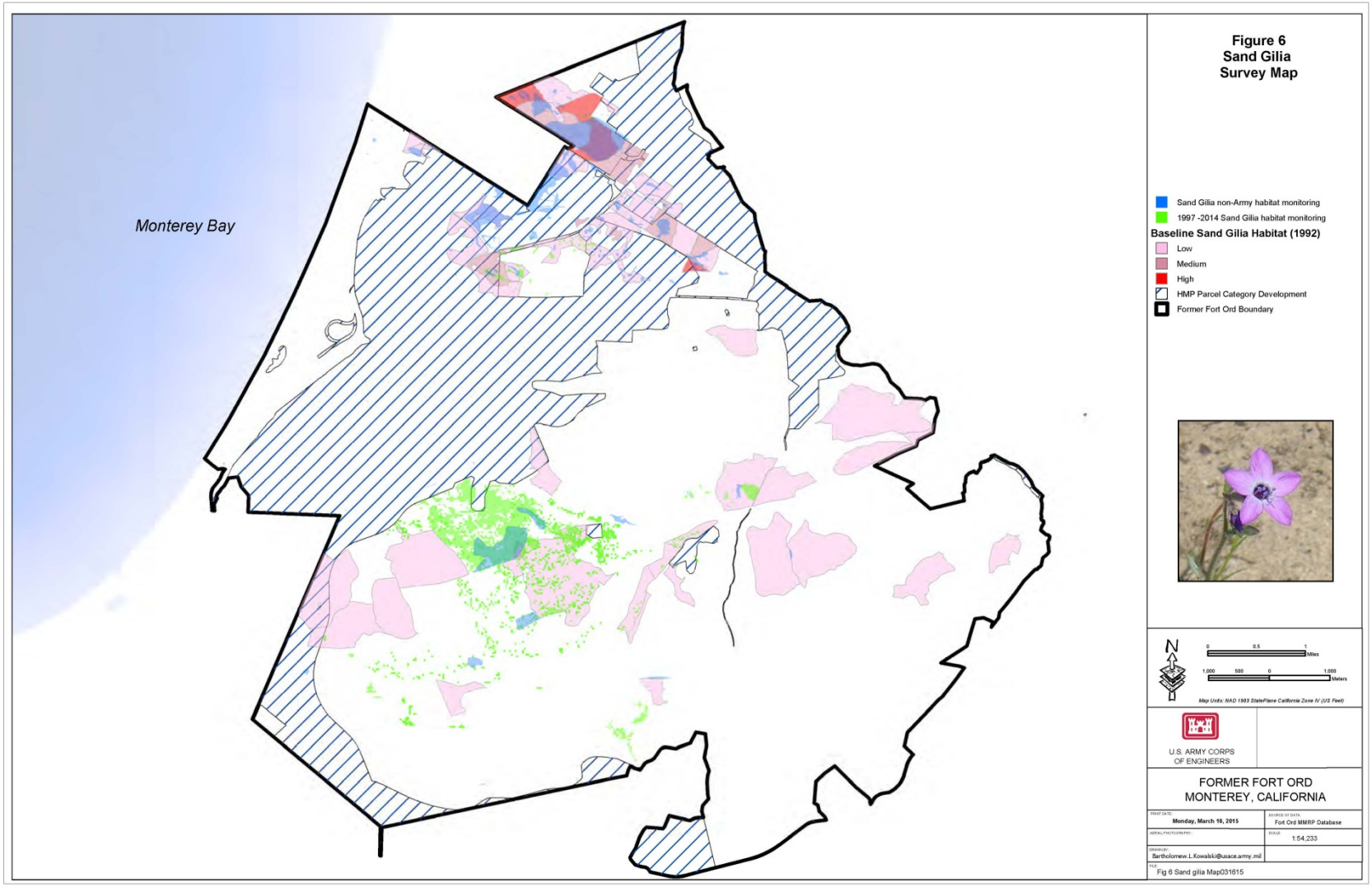
APPENDIX N. California tiger salamander survey map.



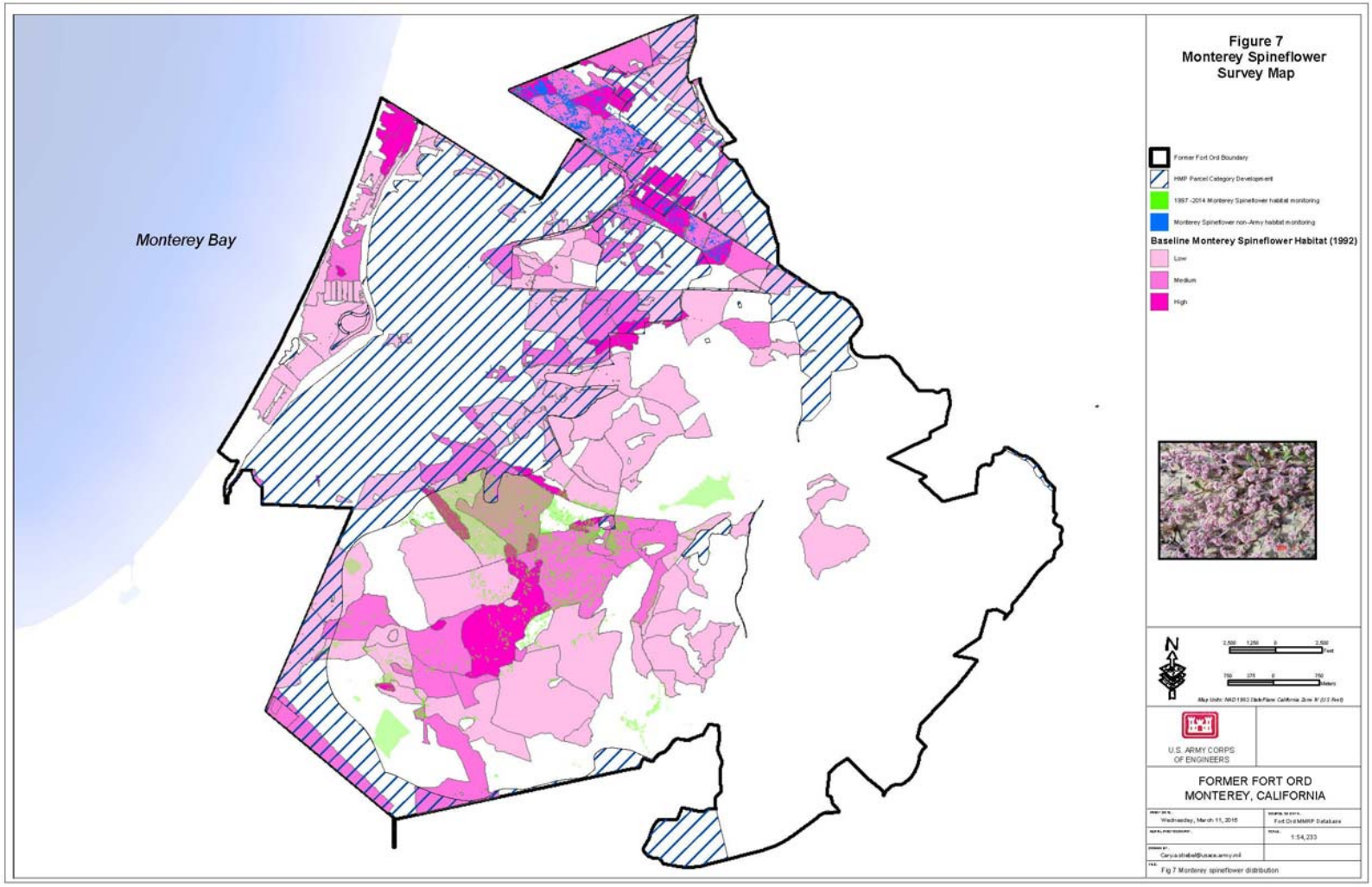
APPENDIX O. Contra Costa goldfields survey map.



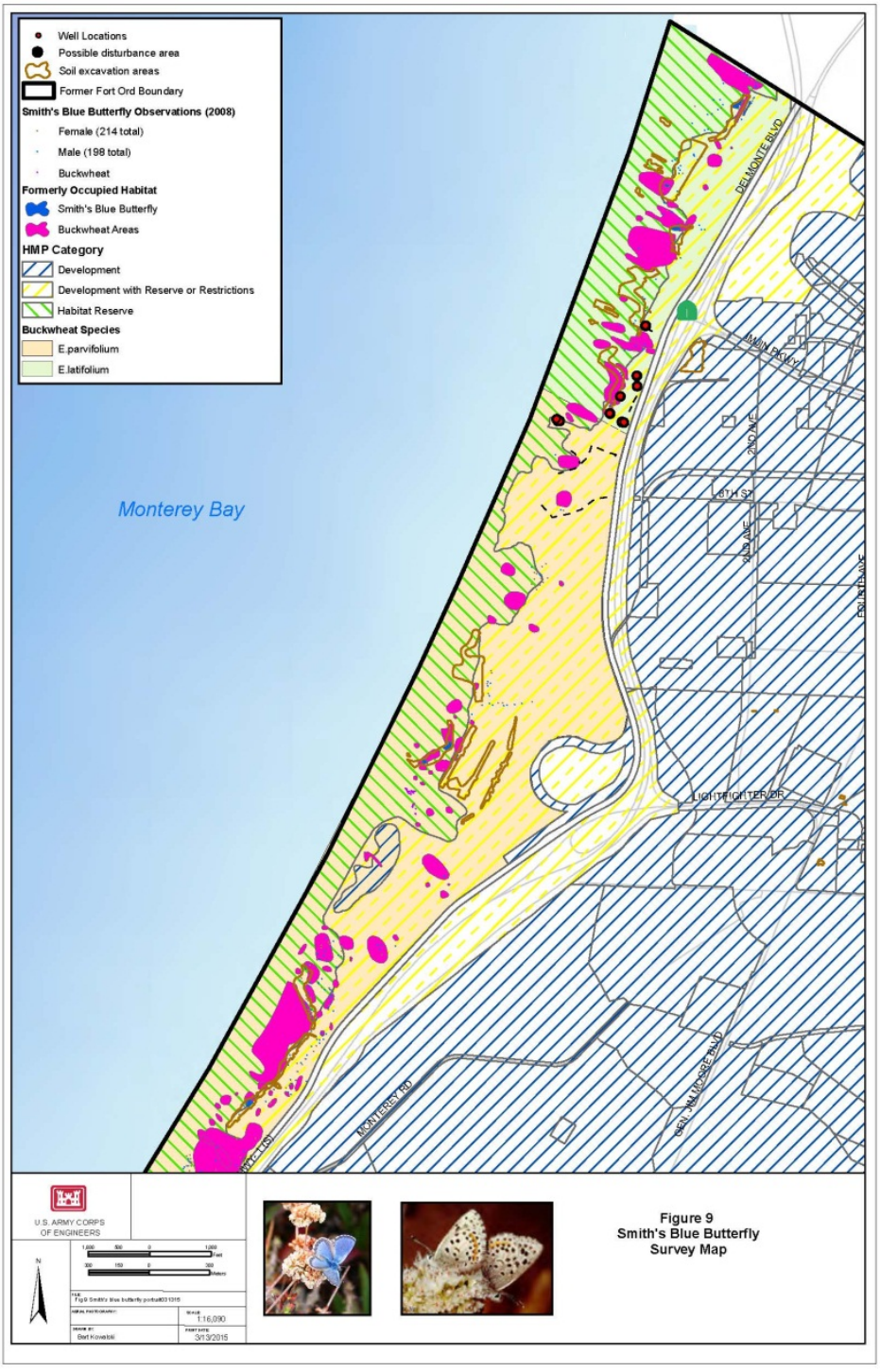
APPENDIX P. Monterey (sand) gilia survey map.



APPENDIX Q. Monterey spineflower survey map.



APPENDIX R. Smith's blue butterfly survey map.



APPENDIX S. Monterey spineflower critical habitat map.