United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
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Ventura, California 93003

IN REPLY REFER TO:
81440-2011-F-0163

June 23, 2011

Jane M. Hicks, Chief
Regulatory Division
U.S. Army Corps of Engineers, San Francisco District
1455 Market Street
San Francisco, California 94103-1398

Subject: Biological Opinion for the Partners in Restoration Permit Coordination Program, Santa Cruz County, California (8-8-11-F-13)

Dear Ms. Hicks

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Army Corps of Engineers' (Corps) proposed authorization of a Regional General Permit (RGP) to cover the U.S. Department of Agriculture, Natural Resources Conservation Service's (NRCS) and Santa Cruz County Resource Conservation District's (SCCRCD) Santa Cruz Countywide Partners in Restoration Permit Coordination Program (Program). The Program would involve implementation of 15 conservation practices outlined within the biological assessment (BA) included with your request. These practices would be carried out within Santa Cruz County, as a coordinated effort between the NRCS and the SCCRCD. These conservation practices would be designed to enhance fish and wildlife habitat, increase biodiversity, aid in the recovery of sensitive species, and improve water quality and quantity. The requested consultation concerns the potential effects of the Program on the federally endangered robust spineflower (*Chorizanthe robusta* var. *robusta*), Scott's Valley polygonum (*Polygonum hickmanii*), Scott's Valley spineflower (*Chorizanthe robusta* var. *hartwegii*), tidewater goby (*Eucyclogobius newberryi*), Zayante band-winged grasshopper (*Trimerotropis infantilis*), and designated critical habitat for each of these species; federally endangered Ben Lomond spineflower (*Chorizanthe pungens* var. *hartwegiana*), Ben Lomond wallflower (*Erysimum tetetifolium*), Santa Cruz cypress (*Cupresses abramsiana*), white-rayed pentachaeta (*Pentachaeta bellidiflora*), Mount Hermon June beetle (*Polyphylla barbata*), Ohlone tiger beetle (*Cicindela ohlone*), and Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*); and the federally threatened Monterey spineflower (*Chorizanthe pungens* var. *pungens*), Santa Cruz tarplant (*Holocarpha macradenia*), and California red-legged frog (*Rana draytonii*), and designated critical habitat for each of these species; federally threatened marbled murrelet (*Brachyramphus marmoratus*) and its proposed critical habitat; and federally threatened California tiger salamander (*Ambystoma californiense*). This biological opinion is issued in accordance with section 7 of the Endangered Species Act (Act) of 1973 as amended (16 U.S.C. 1531 et seq.).

You also requested our concurrence with your determination that the proposed project may affect, but is not likely to adversely affect the least Bell's vireo (*Vireo bellii pusillus*) and San Francisco garter snake (*Thamnophis sirtalis tetrataen*). We concur with your determination that the proposed project may effect but is not likely to adversely affect the federally endangered the least Bell's vireo and San Francisco garter snake because we anticipate any negative impacts to these species, if found to be present, would be avoided through implementation of the avoidance and minimization measures outlined below in the Description of the Proposed Action section. Additionally, San Francisco garter snakes are only known to occur in a small portion of northern Santa Cruz County (within Año Nuevo State Park, where Program activities will not occur) and least Bell's vireos are not currently known to occur in Santa Cruz County. During each year the proposed Program is in operation, the Corps, NRCS, and SCCRCD will coordinate with the Service to determine whether San Francisco garter snakes or least Bell's vireos have been documented within the Program area. If a San Francisco garter snake or an active least Bell's vireo nest is found within a 10-mile radius of any project site at any time, all project activities will halt and the Corps will reinitiate informal consultation with the Service.

We prepared this biological opinion using the following sources of information: the Program BA (NRCS 2010) accompanying your January 31, 2011 request for formal consultation, received in our office on February 3, 2011; telephone and electronic correspondence with staff from the Corps, NRCS, and SCCRCD; and information in our files. A complete record for this consultation can be made available at the Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

The existing NRCS/SCCRCD 5-year permit coordination program (2006 to 2010) for Santa Cruz County expired on December 31, 2010. On November 11, 2009, we received an electronic mail correspondence from Kelli Camara of the SCCRCD requesting technical assistance on the renewal of the Program. We provided technical assistance to the Corps, NRCS, and SCCRCD regarding the proposed changes to the conservation practices to be implemented under the Program, identification of federally protected species potentially occurring in the project area, habitat and wildlife concerns related to practices, potential effects to listed species in the project area, and recommended protection measures to minimize adverse effects to listed species. The Program has been refined to incorporate these recommendations and proposed changes and now contains a system for tiered ranking of practices, where higher tiered and more complex projects require more coordination with resource agencies and more stringent avoidance measures.

On February 3, 2011, the Ventura Fish and Wildlife Office received a request to initiate formal consultation for the proposed Program. We received electronic mail correspondence from Ms. Camara on February 9, 2011 that included a revised description of the wetland management practice under the Program. We then received a subsequent email from Holly Costa of the Corps on February 16, 2011, which was followed by a conference call between staff from our office and Ms. Camara on March 2, 2011, regarding details of the Corps' jurisdiction over the proposed Program. We received additional electronic mail correspondence from Ms. Camara on March 3, 2011, requesting formal consultation on the potential effects of the Program on the Santa Cruz

long-toed salamander and requesting changes to the allowable take as a result of death or injury for the Zayante band-winged grasshopper and Ohlone tiger beetle. We received electric mail correspondence from Ms. Camara on March 6, 2011, requesting consideration for inclusion of an additional authorized biologist to perform work under the biological opinion. We also received electric mail correspondence from Ms. Costa on June 15, 2011, requesting that critical habitat for the California red-legged frog and the tidewater goby be included in, and that the tidestrom's lupine be excluded from the formal consultation for the Program. This information has been incorporated into this biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Program Overview

The NRCS, in coordination with the SCCRCD, proposes to assist landowners in Santa Cruz County by providing funding and permitting assistance to those wishing to restore and enhance natural resource conditions on their properties. The NRCS would retain discretionary authority over projects implemented under the Program and maintain oversight of all individual projects through the planning, implementation, and monitoring phases of the Program. The NRCS and the SCCRCD would provide technical and cost-share assistance to participating landowners (cooperators), ensure compliance with proposed protective measures and permit conditions, and provide annual reports to the Service and other regulatory agencies. All landowners participating in the Program are required to sign a "Cooperator Agreement" (enclosure 1) which is also signed by the NRCS and SCCRCD. In signing the Cooperator Agreement, the landowner commits to abide by the specifications of the permits and agreements issued by the regulatory agencies authorizing conservation activities under the Program. If the landowner fails to perform according to the specifications outlined in the Cooperator Agreement, the NRCS/SCCRCD have the authority to remove the landowner from the Program and activities carried out by the landowner would no longer be authorized under the Program.

The Program is designed to facilitate coordination with multiple regulatory agencies (e.g., the Corps, the Service, National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), Central Coast Regional Water Quality Control Board (Regional Board), Santa Cruz County (County), California Coastal Commission (CACC), U.S. Environmental Protection Agency (USEPA), etc.) to ensure compliance with agency mandates while offering a more accessible permitting procedure to agricultural and rural landowners. The Program was originally modeled after the previously-developed Salinas River, Elkhorn Slough, and Morro Bay Watershed Permit Coordination Programs and has been successfully implemented in Santa Cruz County for the last 5 years. Under the proposed renewal of the Program, regulatory agencies would conduct programmatic evaluations of 15 specific, standardized conservation practices that are intended to improve habitat, water quality, and soil stability on farms, ranches, and other rural properties.

Individual projects under the Program would be relatively small in size, demonstrate a net environmental benefit to the species and habitats in the area, and would consist of erosion control or restoration activities in and around waterways throughout Santa Cruz County. The Program area encompasses all of the watersheds in Santa Cruz County. Specifically, the Program area includes the watersheds of Pescadero, Año Nuevo, Waddell, Scotts, Swanton Bluffs, Davenport, San Vicente, Lidell, Laguna, Majors, Baldwin Wilder, Soquel, Aptos, San Andreas, Arana Gulch-Rodeo, Pajaro River, San Lorenzo River, and Watsonville Slough.

NRCS/SCCRCD Planning Process

To ensure project activities are in compliance with Federal and State laws (e.g., the Federal Endangered Species Act, Migratory Bird Treaty Act, Clean Water Act, California Endangered Species Act, California Environmental Quality Act, etc.), the NRCS and SCCRCD propose to implement a rigorous planning process before offering assistance to potential cooperators. The NRCS and SCCRCD propose the following nine-step planning process to customize a management plan unique to the conditions of the local property and its owner/manager: (1) hold a consultation with the landowner to identify resource problems on the property; (2) determine and document the landowner's objectives; (3) inventory the soil, water, air, plant, animal, and human resources at project sites; (4) analyze resource problems or concerns identified during the inventory; (5) formulate alternative solutions which result in a significant positive improvement in all resource problem categories; (6) evaluate alternative solutions; (7) determine the course of action by selecting the optimal set of conservation practices to maximize resource protection and enhancement and prepare a conservation plan; (8) implement conservation practices with NRCS support according to recommended design standards and specifications; and (9) evaluate effectiveness and results of the plan, making adjustments as needed.

The SCCRCD proposes the following language for funding assurances to meet CDFG requirements:

> For projects funded by grants, the funding assurance shall be the Grant agreement itself, showing monies earmarked for implementation of necessary protection measures during implementation and follow-up monitoring, or another mechanism approved by CDFG in writing. For projects that do not have grant funding, the applicant shall be required to provide security in the form of a cash deposit in an amount approved in writing by CDFG and held by CDFG or another mechanism approved in writing by CDFG. The funding security will be held until the required measures have been successfully implemented.

Conservation Practices

The SCCRCD/NRCS propose to conduct 15 different types of conservation practices under the Program. Each of the conservation projects would be ranked with a four-tier system dictating which standardized protection measures would be applied based on the level of impact that the project is expected to have on the environment. Projects with the least impact would be placed in Tier I; those within the riparian corridor would be placed in Tier II; any and all projects that

have potential to negatively impact listed species or their habitat, designated critical habitat, and/or cultural resources, or projects that have work proposed within the stream corridor that require rock stream bank protection, grade stabilization structures, or replacement/repair of stream crossings would be placed in Tier III; and projects that occur in fish-bearing streams and involve dewatering and relocation of fish would be placed in Tier IV. Tiers are additive, thus each tier not only includes the protection measures specified for that tier, but also all of those specified for the lower tiers, too. Approximately 10 projects would occur annually in various locations throughout Santa Cruz County over the 10-year duration of the program. The SCCRCD/NRCS have proposed size limitations for all practices to limit the extent of disturbance within each project area (see enclosure 2). Detailed discussions of all 15 types of practices can be found in the Program BA (NRCS 2010); however, brief definitions and descriptions are as follows:

1. Access Road Improvements:

The NRCS/SCCRCD and cooperator would improve existing roads as part of a conservation plan. No new roads would be established. Roads would be improved (e.g., graded, drainage structures installed, etc.) to move livestock, produce, or equipment, or to improve access for property management while controlling runoff to prevent erosion. Water quality would also be maintained or improved. Examples of techniques employed are re-grading, outsloping, or installing waterbars or rolling dips for erosion control. If ditch relief culverts discharge onto slopes greater than 30 percent, additional protection measures would be implemented. Drainage would be addressed by providing drainage structures (i.e., culverts, bridges, or grade dips) dependent on the runoff conditions. Roadside ditches, water breaks, water bars, or drop inlets may be used to control surface runoff when necessary. The CDFG California Salmonid Stream Habitat Restoration Manual (CDFG 2002) would be used to guide implementation of projects.

2. Planting:

This conservation practice would involve planting vegetation such as trees, shrubs, vines, grasses, or legumes on highly erodible or critically eroding areas. This practice is used to stabilize the soil, reduce damage from sediment and runoff to downstream areas, and improve wildlife habitat and visual resources. Plants are expected to reduce the amount of soil nutrients and pollutants flowing into surface runoff or leaching into ground water.

3. Stream Habitat Improvement and Management:

The stream habitat improvement and management practice would involve “improving” or restoring a stream channel to create or enhance fish and wildlife habitat. The practice would be used to increase the quality of aquatic habitat in degraded streams, channels, and ditches by providing shade, controlling sediment, and restoring pool and riffle stream morphology. Pools and riffles would be formed in degraded stream reaches by strategically placing logs, root wads, or natural rock that reduces flow velocities through the area and the sedimentation downstream. This practice may also involve removing or modifying fish and wildlife passage barriers such as

flashboard dams, culverts, or logjams. Flashboard dams would be modified by cutting a notch in the dam. Dewatering project areas where this practice is implemented may be necessary. Dewatering would involve isolating the work area using temporary structures (e.g., sandbag cofferdams) and pumping water around the worksite.

4. Stream Crossing

This practice would be used to provide access on a site where an in-stream barrier has been removed (e.g., installing a bridge where a culvert has been removed). The maximum bridge size to be installed would be 100 feet across by 20 feet wide.

5. Grade Stabilization Structures:

Projects of this type would build structures into a gully to control grade and prevent channel incision. This practice involves earth-moving to reshape the area impacted by the gully and would utilize rock, timber, or vegetation structures, such as a brush mattress, placed to reduce the flow velocity (and thereby reduce erosion) above and below the structure. This practice is intended to decrease sediment yield and improve downstream water quality.

This practice would not be installed in fish-bearing streams and would be used primarily for gully repair. The CDFG California Salmonid Stream Habitat Restoration Manual would be used to guide implementation of projects.

6. Grassed Waterways:

This practice would involve shaping or grading a channel and planting suitable vegetation to stabilize the conveyance of surface runoff. This practice is intended to reduce the erosive force of concentrated runoff flow area such as a gully and the vegetation would act as a filter in removing sediment that would otherwise be delivered downstream of the waterway. This practice may involve some limited grading to prepare the area before planting.

7. Obstruction Removal:

Program activities of this type would remove and dispose of unnatural structures from waterways (e.g., cars, large appliances, and garbage). Obstructions would not be removed if their removal would have a net detrimental effect to the habitat conditions of the waterway or if they are larger than 50 feet long or wide. Structures would be removed when the stream channel is dry or during the lowest flows to minimize impact. Dewatering the project area may be necessary when conducting this practice.

8. Restoration and Management of Declining Habitats:

This practice would restore and conserve rare or declining native vegetation communities and associated wildlife species. This practice is intended to: restore upland or aquatic habitats

degraded by human activity or exotic species, provide habitat for rare and declining wildlife species by restoring and conserving native plant communities, increase native plant community diversity, and manage unique or declining native habitats. This practice may be used to remove non-native invasive plant species in sensitive habitats or to manage fuel loads in sensitive habitats and includes subsequent maintenance and revegetation of the area.

9. Sediment Basins:

This conservation practice would consist of constructing basins to collect and store debris or sediment to prevent sediment deposition on surrounding lowlands or waterways. Basins would typically be constructed at the base of agricultural lands where runoff and sediment would otherwise degrade water quality and habitat conditions in natural drainages or riparian areas. Basins may also be used to reduce concentrated off-site flow and associated erosion by metering out runoff following large storm events. If water control is necessary, an earth embankment or a combination ridge and channel design may be constructed across the slope to form a sediment trap and water detention basin. The design of spillways and outlets would include water control structures to prevent scouring at discharge points. This practice is not intended to treat the source of sediment, but to provide a barrier to reduce the degradation of surface water quality downstream. Sediment basins would not be constructed in stream channels or other natural water bodies.

10. Stream Bank Protection:

This practice would involve using vegetation or structures to stabilize and protect banks of streams, lakes, or estuaries against scour and erosion. This practice is intended to reduce the amount of sediment and pollution delivered downstream, improve habitat for fish and wildlife, and protect adjacent land from erosion damage. This practice would be applied to natural or excavated channels where stream banks are susceptible to damage from erosion, livestock, or vehicular traffic. In most cases, the streambed grade would need to be controlled before permanent bank protection could be implemented. Examples of this practice include log cribbing, live vegetative crib walls, logbank armor, willow sprigging, brush mattressing, and native material revetment (CDFG 2002).

11. Stream Channel Stabilization:

This practice would consist of designing and installing grade control structures to stabilize a streambed and encourage the growth of riparian vegetation. This practice would be applied to stream channels undergoing aggradation (sedimentation) or degradation (scour) that cannot be reasonably controlled with upstream practices (e.g., establishment of vegetation for protection, installation of bank protection, or installation of upstream water control measures). This practice may also include removing accumulated sand or sediment that has blocked the channel from a storm event, bank failure, or dam. This practice would not be used in fish-bearing streams or for routine dredging of a waterway. Dewatering project areas may be necessary when conducting the stream channel stabilization practice.

12. Structures for Water Control:

Where appropriate, Program activities would install a structure that conveys water, controls the direction or rate of flow, or maintains a desired water surface elevation in an irrigation drainage, stream, or other water management system. This practice would be used to replace or retrofit existing culverts that are not functioning properly or are a barrier to fish passage, or to install new culverts where appropriate. This practice is intended to reduce erosion and prevent down-cutting of stream channels. Culvert design and selection would be consistent with the CDFG Culvert Criteria for Fish Passage (CDFG 2003) and the NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001).

13. Underground Outlets:

This practice would involve installing conduit beneath the surface of the ground to collect surface water and convey it to suitable outlets. Excess surface water from farm land on steep terrain would be collected and conveyed to a sediment basin by installing pipelines underground. Location, size, and number of inlets would be selected to collect excess runoff and prevent erosive surface flow. This runoff would then be discharged to a sediment basin where high velocity runoff is calmed and suspended sediment is trapped and settled prior to releasing water at a natural rate of flow into a natural drainage channel.

14. Wetland Management

This practice would be used to restore and enhance the wetland conditions in an area to those that existed prior to modification for farming, grazing, or other land use or to create improved hydrologic function or wetland conditions for sensitive species. This practice may include minor reshaping to restore topographic relief of the site, hydrological enhancement (increasing the season of inundation or saturation), and vegetative enhancement to remove any non-native species or replant the area with natives. If necessary, diking or other methods of water control may be used to manage the area for pest control. Maintenance of the area, including management of water levels and vegetation composition, would be included under this practice.

15. Upland Wildlife Habitat Management

This practice would be utilized to create, restore, and enhance upland habitat for wildlife species by installing shelter, cover, and/or food, or manipulating vegetation to enable movement and sustain optimal habitat conditions. This practice may also include the creation of infrastructure, such as a fence, water pipeline, or watering facility, as necessary to attain desired habitat conditions or shift livestock out of a sensitive area.

Notification and Communication Procedures

1. Each spring (by May 15) the NRCS/SCCRCD will send an “unofficial pre-construction notification” (PCN) to the Service. The unofficial pre-construction notification will

consist of site-specific information for each of the proposed projects for that construction season.

2. If the Service would like to discuss any of the proposed projects in greater detail after reviewing this notification, the NRCS and SCCRCD will meet with the Service within 30 days of receipt of the PCN and arrange site visits, if necessary. The Service will then determine if additional, site-specific, protection measures are appropriate.

3. If any changes are necessary, the SCCRCD or NRCS will draft a letter to the Service summarizing any special conditions established in the meeting along with the project descriptions, incorporating any recommendations developed during the meeting. This letter will be considered the official PCN.

4. The NRCS and SCCRCD will provide written notification to the Service of the status of all projects in the form of an annual report. The report will list participating land owners, describe the purpose of each project, the area affected, natural biological enhancements, and the volume of grading. The report will list conservation benefits and any net gains in wetlands and riparian areas, describe actions taken to avoid adverse effects to listed species, and provide photo documentation of "before and after" site conditions. The NRCS will submit the annual report to the Service by January 31 of each year.

Conservation Measures

General Conservation Measures

The project proponents propose to implement measures to avoid, reduce, and monitor potential impacts of the Program to federally listed species and their habitat. Unless more specific protective measures are identified for individual species (see the "Species-specific Conservation Measures" section of this biological opinion), the Corps will ensure that the NRCS and SCCRCD implement the measures described below during all projects conducted under the Program.

1. The NRCS and SCCRCD will closely monitor all projects they fund or design during construction to ensure compliance with the plans or recommendations provided. Maintenance of the conservation practices implemented will be the landowner's responsibility; however, the NRCS and SCCRCD will perform annual formal status reviews on all projects during the life of the contract (typically from 2 to 10 years) and perform an annual random review of 20 percent of completed projects. The status review will be used to determine if the system is functioning as planned. The terms and conditions from regulatory agencies shall be included with NRCS/SCCRCD design standards and specifications for each technical assistance and cost share project implemented under this program. Staff of NRCS and SCCRCD will visit sites following project completion; site visits will also be prompted by a cooperator's request for minor

modifications or fine-tuning, or to show other prospective landowners the conservation practices in use.

2. The NRCS and SCCRCD will ensure compliance through on-site monitoring until implementation of the conservation practices is complete. For projects where adverse effects of the action are difficult to assess, an individual approved by the Service will evaluate effects to the federally listed species or critical habitat in question.

3. The general construction season for projects under the program would be from April 15 to October 31; however, modifications to that time frame may be made on a site-specific basis, depending on the practice involved, with approval from the Service. No earth moving activities will take place outside of the general construction season. The NRCS and SCCRCD will incorporate specific conditions for the implementation of conservation practices in project designs where appropriate. These conditions may include temporal or seasonal constraints, limitations on the size or location of the specified practice, or preconstruction notification for specific activities to avoid or minimize the impact of the work on water quality, sensitive habitats, and sensitive species.

4. Only projects that meet all Program criteria (e.g., they would involve 1 or more of the 15 established practices, meet the size limits specified above under the specific conservation practices, comply with all permit conditions, etc.) will be conducted under the Program. For NRCS/SCCRCD projects that do not qualify for inclusion in the Program, the cooperator will be responsible for obtaining individual permits from applicable regulatory agencies prior to conducting the proposed project.

5. After 5 years of program implementation, following the 2015 construction season, the NRCS/SCCRCD will compile a comprehensive assessment of the Program and all projects implemented to that point. The assessment will summarize the types of projects and conservation practices installed and discuss the Program's successes and challenges, including the regulatory process required to comply with the Program's permits and authorizations. The compiled data should provide the agencies with a general overview of the Program's effectiveness and provide an opportunity for the agencies to discuss any needed improvements with the Corps, NRCS, and SCCRCD. A similar comprehensive report would be compiled at the end of the Program in 2020.

6. The NRCS/SCCRCD will identify and evaluate characteristics of habitat conditions and the potential for listed/sensitive species to occur in proposed work areas during pre-project design.

7. The NRCS/SCCRCD will submit names and credentials of individuals under consideration for handling and conducting surveys for any federally listed species to the Service at least 15 days prior to the onset of activities that they are being authorized to conduct.

8. Bird nesting sites and habitat within 75 feet of riparian vegetation will be avoided during the nesting season (generally from March 1 to August 1). If Program activities must occur in potential nesting areas during this timeframe a qualified individual will conduct nesting bird surveys within the project area.

9. Staff of NRCS/SCCRCD will be trained and familiar with the preferred habitats of the species named in this biological opinion.

10. Program activities will avoid impacts to vernal pool habitat. Staff of NRCS/SCCRCD will conduct reconnaissance-level surveys of project sites to determine if potential vernal pool habitat is present. If potential vernal pool habitat exists, a Service-approved individual will conduct a pre-construction survey to verify if vernal pool habitat is present in the project area. If vernal pool habitat is found in the work area, the project will not be included in the Program.

Earthmoving and vegetation removal conservation measures include:

1. Disturbance to existing grades and vegetation within the project sites and access routes will be limited to the smallest area possible (as determined by the NRCS, SCCRCD, and Service-approved individuals). Placement of all access routes, staging areas, and other facilities will avoid and limit disturbance to habitat as much as possible. In many cases, project activities would utilize pre-existing staging areas. In areas where a new staging area must be created, the typical size of the staging area including access roads is expected to be less than 0.25 acre. Routes and boundaries of access routes, staging areas, and work areas will be clearly demarcated. The amount of time construction equipment is staged, working, or traveling within stream channels will be minimized to the greatest extent possible.

2. If the substrate of a water body is altered during work activities and the alteration is not the goal of the practice being implemented (e.g., channel stabilization), it will be returned to the approximate pre-construction morphology and condition unless the Service agrees that other measures should be implemented.

3. Finished grades will not be steeper than 2:1 (run:rise) unless site-specific conditions prohibit the feasibility of a 2:1 slope. Upon completion of grading, all disturbed slopes will be protected through a combination of: (a) establishing permanent vegetation; (b) mulching; (c) geotextiles; and/or (d) installing rock slope protection.

4. Disturbance of native shrubs, woody perennials, or trees in riparian zones will be avoided or minimized to the fullest extent possible. If trees larger than 6 inches in diameter at breast height (dbh) are removed, they will be replaced at a 3:1 ratio (i.e., three trees planted for each tree removed).

5. Program activities will avoid removing riparian vegetation to the maximum extent possible. If riparian vegetation is removed during Program activities, it will be replaced with similar and/or native riparian species (See revegetation and invasive plant removal protective measures (5(c) below).

6. If riparian vegetation removal is required in or adjacent to stands larger than 0.5 acre, the vegetation will be cleared by hand, leaving as much as possible of the roots and base of plants intact (unless the project involves removal of exotic invasive plants such as giant reed (*Arundo donax*) or cape ivy (*Delairea odorata*) that reproduce from cuttings). During or following completion of construction, poles and branches of native riparian vegetation will be replanted on stream banks.

7. Program activities will minimize all potential contributions of sediment to waterways. To the greatest extent possible, excavated materials will be re-integrated on site. In the rare cases where excavated material is not used in project implementation, the excess excavated material will be moved off-site or deposited on portions of the property where it will not be carried by runoff into waterways.

Refuse, debris, and hazardous material conservation measures include:

1. Staging, fueling, and maintenance of vehicles and other equipment will not occur within 100 feet of aquatic habitat, including ponds, streams, creeks, or any other water body. If site conditions (e.g., property size) make this 100-foot distance infeasible, these activities will occur at the maximum distance possible from aquatic areas.

2. Vehicle maintenance and washing will be done off-site.

3. Construction and project-related vehicles will be inspected daily for leaks and repaired immediately. Hydraulic fluids in construction equipment working within a stream channel will not contain organophosphate esters. Any leaks detected will be repaired before resuming construction activities.

4. All spent fluids (e.g., motor oil, coolant, etc.) and used vehicle batteries will be collected, stored, and recycled off-site as hazardous waste. All questionable motor oil, coolant, transmission fluids, hydraulic fluid hoses, fittings, and seals on construction equipment will be replaced.

5. All workers will be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur. Spill containment materials will be kept on-site when mechanical equipment is in operation. All leaks, drips, and other spills will be cleaned up immediately. If a spill occurs, dry cleanup methods (e.g., absorbent materials, rags, etc.) will be implemented whenever possible.

6. All trash and construction debris will be properly contained, removed from the work site, and disposed of at an appropriate off-site disposal location daily. Following project completion, work areas will be inspected to ensure all trash and debris are removed.

7. Construction equipment will not be operated in flowing or standing water, except to cross a stream or pond if necessary to access a work site.

8. Construction equipment with rubber tires will be used whenever possible. Tracked vehicles will only be used when using rubber-tired vehicles is infeasible.

Revegetation and invasive plant removal conservation measures include:

1. Invasive species removal work may continue until December 31, if no known species occurrences are documented in the area within the past 2 years. If historical information is not available for the site, protocol levels surveys will be conducted in the area to determine presence or absence of listed species prior to the onset of work. If listed species are present (or assumed present based on habitat), a Service-approved biologist will be present during work activities. All work during the wet season (e.g., after October 31) will be completed by non-mechanized hand tools.

2. Project area vegetation will be restored to pre-construction conditions or better. If native vegetation is disturbed during project activities, the native plant community will be restored to pre-construction conditions or better.

3. Areas exposed by any project activities, except for soil in agricultural fields, will be revegetated with native trees, shrubs, and/or grasses before the end of the construction season (October 31) of the project year. For any work conducted between October 15 to May 15, all inactive areas (defined as a 5-day period) will have all necessary soil stabilization practices in place 2 days after identification of inactivity or before a rain event, whichever comes first. To the maximum extent possible, revegetation will be implemented at the same time that removal of non-native vegetation occurs.

4. Native plants characteristic of the local habitat type will be the preferred alternative when implementing and maintaining the practices in natural areas. A non-native plant species that cannot reproduce may be used as a nurse crop or to temporarily stabilize disturbed slopes until native plants are established. The NRCS has developed lists of non-native plants that are not allowed to be used for plantings as a part of the Program (Enclosure 3).

5. The NRCS and/or SCCRCD will monitor revegetation and invasive plant removal projects for at least 2 years following project completion to ensure success criteria are met. The NRCS/SCCRCD will document revegetation success in the annual report provided to the regulatory agencies.

6. The introduction or spread of non-native plant species will be avoided to the maximum extent possible by avoiding areas with established native vegetation during project activities, restoring disturbed areas with native species where appropriate, and conducting post-project monitoring and control of non-native species. The NRCS/SCCRCD will remove invasive, non-native plants in the project areas where practicable, and will strongly recommend that cooperators remove invasive non-native species.

7. The NRCS, SCCRCD, and/or cooperators will remove vegetation in the riparian areas by hand (i.e., using hand tools, weed whacking, hand pulling) whenever possible, in preparation for establishment of plantings.

8. Hand labor will be used to control non-native vegetation at the project site. However, herbicides may be necessary to control established stands of non-native species such as vinca (*Vinca major*), cape ivy, English ivy (*Hedera helix*), and brooms (*Cytisus* spp. or *Genista monspessulana*), or to prevent invasions of non-native species into restoration plantings. Herbicides will be applied according to registered label conditions, hand-painted on the treatment area, and carefully applied during non-windy days with no rain forecasted within 3-5 days. When herbicides are used near waterways, an approved glyphosate-based herbicide that is safe to use in or near aquatic habitats will be utilized.

9. No soil amendments will be used within the stream channel. On stream banks (above the high water mark) or uplands, organic soil amendments will be exclusively used whenever possible to ensure successful establishment of restoration vegetation associated with the practices. Occasionally, chemical fertilizers may be used in situations where organic amendments will not guarantee an adequate establishment of restored vegetation. In such cases, application rates will be based on soil nutrient testing and will utilize slow release or split applications to minimize leaching or runoff into water bodies.

10. If giant reed (or similar invasive plant species that reproduce from cuttings) is removed, cuttings will be disposed of in a manner that will not allow re-establishment to occur and will not introduce cuttings to other areas.

Erosion control conservation measures include:

1. Earthmoving activities will be completed prior to October 31. Work beyond October 31 will occur only if authorized in advance by the Service and other participating agencies. All excavation and grading activities will be conducted during dry weather periods. If federally listed species are present (or assumed present based on habitat), a Service-approved biologist will be onsite during work activities.

2. Erosion control and sediment retention devices will be incorporated into project designs and implemented at the time of construction. These devices will be in place prior to the onset of rain. They will be placed at all locations of a project site where the likelihood of

sediment transport exists. Sediment collected by these devices will be disposed of away from the collection site and above the normal high-water mark.

3. All debris, sediment, vegetation, and other material removed from a waterway will be removed to a location where it cannot re-enter waterways or wetlands.

4. Best management practices, as defined by the Regional Board, will be implemented for all projects conducted under the Program.

Conservation measures for working in streams and permanently ponded areas include:

1. No practices shall be implemented or maintained in ponded areas without discussion with the Service to determine if additional conditions or procedures are needed. Permanent ponded areas are understood to be areas where there is standing water most of the year.

2. If it is necessary to conduct work in or near a live stream or ponded area, the work area will be isolated from flowing water to prevent sedimentation and turbidity. To isolate work areas, flowing water will be temporarily diverted around the work site such that downstream flows are maintained during construction.

3. Any temporary dam or artificial obstruction will be constructed from materials such as sandbags or clean gravel that will not contribute sediment to the waterway.

4. If potential wetlands are identified in the project area, wetland delineations will be performed during the site evaluation stage of planning to assist in avoiding impacts to wetlands. The methodology for conducting the delineations under the proposed Program has been developed in coordination with the Corps.

Species-specific Conservation Measures

Least Bell's Vireo Protective Measures

1. Least Bell's vireos are not currently known to occur in Santa Cruz County. During each year the proposed Program is in operation, the Corps, NRCS, and SCCRCD will coordinate with the Service to determine whether least Bell's vireos have been documented in Santa Cruz County. If an active least Bell's vireo nest is found within a 10-mile radius of any project site at any time, all project activities will halt and the Corps will reinitiate consultation with the Service.

2. If least Bell's vireos are documented in Santa Cruz County at any time during the life of the Program, the Corps, NRCS, and SCCRCD will implement the following avoidance measures:

a. During the project assessment stage, NRCS or SCCRCD staff or qualified individual knowledgeable in least Bell's vireo identification and biology will assess if potential least Bell's vireo habitat occurs in the project area;

b. No construction activities will be conducted within 0.25 mile of any site with potential least Bell's vireo habitat between February 1 and September 15;

c. Vegetation will not be removed from any site with potential least Bell's vireo habitat between February 1 and September 15. If it is not possible to schedule removal of vegetation between September 16 and January 31 at sites with potential least Bell's vireo habitat, a Service-approved biologist that is knowledgeable in least Bell's vireo identification, vocalizations, and biology will conduct two pre-construction surveys for least Bell's vireo. The second pre-construction survey will be conducted no more than 4 days prior to the commencement of project-related activities. If a least Bell's vireo is detected during pre-construction surveys, the NRCS/SCCRCD or Corps will notify the Service and work will not be conducted at the site until the Service, NRCS, and Corps have completed the appropriate level of consultation.

3. There will not be any incidental take of least Bell's vireo proposed under the Program.

San Francisco Garter Snake Protective Measures

If at any time a San Francisco garter snake is observed on or near a project site, all project activities at the site will cease and the NRCS or SCCRCD will contact the Service to determine if additional protective measures are necessary. During the project assessment stage, the Corps, NRCS, and SCCRCD will coordinate with the Service and CDFG to determine whether the project area lies within the known range of the San Francisco garter snake. If the project area lies within the known range of the San Francisco garter snake:

1. The NRCS or SCCRCD will conduct a habitat assessment to determine if potential habitat for the species is present in the project area.

2. A Service-approved biologist will conduct a worker education session for all project personnel on identification of the San Francisco garter snake. The worker education session will include, but not be limited to: information on the identification of the San Francisco garter snake; a description of the species' habitat; the importance of the San Francisco garter snake and its habitat; the general measures that are being implemented to conserve the San Francisco garter snake as they relate to the project; and the boundaries within which the project may be accomplished.

3. Project personnel (including NRCS and SCCRCD staff, cooperators, and contractors) will not attempt to touch, capture, or move any snake detected during project activities.

4. Project areas, including access routes and staging areas, will be clearly marked and limited to the minimum area necessary for project completion. All project-related activities will be restricted to these established routes and staging areas. To the maximum extent possible, access routes, staging areas, and work areas will be sited to avoid areas with small mammal burrows.

5. If the project area lies within the known range of the San Francisco garter snake, and the habitat assessment described in measure 1 above determines that potential habitat for the species occurs within or adjacent to the project site, the following protection measures will be implemented:

    a. Within 48 hours prior to the commencement of equipment staging, construction, vegetation removal, grading, or other project-related activities, a Service-approved biologist will conduct a survey of all work areas that will be disturbed by project activities and identify any burrows that may potentially be used by the San Francisco garter snake. If suitable habitat for the San Francisco garter snake exists or the subspecies is observed during pre-construction surveys or at any point during the project, all activity in the area will cease and the NRCS or SCCRCD will contact the Service immediately for further guidance. Project-related activities will not begin until this protective measure has been completed.

    b. A Service-approved biologist will thoroughly survey for San Francisco garter snakes prior to, and be on site during, all vegetation removal, fill placement, grading, or other ground-disturbing activities to maximize the likelihood of detecting any San Francisco garter snakes that may be present in work areas. The Service-approved individual will have the authority to halt work activities that may adversely affect San Francisco garter snakes until such time as individuals of the species are no longer in harm's way.

    c. All vegetation removal activities will be conducted with hand tools, rather than with heavy or mechanized equipment, to maximize the likelihood of detecting any San Francisco garter snakes that may be present in work areas.

    d. Whenever possible, the NRCS and SCCRCD will avoid working in ponds and marshes. However, if it is not possible to avoid working in ponds and marshes, work will be conducted when the area is dry.

    e. Whenever project activities remove native vegetation, such removal will be temporary (i.e., the area will be revegetated). Project activities will not reduce the coverage of native vegetation by more than 50 percent in any project area during the period prior to revegetation.

6. There will not be any incidental take of San Francisco garter snake proposed under the Program.

Protective Measures for Federally Listed Plant Species

During the project assessment, the NRCS/SCCRCD will assess if suitable habitat is present within the project area for the following listed plant species: Ben Lomond spineflower, Ben Lomond wallflower, Monterey spineflower, robust spineflower, Santa Cruz cypress, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, and the white-rayed pentachaeta.

1. If suitable habitat exists or a listed species is found within the project area, a Service-approved biologist will evaluate characteristic habitat conditions for the listed species during steps 3 through 6 of the conservation planning process.

2. When listed plant species are found in a project area, the plants will not be disturbed and a buffer zone of 20 feet will be established around the plants to avoid impacts to the plants. Removal of invasive, non-native plants by hand (i.e. using hand tools, hand pulling, etc.) within this buffer may occur to protect listed plants.

3. If impacts to listed plant species cannot be avoided and the 20-foot buffer maintained, the Service will be notified and options to offset potential effects will be proposed as part of the project.

4. Pesticides or fertilizers will not be used in the buffer zone to hasten or improve the growth of any plantings associated with the Program practices.

5. Grading of adjacent portions of the project site shall not alter surface and subsurface hydrologic processes to the detriment of the species.

6. No sod-forming or non-native invasive plants will be planted.

7. The introduction or spread of invasive non-native plants will be discouraged and removal strongly recommended.

Mount Hermon June Beetle Protective Measures

During the project assessment stage, the NRCS and SCCRCD will evaluate whether project areas support potential habitat for the Mount Hermon June beetle. A Service-approved individual will evaluate all proposed project areas within the Felton quadrangle (U.S. Geological Survey, 7.5-minute series) for the potential presence of Sandhills species. If the project area supports suitable habitat for either species, the Corps will ensure that the NRCS and SCCRCD implement the following minimization and avoidance measures:

1. If potential habitat is present in the project area, all work activities will occur between October 1 and May 15 to avoid the active flight season. The NRCS/SCCRCD will contact the Service for prior approval if activities are proposed outside of the approved time period.

2. Non-native plant removal will be completed using hand tools and hand pulling, if possible.

3. A Service-approved biologist will be on site during ground disturbing activities to monitor work and to relocate Mount Hermon June beetles if found during ground disturbance activities. If found, adults will be placed outside of the work zone and larvae unearthed will be reburied in suitable habitat. Any larvae unearthed will be carefully buried by a Service-approved biologist to a similar depth as it was found. All non-ground disturbing activities will be supervised by a Service-approved monitor.

4. Soils disturbed and left unworked for an extended period of time (for more than 24 hours) as a result of project-related activities will be left in their disturbed state for 72 hours to avoid injury to unearthed Mount Hermon June beetles and allow time for larvae and adult females to burrow back under the soil surface. Whenever possible, following this 72 hour period, workers will pack down soils by hand to minimize potential impacts to the beetles and larvae beneath the surface.

5. Temporary stockpiling of non-native vegetation (tree and shrub cuttings, etc.) will only occur in areas where no habitat is present for the federally listed Zayante Sandhills species, as determined by a Service-approved biologist. All material will be removed from the site prior to May to avoid the Mount Hermon June beetle flight season.

6. If revegetation is deemed necessary, no sod-forming grasses or non-native species will be planted. No mulch will be utilized.

7. Whenever possible, project activities will avoid impacts to ponderosa pines. If possible, the development envelope will be sited at least 33 feet from any living pines. For project activities occurring in the Zayante Sandhills, if it is determined that the project requires removal of ponderosa pines, NRCS/SCCRCD will notify the Service in the pre-construction notification to the agencies prior to removal. If ponderosa pine trees are removed from the project site, the NRCS or SCCRCD will plant ponderosa pine seedlings as part of the project.

8. In addition to the limitations on use of herbicides described under Revegetation and Invasive Plant Removal General Conservation Measures section (Measure 8) of this biological opinion, the NRCS/SCCRCD will apply the following restrictions on herbicide use to project areas that support potential habitat for the Mount Hermon June beetle:

    a. When herbicides are used near waterways, an approved glyphosate-based herbicide that is safe to use in or near aquatic habitats would be utilized.

    b. Herbicides would be applied on calm (wind speed less than 5 miles per hour), dry days (no rain), and according to registered label conditions.

c. All chemicals used in herbicide operations would be limited to that which is minimally necessary, and when not in use will be stored in an impermeable lining away from areas that support habitat for listed species.

Ohlone Tiger Beetle Protective Measures

During the project assessment stage, the NRCS/SCCRCD will determine if the project area is in the vicinity of a known population of the Ohlone tiger beetle. If the project area is within 0.5 mile of a known population of the species and/or within suitable habitat for the Ohlone tiger beetle (i.e. coastal terrace prairie grassland), the NRCS/SCCRCD will work with the Service to develop site-specific avoidance and minimization measures for the project. The protective measures implemented will include, but not be limited to:

1. Soils disturbed and left unworked for an extended period of time (more than 24 hours) as a result of project-related activities will be left in their disturbed state for at least 72 hours to avoid injury to unearthed Ohlone tiger beetles and allow time for larvae and adult beetles to burrow back under the soil surface. Whenever possible, following this 72 hour period, workers will pack down soils by hand to minimize potential impacts to the beetles and larvae beneath the surface.

2. No sod-forming grasses will be planted.

Zayante Band-winged Grasshopper Protective Measures

During the project assessment stage, the NRCS and SCCRCD will evaluate whether project areas support potential habitat for the Zayante band-winged grasshopper. A Service-approved biologist will evaluate all proposed project areas within the Felton quadrangle (U.S. Geological Survey, 7.5-minute series) for the potential presence of Sandhills species. If the project area supports suitable habitat for Zayante band-winged grasshopper, the Corps will ensure that the NRCS and SCCRCD implement the following minimization and avoidance measures:

1. A Service-approved biologist will be on site to relocate juvenile and adult Zayante band-winged grasshoppers and move them out of harm's way if found during ground disturbance activities.

2. If silver bush lupine (*Lupinus albifronss*) or sessileflower false goldenaster (*Heterotheca sessiliflora* ssp. *echioides* var. *camphorata*) are present in the project area, project activities will avoid impacts to Zayante band-winged grasshoppers feeding on these plants by establishing a 30-foot buffer around the plants.

3. The NRCS/SCCRCD will determine if lupines or *Lotus* spp., other than listed tidestrom's lupine, or telegraph weed (*Heterotheca grandiflora*) are present in the project area. If these plant species are found within the project area, a 10-foot buffer will be established

around the plants to avoid impacts to any Zayante band-winged grasshoppers feeding on these plants.

4. Stockpiling of vegetation would only occur in areas where no habitat is present for the Zayante band-winged grasshopper. AService-approved biologist will inspect the area prior to placing the stockpiled material and move any Zayante band-winged grasshoppers found out of harm's way.

5. Non-native plant removal will be completed using hand tools and hand pulling, if possible.

6. If revegetation is deemed necessary, no sod-forming grasses or non-native species will be planted. No mulch will be utilized.

7. In addition to the limitations on use of herbicides described under Revegetation and Invasive Plant Removal General Conservation Measures section (Measure 8) of this biological opinion, the NRCS/SCCRCD will apply the following restrictions on herbicide use to project areas that support potential habitat for the Zayante band-winged grasshopper:

    a. When herbicides are used near waterways, an approved glyphosate-based herbicide that is safe to use in or near aquatic habitats would be utilized.

    b. Herbicides would be applied on calm (wind speed less than 5 miles per hour), dry days (no rain), and according to registered label conditions.

    c. All chemicals used in herbicide operations would be limited to that which is minimally necessary, and when not in use will be stored in an impermeable lining away from areas that support habitat for listed species.

Tidewater Goby Protective Measures

During the project assessment stage, the NRCS/SCCRCD will determine whether any of the project areas occur on a stream that supports known or potential habitat for the tidewater goby. For project sites within these areas, the NRCS/SCCRCD will determine if the project area itself supports suitable habitat for the species. If the project area does support suitable habitat, the Corps will ensure that the NRCS and SCCRCD implement the following measures to minimize and avoid adverse effects on the tidewater goby:

1. No projects that would change or disturb the hydrology of the waterbody will be implemented in or around the lagoons of Baldwin, Wilder, Moore, or Scott Creeks; or the San Lorenzo or Pajaro Rivers.

2. Projects will be designed to minimize disturbance along lagoon edges.

3. Silt detention measures will be used during the implementation of the practices along banks and lagoon shores of Baldwin, Wilder, Moore, or Scott Creeks; or the San Lorenzo or Pajaro Rivers within the range of the tidewater goby.

California Red-legged Frog Protective Measures

1. During the project assessment, the NRCS/SCCRCD will determine whether potential habitat for the California red-legged frog occurs in the project area.

2. If suitable habitat is present or the species is known to occur in the vicinity, construction activities will begin after April 15 and before October 31 to avoid impacts to breeding adults or egg masses, unless otherwise agreed to by Service.

3. A Service-approved biologist will conduct a pre-construction survey no more than 48 hours before the start of construction activities. The approved biologist will look for the species, evaluate the likelihood of usage, and determine if additional biological monitoring is needed during construction.

4. If California red-legged frogs are observed during pre-construction surveys, the Service will be contacted before work activities begin to see if additional protective measures are needed.

5. If biological monitoring during construction is needed (i.e. for work occurring in occupied or potentially occupied habitat), a Service-approved biologist will have the authority to halt work activities that that may affect adults, tadpoles, or egg masses until they can be moved out of harm's way.

6. Relocation of California red-legged frogs and tadpoles to the closest suitable habitat will be performed only by Service-approved biologists. In the rare case that egg masses are found after April 15, the NRCS/SCCRCD will make every attempt to wait until the tadpoles emerge to transport them.

7. Whenever possible, NRCS/SCCRCD will avoid working in ponds or active stream channels. If it is not possible to avoid these areas, work will be conducted when streams/ponds are dry. All activities occurring in the stream channel will occur before winter rains commence and will be conducted during daylight hours.

8. Projects will be designed to minimize disturbance of vegetation in and around permanent and seasonal marshes, ponds, shorelines, and pools within streams with extensive emergent vegetation or weedy vegetation.

9. Additional guidelines for surveys and handling of the California red-legged frog and the California tiger salamander described below under "*Additional guidelines for surveys and*

handling of the California red-legged frog and the California tiger salamander" will be adhered to.

California Tiger Salamander Protective Measures

If the project area is located within 5 miles of either of the two known locations of the California tiger salamander in Santa Cruz County (Ellicott Reserve and the Buena Vista Pond in Watsonville), the following protection measures will be implemented.

1. During the project assessment, the NRCS/SCCRCD will determine whether potential habitat for the California tiger salamander occurs in the project area. If any California tiger salamanders are found at the site, they will be relocated by a Service-approved biologist to the closest suitable habitat less than 24 hours prior to initiation of construction.

2. Projects will be designed to minimize disturbance of vegetation in and around permanent and seasonal marshes and ponds, shorelines, and pools within streams with extensive emergent vegetation and/or weedy vegetation. Vernal pools will be avoided during project design.

3. If potential habitat is present, a biological monitor will be present during all ground disturbance activities and will have the authority to halt work activities that may affect the animal.

Additional guidelines for surveys and handling of the California red-legged frog and the California Tiger Salamander

1. Staff of NRCS/SCCRCD conducting reconnaissance-level surveys must be trained by Service-approved biologists prior to conducting field surveys. At least 15 days prior to any training, surveys, or monitoring activities, NRCS/SCCRCD will submit for review and approval by the Service, the credentials of staff who will conduct training, reconnaissance-level surveys, pre-activity surveys, monitoring activities, and be handling the California red-legged frogs and California tiger salamanders.

2. If NRCS/SCCRCD staff determines during reconnaissance-level surveys that suitable habitat for the California red-legged frog exists in the project area, a Service-approved biologist will conduct pre-construction surveys of the project site no sooner than 48 hours prior to the beginning of construction activities. Surveys for California red-legged frogs will consist of searches during daylight hours for egg masses, tadpoles, or adults, and searches during nighttime hours for adults and sub-adults.

3. If California red-legged frogs or California tiger salamanders occur within the project area and cannot be avoided, Service-approved biologists will relocate the individuals out of the project area to a nearby suitable location.

4. Nets or bare hands may be used to capture California red-legged frogs and California tiger salamanders. Authorized individuals will not use soaps, oils, creams, lotions, repellants, or solvents of any sort on their hands before and during periods when they are capturing and translocating these species.

5. The Service-approved biologist(s) will limit the duration of handling and captivity of the California red-legged frogs and California tiger salamanders. While in captivity, individuals of these species will be kept in a cool, moist, aerated environment, such as a bucket containing a damp sponge. Containers used for holding or transporting this species will not contain standing water.

6. To avoid transferring disease or pathogens between aquatic habitats during the course of surveys or handling of California red-legged frogs and California tiger salamanders, the Service-approved biologist will follow the Declining Amphibian Population Task Force's Code of Practice.

7. All diversion or dewatering activities, including restoration of flows after construction, will be monitored by a Service-approved biologist who will relocate California red-legged frog and California tiger salamander adults, tadpoles, or egg masses imperiled by the action. The Service-approved biologist will assist project personnel in selecting the point(s) at which diversion would least disrupt stream flow and will monitor the area for stranded California red-legged frogs and California tiger salamanders when flows are restored. If listed species are present or suitable habitat exists in areas where exotic species are to be removed, the Service-approved biologist will define where trails, staging areas, and other general sites of disturbance may occur.

Santa Cruz Long-toed Salamander Protective Measures

During the initial project assessment, the NRCS or SCCRCD will coordinate with the Service and CDFG to determine if the proposed project site is located within 0.5 mile of an unsurveyed pond, or within/adjacent to the area bounded by the known breeding locations of the Santa Cruz long-toed salamander (i.e., roughly bounded on the north by Valencia Creek, on the east by Corralitos Creek, on the south by the Pajaro River, and on the west by the Pacific Ocean). If the project site meets either of these criteria, the NRCS/SCCRCD will conduct a habitat assessment to determine if the project area supports potential habitat or movement corridors (i.e., land between aquatic and upland habitats) for the Santa Cruz long-toed salamander. If the habitat assessment finds that the project area supports potential habitat or movement corridors for the Santa Cruz long-toed salamander, the following protective measures will be implemented:

1. Within 48 hours prior to the commencement of equipment staging, construction, vegetation removal, grading, or other project-related activities, a Service-approved biologist will conduct a survey of all work areas that would be impacted by the project to search for Santa Cruz long-toed salamanders. The Service-approved biologist will identify all potential refugia that the species may be utilizing for shelter or foraging

(rocks, downed branches, leaf litter, etc.) within the impact area and conduct thorough inspections of these areas to determine occupancy. Prior to the use of heavy equipment and any surface-disturbing activities, the work area will be cleared under the direction of a Service-approved biologist. All vegetation will be removed by hand (brush-cutters, weed whackers, and chainsaws). Piles of woody debris will be cleared by hand. Larger debris will only be moved after being inspected by the Service-approved biologist. If Santa Cruz long-toed salamanders are observed incidentally during vegetation and debris removal activities, they will be relocated to the nearest appropriate habitat by a Service-approved biologist.

2. Prior to the onset of activities that result in disturbance of potential Santa Cruz long-toed salamander habitat or individuals, a Service-approved biologist will conduct a training session for all project-related personnel. At a minimum, the training will include: a description of the Santa Cruz long-toed salamander, a description of the species' habitat, the importance of the Santa Cruz long-toed salamander and its habitat, the general measures that are being implemented to conserve the Santa Cruz long-toed salamander as they relate to the project, and the boundaries within which the project may be accomplished. Brochures, books, and briefings may be used in the training session.

3. A Service-approved biologist will monitor all vegetation removal and ground disturbing construction activities. Service-approved biologists and/or biological monitor will have the authority to stop and/or redirect project activities to ensure protection of resources and compliance with all environmental permits and conditions of the project.

4. A Service-approved biologist or designated biological monitor will be on site during all project activities. If a Santa Cruz long-toed salamander is observed (by anyone) in an area to be impacted, work will immediately cease and the Service-approved biologist immediately notified.

5. To the maximum extent possible, access routes, staging areas, and work areas will avoid areas with small mammal burrows. The project area, including access routes and equipment staging areas, will be clearly marked and limited to the minimum area necessary for project completion. All project-related activities will be restricted to these established routes, staging areas, and work areas.

6. When designing projects, the NRCS/SCCRCD will avoid the removal of woody debris in upland areas to the maximum extent feasible. All vegetation removal will be conducted by hand. Any removal of native vegetation that results from project activities will be temporary.

7. Project-related personnel will not attempt to touch, capture, or move any salamander detected.

8. When designing projects, the NRCS/SCCRCD will avoid working in ponds to the maximum extent possible. To the maximum extent possible, the NRCS/SCCRCD will conduct project activities only when project sites are dry. If it is not possible to work when the site is dry, the NRCS/SCCRCD will assume the presence of the Santa Cruz long-toed salamander and contact the Service and CDFG for further guidance.

Marbled Murrelet Protective Measures

1. During the project assessment, the NRCS/SCCRCD will assess if potential marbled murrelet habitat occurs in the project area.

2. If habitat is present in the project area, the NRCS/SCCRCD will either 1) perform work after September 15 and before April 1 or 2) implement sound reduction measures to ensure that activities do not significantly raise noise levels above ambient levels. These measures can include, but are not limited to, laying a bed of sand before unloading gravel or rock from a truck and/or disabling "back-up beepers" on equipment.

3. To the greatest extent possible, project activities will avoid old-growth trees.

Minimization Measures for Projects Occurring in the Vicinity of Critical Habitat

If work is performed within areas designated as critical habitat for the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, or marbled murrelet, the following measures will be implemented to reduce the potential for adverse modification of critical habitat for these species in the project area:

1. During initial site assessments, the NRCS/SCCRCD will determine if the project area is located within the critical habitat units designated for these species.

2. If proposed project sites occur within these critical habitat units, the NRCS/SCCRCD will determine if any of the primary constituent elements, as defined in the critical habitat rule for each species, exist in the proposed project area.

3. The NRCS/SCCRCD will implement species-specific minimization and avoidance measures described above for each species, based on which species and critical habitat areas occur or have the potential to occur within the project area.

4. Construction activities will avoid damaging or destroying habitat features or primary constituent elements.

5. Staging areas will be confined to the smallest area possible as described above under the General Conservation Measures Section.

6. Whenever possible, project activities will include removal of non-native species from the project area.

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 evaluates the range-wide conditions of the Ben Lomond spineflower, Ben Lomond wallflower, Monterey spineflower, robust spineflower, Santa Cruz cypress, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, White -rayed pentachaeta, Mount Hermon June beetle, Ohlone tiger beetle, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet, the factors responsible for those conditions, and the survival and recovery needs of these listed species; (2) the *Environmental Baseline*, which evaluates the conditions of federally listed species in the action area, the factors responsible for those conditions, and the relationship of the action area to the survival and recovery of these 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 federally listed species covered in this biological opinion; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the federally listed species covered in this biological opinion.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the federally listed species covered in this biological opinion, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these federally listed species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the federally listed species covered in this biological opinion and the role of the action area in the survival and recovery of these species 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 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 Code of Federal Regulations (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 evaluates the range-wide condition of designated critical habitat for the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet, in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the *Environmental Baseline*, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, 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.

For purposes of the adverse modification determination, the effects of the proposed Federal action on the critical habitat of the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for these species.

The analysis in this biological opinion places an emphasis on using the intended range-wide recovery function of critical habitat for the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet 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 AND CRITICAL HABITAT

Ben Lomond Spineflower

The Ben Lomond spineflower was federally listed as endangered on February 4, 1994 (59 Federal Register (FR) 5499). Critical habitat has not been designated. The Ben Lomond spineflower is a small annual herb of the buckwheat family (Polygonaceae) that can grow up to 10 inches high, but more typically grows no more than a few inches above ground. The flower clusters and associated structures are pink with small distinct heads. Whorls of bracts below the flowers are 0.06 to 0.09 inch long and have pink margins.

The Ben Lomond spineflower is a short-lived annual species. Seeds germinate in late fall after the first substantial rains. The plants mature through the winter, bolt and produce branches, flower in April and May, and die soon after seed production (Levin and McGraw 1998). The lifespan of the plant ranges from 15 to 21 weeks, with most of the variability during the adult stage. In open habitat, the Ben Lomond spineflower can reach seedling densities of hundreds to thousands per square meter (Zador 1993; Kluse and Doak 1999). When in bloom, the Ben Lomond spineflower often appears as a spreading mat of small, showy, pink flowers.

A variety of potential pollinators have been observed on the Ben Lomond spineflower including wasps, bees, flies, and butterflies (Service 1998). If cross-pollination by insects does not occur within 1 or 2 days, self-pollination may occur as the flower closes at the end of the day (Reveal 2001). Overall, the relative importance of insect pollination and self-pollination to seed set of the Ben Lomond spineflower is not well understood. Spines on the seed structure of the Ben Lomond spineflower can attach to passing animals thus dispersing seeds between populations. Furthermore, the prevailing winds undoubtedly play a role in scattering seed within populations.

The Ben Lomond spineflower is restricted to sandy soils of the Zayante series and is endemic to the Zayante Sandhills of Santa Cruz County. The plant is often found in association with the sand parkland plant community, but can occur in non-parkland areas that have the appropriate soils and microhabitat characteristics. Specifically, the Ben Lomond spineflower requires sandy soils in open, sparsely vegetated areas that receive ample amounts of sunlight (Levin and McGraw 1998). The core of current and historical populations of the species occurs in the vicinity of Mount Hermon, Felton, Ben Lomond, Zayante, and Scotts Valley. No information is available regarding the current or historical number of populations, and population sizes vary widely from year to year due to changing environmental conditions.

Past and current sand mining from five quarries has resulted in the permanent removal of habitat for the Ben Lomond spineflower. Residential and commercial development has reduced the amount of habitat for the Ben Lomond spineflower. As described above, ridges of Zayante Sandhills have been developed into dense residential and commercial neighborhoods. On occasion, the Ben Lomond spineflower has been observed growing in yards and along roadsides in small numbers within these neighborhoods. However, these populations are highly susceptible to extirpation because they are small, fragmented, and isolated. One of the secondary effects of urban development is the introduction of non-native plants to adjacent intact habitat. The Ben Lomond spineflower is easily out-competed by non-native grasses, herbs and woody vegetation. Furthermore, natural fire regimes have been suppressed resulting in the increase of vegetation cover and leaf litter (particularly from pine needles), and reduction of habitat for the Ben Lomond spineflower.

Recreational uses of habitat threaten the Ben Lomond spineflower throughout its range. Because the Ben Lomond spineflower is shade intolerant, it may benefit from low-level disturbance that would maintain the open habitat it needs. Therefore, the plant may tolerate light recreational use; however, overuse by motorized bikes, equestrians, and pedestrians can result in erosion of sandy soils, and create inhospitable conditions for the Ben Lomond spineflower.

Ben Lomond Wallflower

The Ben Lomond wallflower was federally listed as endangered on February 4, 1994 (59 FR 5499). Critical habitat has not been designated. The species is also listed as endangered by the state of California. The Ben Lomond wallflower, a member of the mustard family (Brassicacae), is a short-lived perennial herb, although occasionally the species can complete its life cycle in 1 year. Seedlings form a basal rosette of the leaves which then wither as the main stem develops a raceme (flowers clustered in a terminal spike). The flowers are a deep yellow with petals 0.5 to 1 inch in length. The fruit, a slender capsule, reaches 4 inches in length and is covered with hairs. Plants in their first, and frequently second, year of growth consist of a basal rosette, while in the subsequent year, the basal rosette usually withers as the main flowering stem develops. Flowering may be postponed to due to unproductive habitat; therefore, some adults of the Ben Lomond wallflower may live to be older than 2 years.

The Ben Lomond wallflower is restricted to sandy soils of the Zayante series and is endemic to the Zayante Sandhills. As of 1998, 17 extant populations of the Ben Lomond wallfower were known to occur in the vicinity of Scotts Valley, Ben Lomond, Felton, and Bonny Doon in open areas with vegetation characteristic of silver manzanita mixed chaparral, ponderosa pine forest and sand parkland. The largest populations of the species are found on ridges of sand parkland. Like the Ben Lomond spineflower, the Ben Lomond wallfower requires sandy soils in open and sparsely vegetated areas that receive ample amounts of sunlight.

Threats to the Ben Lomond wallfower are similar to those of the Ben Lomond spineflower. Past and current sand mining and urban development have resulted in direct removal of habitat for the Ben Lomond wallflower. The species has not been observed growing on the floors or benched sides of quarry pits that have been mined to a hard sandstone layer nor in yards and along roadsides in urbanized areas. The Ben Lomond wallflower is threatened further by recreational use, invasive plant species, and suppression of natural disturbance regimes. The impacts of these threats on the Ben Lomond wallflower are similar to those for the Ben Lomond spineflower as described in this biological opinion.

Monterey Spineflower

The Monterey spineflower was listed as a federally threatened species on February 4, 1994 (59 FR 5499), and 11,055 acres of critical habitat was designated on January 9, 2008, (73 FR 1525). Information contained in this account was obtained primarily from the final listing rule and the 5-Year Review for the species (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.

Monterey spineflower is currently known to be extant in southern Santa Cruz and northern Monterey Counties. Two historical collections were made farther south, in southern Monterey County in 1935 and in northern San Luis Obispo County in 1842. The California Natural Diversity Database (CNDDB) lists 30 occurrences of Monterey spineflower in that range (CNDDB 2011). At the time of listing, Monterey spineflower in the Monterey Bay area was known from scattered populations along the immediate coast, in coastal and inland areas, and from historical collections in the Salinas Valley.

From Santa Cruz County, the distribution of Monterey spineflower extends south along the Monterey Bay to the Monterey Peninsula. Populations also occur inland in Monterey County in the Prunedale Hills and at Fort Ord. One population has also been located in the Soledad area of the Salinas Valley (Reveal and Hardham 1989, CNDDB 2011).

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 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.

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 2011).

Monterey spineflower plants produce a maximum of one seed per flower and, depending on the vigor of the plant, produce dozens of seeds per plant (Fox et al. 2006). Seed dispersal in is likely facilitated by hooked spines on the structure surrounding the seed that attach to passing animals, moving seeds between plant colonies and populations (Reveal 2001). Wind also likely disperses seeds within colonies and populations. Information concerning the soil seed bank of Monterey spineflower was published in 2006 (Fox et al. 2006). This 5-year study found that the density of Monterey spineflower in a population was directly related to the previous year's seed set. Results suggest that Monterey spineflower germinates well under most winter conditions and does not develop an extensive persistent soil seed bank; therefore, loss of above-ground individuals prior to seed set could have a greater impact on populations than was previously thought. However, there are anecdotal reports of Monterey spineflower reappearing in several areas after habitat restoration efforts removed dense cover of iceplant (*Carpobrotus edulis*, *Mesembryanthemum crystallinum*), indicating that under some conditions, a soil seed bank that persists for several years may be present and substantial enough to repopulate a site.

A pollination ecology study was conducted on the closely related robust spineflower. Results of this study should be considered relevant to recovery of Monterey spineflower, because these two taxa occur in proximity to each other at several locations (Sunset and Manresa State Beaches),

occupy similar plant communities, and are similar genetically (Brinegar 2006). The pollination study compared the pollination ecology of coastal and inland populations (Murphy 2003). It found that although robust spineflower may self-pollinate, pollinator access to flowers significantly increased seed set. A high diversity of potential pollinators, including sweat bees (Halictidae), bumblebees (*Bombus* spp.), wasps (Sphecidae), honeybees (*Apis mellifera*), and soft-winged flower beetles (Dasytidae) were found to transport pollen of this taxon. Pollinator diversity was correlated with variation in microhabitat conditions, including exposure; proximity to the coast; and the structure, composition, and density of the surrounding vegetation (Murphy 2003). These results suggest that protecting pollinator habitat and diversity is important to the recovery of the *Chorizanthe* taxa.

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. The ITS sequencing could not differentiate the two taxa; however chloroplast DNA (cpDNA) sequencing of populations found some divergence between coastal populations of Monterey spineflower and robust spineflower, but further analysis is needed to determine how this would affect a taxonomic treatment of these taxa. In a second phase of analysis, researchers sequenced cpDNA 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 (Baron *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, 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 (Levin and McGraw 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 the 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 non-native 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).

Robust Spineflower

The Service listed the robust spineflower as endangered on June 22, 1992 (57 FR 27848). The robust spineflower has thin white to pinkish scarious margins along the basal portions of the teeth and an erect to spreading or prostrate habit. The heads are large (1.5 to 2 cm (0.6 to 0.8 in) in diameter) and distinctly aggregate.

The robust spineflower is endemic to the sandy soils in coastal areas in southern Santa Cruz and northern Monterey Counties. The robust spineflower is found in coastal dune, coastal scrub, maritime chaparral, or oak woodland habitats. The most prevalent soil series represented are Baywood, Ben Lomond, Zayante, Tierra, and Watsonville. Habitat where the robust spineflower occurs is relatively open and free of other vegetation, due to the presence of nutrient-poor sandy soils, which often limits the abundance of other herbaceous species that can grow on them. Because of the patchy and limited distribution of such soils, many species of Chorizanthe, including the robust spineflower, tend to be highly localized in their distribution.

The robust spineflower is a short-lived annual species. It germinates during the winter months and flowers from April through June. A pollination ecology study was conducted on the robust spineflower that compared the pollination ecology of coastal and inland populations. It found that although robust spineflower may self-pollinate, pollinator access to flowers significantly increased seed set. A high diversity of potential pollinators, including sweat bees, bumblebees, wasps, honeybees, and soft-winged flower beetles were found to transport pollen of this taxon.

Pollinator diversity was correlated with variation in microhabitat conditions, including exposure; proximity to the coast; and the structure, composition, and density of the surrounding vegetation. These results suggest that protecting pollinator habitat and diversity is important to the recovery of the *Chorizanthe* taxa. Other known pollinators of this taxon include leaf cutter bees (megachilids), at least 6 species of butterflies, flies, and sphecid wasps (Murphy 2003).

Each flower produces at least one seed, sometimes more depending on the vigor of the individual plant. The importance of pollinator activity in seed set has been demonstrated by the production of seed with low viability where pollinator access was limited (66 FR 10420). The robust spineflower turns a rusty hue as they dry through the summer months, eventually shattering during the fall. Seed dispersal is facilitated by the involucral spines, which attach the seed to passing animals. Wind is also important in seed dispersal for this species.

Portions of the coastal dune, coastal scrub, grassland, chaparral, and oak woodland communities that support the robust spineflower have been eliminated or altered by recreational use, conversion to agriculture, and urban development. Dune communities have also been altered in composition by the introduction of non-native species, especially iceplant and European beachgrass (*Ammophila arenaria*), in an attempt to stabilize shifting sands. In the last decade, significant efforts have been made to restore native dune communities, including the elimination of these non-native species (66 FR 10421).

Santa Cruz Cypress

The Santa Cruz cypress was federally listed as endangered on January 8, 1987 (52 FR 679) and is recognized by CDFG as an endangered species. The Santa Cruz cypress is a member of the cypress family (Cupressaceae) and was first collected by Marcus E. Jones in 1881, probably from Bonny Doon in Santa Cruz County. Despite noting its intermediate characteristics, Little (1970) reduced Santa Cruz cypress to a variety of Gowen cypress (*Cupressus goveniana* var. *abramsiana*). Subsequently, Murray (1982), with no explanation, reduced Santa Cruz cypress to a subspecies of Gowen cypress. However, Bartel (1993) treated Santa Cruz cypress as a species in his treatment of the genus for the Jepson Manual. Recent DNA analyses have indicated that, while Santa Cruz cypress does have some affinities to Gowen cypress, it is even more closely related to Sargeant cypress (*Cupressus sargentii*) and Mendocino cypress (*Cupressus pygmaea*) (Bartel et al. 2003).

According to Bartel's (1993) treatment, Santa Cruz cypress is a tree 3 to 82 feet in height. The grey bark is fibrous, thin, and broken into vertical strips or plates. The scale-like leaves are light green. Pollen cones are more or less four-sided, being 0.12 to 0.16 inch long and 0.08 inch in diameter. Each pollen cone has 10 to 16 scales. The seed cones are spherical to widely elliptic. The 8 to 10 brown scales each have a central projection. The seeds are 0.12 to 0.14 inch long and dull brown. The seed has a conspicuous scar where it was attached to the seed cone (Bartel 1993).

All five populations of Santa Cruz cypress occur on or near dry ridges that are located above the coastal fog belt. The tree's habitat ranges in elevation from approximately 1,000 to 2,500 feet in areas having a Mediterranean climate with cool, wet winters and hot, dry summers. All soils where Santa Cruz cypress are found are sandy or gravelly, and therefore are well-drained and porous. Further study is needed to determine the exact soil types on which the species is found.

Like most cypresses, Santa Cruz cypress has cones that are late to open (Johnson 1974). The cones remain on the tree and remain closed until the vascular connection with the parent plant is severed. Normally, secondary growth eventually causes the cone's stalk to break, which cuts off the vascular water supply and results in the release of seeds as cones dry and open (Daubenmire 1974). However, mechanical breakage or fire heat could also trigger such opening (Barbour et al. 1980). Research by McGraw (2011) within the Bonny Doon Ecological Reserve showed that the Martin Fire of 2008 promoted regeneration of Santa Cruz cypress by: 1) killing adult trees and, in doing so, released seed from their serotinous cones; 2) removed accumulated leaf litter on the soil surface exposing bare soil that is conducive to seedling establishment and; 3) creating low canopy/high light conditions that may be required for seedling and juvenile growth. Mechanical disturbance appears to be effective in promoting germination and seedling establishment.

Santa Cruz cypress reaches reproductive maturity at an average age of 11 years, although some individuals have been reported to produce cones at 6 years. The cones take 2 years to mature with seeds maturing at 15 to 18 months after pollination. Seeds are released at a slow rate throughout the life of the tree. Additionally, seed viability decreases as cones become older (Kuhlmann 1986) and fire is not a requirement for the release of seeds from dispersed cones.

Santa Cruz cypress seedlings survive best in full sunlight on bare mineral soils lacking litter. Areas supporting saplings have the highest density of trees, while the lowest densities are in areas with trees in larger size classes. As with many long-lived plant species, mortality in Santa Cruz cypress is likely high during the early years of stand development, with older stands approaching a constant density that is independent of initial sapling density.

Five populations of Santa Cruz cypress are known to occur in the Santa Cruz Mountains. No historical distribution beyond these five sites is known. The Butano Ridge population is in San Mateo County and the Eagle Rock, Bonny Doon, Bracken Brae, and Majors Creek populations are in Santa Cruz County (Lyons 1988). These five relatively isolated populations range over a distance of 15 miles from the northernmost population at Butano Ridge to the southernmost at Majors Creek. The five known populations encompass approximately 356 acres. The geographic distribution of Santa Cruz cypress lies between the distributions of Gowen cypress and Sargent cypress, with Gowen cypress to the south in Monterey County and Sargent cypress to the north in Marin County. Preliminary surveys in 2003 indicate that there are significantly more trees in the Bracken Brae population, and possibly others, than were previously thought (Taylor 2005).

The Santa Cruz cypress was listed because it was threatened by imminent residential development, agricultural conversion, and logging. These activities no longer threaten the species, but lesser threats must still be addressed, including disease, genetic introgression from introduced Monterey cypress (*Cupressus macrocarpa*), competition with invasive species such as French broom, and interruption of the natural frequency of fire in the cypress's habitat.

Santa Cruz Tarplant

The Santa Cruz tarplant was federally listed as threatened on April 19, 2000 (65 FR 14898) and critical habitat was designated for the species on November 15, 2002 (67 FR 63967). Santa Cruz tarplant is an aromatic annual herb in the aster family (Asteraceae), and is one of only four species of the genus *Holocarpha,* all geographically restricted to California. Santa Cruz tarplant occurs in coastal terrace prairie habitat along the coast of central California in Contra Costa, Santa Cruz, and Monterey Counties. Santa Cruz tarplant is an upright annual plant, standing no higher than 2 feet tall, and is distinguished from other members of the genus by its numerous ray flowers and black anthers. Like many tarplants, Santa Cruz tarplant is strongly scented and produces a sticky resin (Kiel 1993, Hayes 1998). Flowering from July to October, the inflorescences comprise yellow ray and disc flowers. Most seeds remain on the plant until the first significant rain (0.6-1.2 inches) in late autumn (Holl and Hayes 2006). The basal rosette increases in size until approximately June, when plants produce a stem that reaches a height of 11.8 to 31.5 inches.

Plants produce 1 to 60 inflorescences that have two types of achenes (seeds) with different morphologies and requirements for germination. Seeds from the ray flowers have a thicker seed coat, long-term dormancy, and complex germination cues; whereas seeds from the disk flowers are lighter, and narrower. Neither type of seed appears to have a structural means for dispersal, and most fall within 17.7 inches of the plant (Holl and Hayes 2006), though it is possible that some ray seeds may be dispersed over long distances by animals (Satterthwaite et al. 2007). Results of studies indicate that disk seeds produced by Santa Cruz tarplant germinate within a year of production while ray seeds form persistent seed banks. The precise length of time Santa Cruz tarplant seed banks remain viable is unknown, though there is an account of Santa Cruz tarplant seedlings emerging from a pile of soil scraped from a construction site 8 years after it last hosted adult plants. It is possible that seed bank survival is high, since seeds known to be at least 15 years old have successfully germinated (Satterthwaite et al. 2007).

Santa Cruz tarplant is self-incompatible, meaning that individuals will not produce viable seeds without cross pollinating with other individuals (Baldwin, *in litt.* 2001). Gene flow from individual to individual and from population to population increases the likelihood of viability by maintaining genetic diversity; therefore, gene flow is essential for the long-term survival of self-incompatible species (Ellstrand 1992). Because Santa Cruz tarplant is capable of establishing seedbanks, sites that support populations of the species, particularly small populations (fewer than 100 individuals), may not display any individuals in a given year, but can have viable populations in other years (65 FR 14898). Without proper seedbank management, the increase of aboveground expression may deplete seed banks, decreasing the ability of the bank to buffer

against environmental variability and decreasing longevity (Satterthwaite et al. 2007).

Historically, habitat for Santa Cruz tarplant occurred on grasslands and prairies found on coastal terraces in elevations below 330 feet, from Monterey County, north to Contra Costa and Marin Counties. Santa Cruz tarplant was known from "low dry fields about San Francisco Bay" (Jepson 1925). Early herbarium collections were made in Santa Cruz County in 1881, Marin County in 1883, Alameda County in 1891, San Francisco County in 1916, and in Contra Costa County in 1974 (Consortium 2010). At the time of listing in 2000, Santa Cruz tarplant was known from 12 natural and 8 experimentally seeded populations, in the counties of Contra Costa, Monterey, and Santa Cruz (Hayes 1998). In July of 2000, a population of Santa Cruz tarplant was discovered at the Santa Cruz Armory (De Laveaga population) during a rare plant survey, with estimated plant numbers at several thousand and stable (Olson 2003, J. Olson, botanist California Army National Guard, pers. comm. 2010). In addition, a small population of Santa Cruz tarplant was noted in a survey conducted in 2008, when 59 individuals were observed on a Pacific Gas & Electric (PG&E) easement just east of Atkinson Lane in the City of Watsonville (EcoSystems West 2008).

The current number of natural populations is 14; 13 in Santa Cruz County, and 1 in Monterey County. Some of these natural populations may be fragmented representatives of historically larger populations. Additionally, 8 experimentally seeded populations occur in the Wildcat Canyon Regional Park in Contra Costa County. Habitat for the last naturally occurring population in the San Francisco Bay area was converted to a shopping center in 1993 (CDFG 1997; CNDDB 1997). Seeds taken from the population were transplanted into 22 locations in suitable habitat within the historical range of the species between 1982 and 1986; however, only 4 of these have expressed a substantial number of aboveground plants within recent years. Grasslands and coastal prairies that are essential habitat for Santa Cruz tarplant continue to be increasingly fragmented and affected by humans (Buisson et al. 2006).

The 14 natural and 8 experimentally seeded populations comprise the entirety of known populations of Santa Cruz tarplant today. Population numbers fluctuate annually; however, many populations of Santa Cruz tarplant have decreased in numbers over time. With the exception of the Watsonville Airport (Santa Cruz County) and Mezue (Contra Costa County) populations, most populations of Santa Cruz tarplant show numbers in the hundreds or less, some having had no aboveground plants expressed in recent years.

Historically, most extirpations of Santa Cruz tarplant populations were caused by residential and commercial development. A number of populations continue to be threatened by development and lack of management of the rare coastal prairie and grassland habitat that supports Santa Cruz tarplant. In addition, the Arana Gulch population is genetically distinct, which heightens the urgency of managing and protecting that habitat to better support the species.

Threats to Santa Cruz tarplant and its habitat include: habitat alteration and destruction caused by development; presence of (and competition with) nonnative, invasive vegetation; lack of proper ecological disturbance; and changes in hydrology. In addition, limited reproductive

success and stochastic extinction also threaten the species. Climate change is a potential new threat that has been identified since the time of listing. Of these, competition with and the presence of nonnative, invasive vegetation appears to be a primary threat to the species. The steady decline of populations of Santa Cruz tarplant since it was listed in 2000, and lack of knowledge of existing seed bank size and viability, are causes for concern for the survival of the species overall.

Scott's Valley Polygonum

The Scotts Valley polygonum was listed as endangered by the Service on April 8, 2003 (68 FR 16979). Critical habitat was designated in the same final rule. A recovery plan has not been developed; however, conservation recommendations for the species were included in the Recovery Plan for Insect and Plant Taxa from the Santa Cruz Mountains in California (Service 1998).

Scotts Valley polygonum is an endemic plant species to Scotts Valley, Santa Cruz County, California (Hinds and Morgan 1995). The plant is a small, erect, taprooted annual in the buckwheat family (Polygonaceae). It grows from 1 to 2 inches tall and can be either single stemmed or profusely branching near the base in more mature plants. The linear-shaped leaves are 0.2 to 1.4 inches long, 0.04 to 0.06 inch wide, and tipped with a sharp point. The single white flowers consist of two outer and three inner tepals (petal-like structure) and are found in the axils of the bracteal leaves (modified leaves near the flower).

As with many other annual species found within Mediterranean climates in California, Scotts Valley polygonum germinates in the fall or early winter in response to winter season rains. The plant grows slowly over the next few months and remains fairly inconspicuous until flowering begins in May. The panicles (floral branches) are indeterminate in their growth, meaning that the oldest flowers are found near the base of the stem and younger flowers found near the continually growing tip. The degree to which Scotts Valley polygonum depends on insect pollinators (rather than being self pollinated) has not been determined.

With the type of floral development found in Scotts Valley polygonum, new flowers will continue to be produced until climate or microhabitat conditions are no longer favorable. Consequently, seed production ranges from a few dozen seeds in a typical individual to as many as 200 in a particularly robust individual. The seeds of many plant taxa within the buckwheat family (Polygonanceae) are known to be attractive forage to wildlife, which then inadvertently disperse some portion of the seed. Because the seed of Scotts Valley polygonum are small, they most likely would be attractive to birds and small mammals including such species as black-tailed jackrabbits (*Lepus californicus*), California pocket mice (*Chaetodipus californicus*), western gray squirrel (*Sciurus griseus*), California ground squirrels (*Spermophilus beecheyi*), striped skunks (*Mephitis mephitis*), Virginia opossums (*Didelphis virginiana*), and raccoons (*Procyon lotor*) (Martin et al. 1951).

Maintaining a seed bank (a reserve of dormant seeds, generally found in the soil) is important to the year-to-year and long-term survival of annual plants (Baskin and Baskin 1978, Baskin and Baskin 1998). A seed bank includes all the mature seeds in a population and generally covers a larger area than the extent of observable plants seen in a given year (Given 1995). The number and location of standing plants (the observable plants) in a population varies annually due to a number of factors, including the amount and timing of rainfall, temperature, soil conditions, and the extent and nature of the seed bank. The extent of seed bank reserves is variable from population to population and large fluctuations in the number of standing plants at a given site may occur from one year to the next.

The distribution of Scotts Valley polygonum is limited to two sites about 1 mile apart at the northern end of the Scotts Valley area in Santa Cruz County, California: the Glenwood site and the Polo Ranch site (CNDDB 2011). The plant is found on gently sloping to nearly level shallow soils over outcrops of Santa Cruz mudstone and Purisima sandstone (Hinds and Morgan 1995). It frequently, though not always, occurs with the Scotts Valley spineflower and other small annual herbs in patches within a more extensive annual grassland habitat. These small patches, scattered in a mosaic throughout the grassland plant community, have been referred to as "wildflower fields" because they support a large number of native herbs, in contrast to the adjacent annual grasslands that support a greater number of nonnative grasses and herbs.

While the wildflower fields are underlain by shallow, well-draining soils, the surrounding annual grasslands are underlain by deeper soils with a greater water-holding capacity, and therefore more easily support the growth of nonnative grasses and herbs. Although the patches of wildflower field habitat stand out in contrast to the surrounding grasslands, a closer look at the wildflower field patches reveals slight microhabitat differences within the patch itself. The outer edge, or "ring" of the patch supports the greatest diversity of the native herbs, which are found on the deepest soils within the patch. Moving toward the center of the patch, the soil layer is shallower, and another ring supporting primarily the Scotts Valley spineflower occurs here. The greatest concentration of Scotts Valley polygonum is found in the very center of the patch where the soils are shallowest and other species are sparse. The surface soil texture in the center of the wildflower fields tends to be consolidated and crusty rather than loose and sandy (Biotic Resources Group 1998). Flowering in Scotts Valley polygonum lags behind that of the Scotts Valley spineflower and the other herbs by 4 to 8 weeks, and the consolidated soil surface may play a role in supplying late spring moisture to the species.

Elevation of the two occupied sites is from 700 to 800 feet (Hinds and Morgan 1995; CNDDB 2011). In the Scotts Valley area, the grasslands tend to be located on the middle to lower slopes within the subwatersheds, while the slopes above the grasslands tend to support redwood (*Sequoia sempervirens*) and mixed forest plant communities. On the Polo parcel, the slopes become increasingly steep from west to east; slopes nearest to Carbonero Creek on the western edge of the parcel are less than 20 percent, the slopes in the middle of the parcel range from 20 to 40 percent, and the slopes along the eastern edge of the parcel up to the ridgeline reach over 40 percent. Geologic reports discuss several hazards that contribute to the geologic instability of the site. First, the site is within a seismically active region that experiences groundshaking. Second,

the site has been subject to landslide activity, and evidence of past debris flows has been observed on the site. Third, due to the impermeable nature of the Purisima Formation bedrock, seasonal perched groundwater conditions are common in areas where the bedrock is overlain by alluvium (material deposited by flowing water) and colluvium (loose deposit of rock debris accumulated at the base of a cliff or slope), which contributes to slope instability (Impact Sciences 2000).

The geology of the Glenwood parcel has some similarities to the Polo parcel. Santa Cruz mudstone underlays the lower slopes and alluvial deposits while the Purisima Formation underlays the upper slopes and ridges. The lowest elevations are along Carbonero Creek, which runs through the middle of the parcel from north to south. Similar to the Polo parcel, the mildest slopes are adjacent to the creek, while the slopes generally increase with increased distance from the creek, and slopes along the ridges to the east and west reach over 30 percent (Impact Sciences 1997, 1998). Geologic hazards on the site that contribute to slope instability include seismic hazards, landslide activity, high erosion, and sedimentation potential due to the presence of springs and drainages and the impermeable nature of the Purisima Formation on the upper slopes.

Although soil erosion and sedimentation are natural processes, human activities can increase the rates above their natural levels (Global Change Research Information Office 2002). Processes such as soil erosion on upper slopes, the accumulation of sedimentation on lower slopes, and soil compaction can alter the physical and chemical properties of those soils sufficiently to change their ability to store and supply nutrients and moisture needed by plants (Global Change Research Information Office 2002). The persistence of plants with specific microhabitat requirements depends on maintaining the appropriate edaphic or soil conditions. Therefore, maintaining the stability of the higher slopes within a subwatershed is important for maintaining the stability of the edaphic conditions directly downslope.

Scotts Valley polygonum is associated with a number of native herbs including Scotts Valley spineflower, goldfields (*Lasthenia californica*), sandwort (*Minuartia douglasii*), California sandwort (*Minuartia californica*), gilia (*Gilia clivorum*), owl's clover (*Castilleja densiflora*), sky lupine (*Lupinus nanus*), brodiaea (*Brodiaea terrestris*), Mount Diablo cottonweed (*Stylocline amphibola*), Gray's clover (*Trifolium grayii*), and coast tarplant (*Hemizonia corymbosa*). Nonnative species present at the two sites include filago (*Filago gallica*) and rattail fescue (*Vulpia myuros*) (CNDDB 2011). In many cases, the habitat also supports a crust of mosses and lichens (Biotic Resources Group 1998).

Habitat alteration and destruction, including urban development, road construction, and their attendant secondary effects (including increased trampling from humans, pets, bicycles, and installation and maintenance of landscaped areas), are threats to the species. These activities cause soil erosion, soil compaction, disturbance of the soil crust, changes in soil hydrology, changes in water quality, encroachment of nonnative species, and accumulation of thatch. None of the occupied habitat of the Scotts Valley polygonum is targeted for direct destruction.

However, all occupied habitat will be subject to habitat alteration resulting from current and proposed projects.

Scott's Valley Spineflower

The Scotts Valley spineflower was listed as endangered by the Service on February 4, 1994 (59 FR 5499). Critical habitat was designated on May 29, 2002 (67 FR 37336). A recovery plan has been published (Service 1998).

Scotts Valley spineflower, a short-lived annual species in the buckwheat family (Polygonaceae), is a low-growing herb with rose-pink involucral margins confined to the basal portion of the teeth and an erect form of growth. The aggregate flowers (heads) are medium in size (0.4 to 0.6 inch diameter) and distinctly aggregate. Each flower produces one seed; the seeds are 0.14 to 0.16 inch long. Hooks on the spines of the involucre, which surround the seed, facilitate seed dispersal (Reveal and Morgan 1989).

Scotts Valley spineflower is one of two varieties of the species *Chorizanthe robusta*. The other variety, known as robust spineflower, is federally endangered and restricted to sandy soils in coastal and near-coastal areas in Santa Cruz County. The range of Scotts Valley spineflower also comes close to, but does not overlap with that of the federally endangered Ben Lomond spineflower, another closely related taxon in the *Pungentes* section of the genus, in Santa Cruz County. Recent genetic analyses indicate that Scotts Valley spineflower and Ben Lomond spineflower may be more closely related to each other than each of them is to their respective nominative varieties. For a detailed description of these related taxa, see the Recovery Plan for the Robust Spineflower (Service 2004) and references within this plan.

Scotts Valley spineflower is known from two sites about 1 mile apart at the northern end of Scotts Valley in the Santa Cruz Mountains, Santa Cruz County, California: the Glenwood site and the Polo Ranch site. The species is found on gently sloping to nearly level fine-textured, shallow soils of the Bonnydoon series over outcrops of Santa Cruz mudstone and Purisima sandstone (Hinds and Morgan 1995, Soil Conservation Service 1980, USGS 1989). Scotts Valley spineflower occurs with other small annual herbs in patches within a more extensive annual grassland habitat. These small patches have been referred to as “wildflower fields” because they support a large number of native herbs, in contrast to the adjacent annual grasslands that support a greater number of non-native grasses and herbs. While the wildflower fields are underlain by shallow, well-draining soils, the surrounding annual grasslands are underlain by deeper soils with a greater water-holding capacity, and therefore more easily support the growth of nonnative grasses and herbs. The surface soil texture in the wildflower fields tends to be consolidated and crusty rather than loose and sandy (Biotic Resources Group 1998). Elevation of the two occupied sites is from 700 to 800 feet (Hinds and Morgan 1995; CNDDB 2011).

Scotts Valley spineflower is associated with a number of native herbs including goldfields, sandwort, California sandwort, gilia, owl’s clover, sky lupine, brodiaea, Mount Diablo cottonweed, Gray’s clover, and coast tarplant. Non-native species present include filago and

rattail (CNDDB 2011). In many cases, the habitat also supports a crust of mosses and lichens (Biotic Resources Group 1998).

Scotts Valley spineflower germinates during the winter months and flowers from April through June. Although pollination ecology has not been studied for this taxon, it is likely visited by a wide array of pollinators. Pollinators that have been observed on other species of *Chorizanthe* that occur in Santa Cruz County have included: leaf cutter bees (megachilids); at least 6 species of butterflies; flies; sphecid wasps; ants; and small beetles (Murphy 2003). In other annual species of *Chorizanthe,* the flowers are protandrous, a reproductive strategy in which the anthers (male reproductive structures) mature and shed pollen prior to the maturation of the style (female reproductive structures) to receive pollen, with a delay of style receptivity being one or two days. Protandry facilitates cross-pollination by insects. However, if cross-pollination does not occur within 1 or 2 days, self-pollination may occur as the flower closes at the end of the day (Reveal 2001). The relative importance of insect pollination and self-pollination to seed set is unknown; however, in the closely related Monterey spineflower, the importance of pollinator activity to production of viable seed was demonstrated by the production of seed with low viability where pollinator access was limited (Harding Lawson Associates 2000).

The plants turn a rusty hue as they dry through the summer months, eventually shattering during the fall. Seed is mature by August and dispersal is facilitated by the hooked involucral spines, which surround the seed and attach it to passing animals. Black-tailed jackrabbits have been observed to browse on the related robust spineflower, and most likely act to disperse seeds as well. Other animals likely to assist in seed dispersal include, but are not limited to: mule deer (*Odocoileus hemionus*); gray foxes (*Urocyon cinereoargenteus*); coyotes (*Canis latrans*); bobcats (*Felis rufus*); ground squirrels; striped skunks; opossums; raccoons; and other small mammals and small birds (Martin et al. 1951).

For annual plants, maintaining a seed bank (a reserve of dormant seeds, generally found in the soil) is important to its year-to-year and long-term survival (Baskin and Baskin 1978). A seed bank includes all of the seeds in a population and generally covers a larger area than the extent of observable plants seen in a given year (Given 1995). The number and location of standing plants (the observable plants) in a population varies annually due to a number of factors, including the amount and timing of rainfall, temperature, soil conditions, and the extent and nature of the seed bank. The extent of seed bank reserves is variable from population to population and large fluctuations in the number of standing plants at a given site may occur from one year to the next.

Depending on the vigor of the individual plant and the effectiveness of pollination, dozens, if not hundred of seeds could be produced. The production of seed itself does not guarantee future reproductive individuals for several reasons: seed viability may be low, as has been found in other species of *Chorizanthe* (Bauder 2000); proper conditions for germination may not be present in most years; and seedling mortality may result from withering before maturity, herbivory, or uprooting by gopher activity (Baron 1998).

While the sites that support large colonies or populations of Scotts Valley spineflower most likely also support large seed banks and can sustain the species through several years of poor weather or bouts of predation, sites that support smaller populations and smaller seed banks may be more vulnerable to extirpation. The complex of colonies of Scotts Valley spineflower in the Glenwood area are in close enough proximity to each other that their seed banks most likely are dispersed between colonies; the total number of standing individuals and the attendant seed bank most likely are of sufficient magnitude to perpetuate the species in the near term, absent significant threats to the remaining habitat. In the Polo Ranch area, the colonies of Scotts Valley spineflower are also in close enough proximity to each other that their seed banks most likely are dispersed between colonies; however, the total number of individuals and the attendant seed bank are relatively smaller in magnitude here than at the Glenwood site. Therefore, this unit may be more vulnerable to extirpation if exposed to events such as several years of poor weather or bouts of predation. The total number of colonies of Scotts Valley spineflower is difficult to count because, 1) depending on the scale at which colonies are mapped, a larger or smaller number of colonies may result, and 2) depending on the climate and other annual variations in habitat conditions, the extent of colonies may either shrink and temporarily disappear, or enlarge and merge into each other, thus appearing as larger but fewer colonies.

Scotts Valley spineflower is threatened with extinction by fragmentation and habitat alteration due to secondary impacts of urban development. Urban development includes the recent construction and operation of a high school; installation and maintenance of water delivery pipelines, access roads, and water tanks; and currently existing and proposed housing. Over the last decade a variety of housing proposals have been considered for two of the parcels; the Glenwood development was approved by the City of Scotts Valley in late 2001 (Keenan Land Company 2001), and the proposed Polo Ranch development is currently on hold due to other legal issues.

The small range of this species makes it vulnerable to edge effects from adjacent human activities. The kinds of habitat alterations expected to impact Scotts Valley spineflower as a result of development include changes in soil characteristics such as surface and subsurface water flow and soil compaction; increased disturbance due to trampling from humans, pets, and bicycle traffic; the inadvertent application of herbicides and pesticides; over-spray from landscape irrigation; dumping of yard wastes; and the introduction and spread of non-native species (Conservation Biology Institute 2000).

The chance of random extinction for Scotts Valley spineflower is also increased due to the limited area of habitat available for this species (Shaffer 1981). Because the colonies are concentrated at only a few sites, a random environmental event (e.g., fire) or human disturbance potentially could destroy all colonies occurring on a parcel, thus diminishing the likelihood of long-term persistence.

White-rayed Pentachaeta

The Service listed the white-rayed pentachaeta as endangered on February 3, 1995 (60 FR 6671). The white-rayed pentachaeta is also listed by the State as endangered.

The white-rayed pentachaeta is a small annual plant of the aster family (Asteraceae) with one or a few branches bearing narrow, linear leaves. The flower heads consist of 7 to 16 white, strap-shaped petals surrounding 16 to 38 yellow ray flowers. Flowers of the white-rayed pentachaeta bloom from March to May. The fruits are tawny, coarse-aired achenes (dry one-seeded fruits) (Service 2010b).

The single known confirmed population of white-rayed pentachaeta is found on serpentine grassland in San Mateo County and co-occurs with dwarf plantain (*Plantago erecta)*, purple needlegrass (*Nasella pulchra*), and coastal tidy-tips (*Layia platyglossa*) (CNDDB 2011). Serpentine soils are formed from weathered volcanic (ultramafic) rocks such as serpentinite, dunite, and peridotite. These soils provide a harsh environment for plant growth. Several factors contribute to the inhospitability of serpentine soils to plant growth including: 1) a low calcium-magnesium ratio; 2) lack of essential nutrients such as nitrogen, potassium, and phosphorous; and 3) high concentrations of heavy metals. However, species such as white-rayed pentachaeta have adapted to serpentine soils and require them to survive.

Population growth and urban development in the San Francisco Bay region has reduced the amount of serpentine habitat utilized by this species by nearly 20 percent over the past 25 years (NRCS 2010). White-rayed pentachaeta may be threatened by fragmentation, pedestrian and off-road vehicle traffic, unauthorized garbage dumping, and changes in the pattern of wildland fires. Recreational activities may directly impact plants, or may result in increased erosion and facilitate the invasion of alien species including many introduced annual grasses common in California. Because this species is limited to only one confirmed location, it may be vulnerable to stochastic extinction and effects of climate change (Service 2010b).

Mount Hermon June Beetle

The Mount Hermon June beetle was listed as endangered on January 24, 1997 (62 FR 3509). Critical habitat has not been designated. The Mount Hermon June beetle is a member of the family Scarabaeidae (Insecta: Coleoptera). Adult males measure about 0.75 inch in length and females are slightly longer. The adult has a black head and dark brown elytra (leathery forewings) covered with brown hairs and stripes that are broken and irregular (Young 1988). Larvae, eggs, and pupae of the species have not been described.

The Mount Hermon June beetle is univoltine; that is, it has only one generation per year. As its common name suggests, adult emergence normally begins in June and continues through about mid-August; however, seasonal activity may vary from year to year depending on weather conditions. Adults are active between about 8:45 p.m. and 9:30 p.m. Adult males fly low to the ground in search of pheromones released by flightless females. Mating occurs at the surface of

the soil, and females retreat underground directly after mating where they presumably lay eggs. Lifespan data from a brief capture-recapture study suggest that adult males live no longer than 8 days (Arnold 2001). Dispersal data from the same study indicate that most adult males have home ranges of less than a few acres. Similar data on lifespan and dispersal of females are lacking at this time because they are so infrequently observed.

Specific life history information for the Mount Hermon June beetle is unknown, but can be inferred from related species. Presumably the entire life cycle (egg, larva, pupa, and adult) takes 2 to 3 years to complete. Because adults of the Mount Hermon June beetle are primarily trapped in close proximity to ponderosa pines, it was long thought that the ponderosa pine is an important host plant for larvae of the species (Arnold 2002). Recent research indicates that the Mount Hermon June beetle is a microhabitat specialist, but ponderosa pines are only an important indicator of appropriate habitat; Mount Hermon June beetle burrows have been found associated with 16 different plant species and up to 120 meters distant from the nearest ponderosa pine (Hill and O'Malley 2009). Based on dietary analyses, Mount Hermon June beetles have been found to be opportunistic generalist feeders (Hill and O'Malley 2009).

The Mount Hermon June beetle has been found in association with Zayante sands and vegetation characteristic of maritime chaparral, ponderosa pine forest, sand parkland, and mixed deciduous-evergreen forest. In addition, adults have been found in disturbed sandy areas where remnants of these habitats still occur (Arnold 1999a). The species has been recorded from approximately 80 locations in Zayante Sandhills habitat in the vicinity of Mount Hermon, Felton, Ben Lomond, Zayante, and Scotts Valley. Currently, the entire known range of the Mount Hermon June beetle covers an area of less than 10,000 acres. The amount of habitat within this area that the Mount Hermon June beetle occupies is unknown.

Sand mining has resulted in the loss and fragmentation of habitat for the Mount Hermon June beetle. Five quarries located in the center of the Zayante Sandhills are being excavated currently or have been excavated and abandoned in the past. Mining operators often excavate all of the Zayante sands, leaving only hard sandstone at the base of the quarries. In addition, operators are required to grade the sides of quarries in a bench-like pattern that provides for increased stability and to revegetate these benched areas with native vegetation. Preliminary surveys indicate that sandstone pits and benched areas do not support the Mount Hermon June beetle (Arnold 1999a).

Many ridges that were historically Zayante Sandhills have been developed into dense residential and commercial areas. Although most of the native vegetation in these developed areas has been removed, exposed Zayante sands and ponderosa pines still occur around existing development. Recent surveys indicate that Mount Hermon June beetles continue to inhabit many of these developed areas (Arnold, pers. comm. 2009). Long-term population estimates are not available to assess whether the Mount Hermon June beetle is declining in these developed areas. However, development of the Zayante Sandhills is most likely causing a decline of the Mount Hermon June beetle for the following reasons: (1) dense urban development creates large amounts of impervious surfaces which are unuseable for the Mount Hermon June beetle; (2) adult males of the Mount Hermon June beetle often fly to outdoor lights and remain at lights for

the entire activity period in a given evening, thus disrupting breeding behavior; and (3) potential host plants are being reduced with the removal of many ponderosa pines growing near structures.

An additional threat to the Mount Hermon June beetle is the erosion of sandy soils as a result of recreational uses, including motorized dirt bikes, horse riding, and hiking. These activities could result in exposing eggs, larvae, pupae, and adults to the soil surface, resulting in dessication and increased predation. Invasions of non-native plant species have been identified as a threat to the Zayante Sandhills because of the resulting change in the structure of the plant community; however, the specific impacts of these species on the Mount Hermon June beetle are unknown. The severe fragmentation of the Zayante Sandhills, coupled with the short dispersal distance of adult males of the Mount Hermon June beetle and minimal dispersal capability of flightless females, threaten the genetic exchange between populations of the Mount Hermon June beetle. Finally, stochastic events could result in the loss of highly fragmented, small populations of the Mount Hermon June beetle.

Ohlone Tiger Beetle

The Ohlone tiger beetle was listed as endangered by the Service on October 3, 2001 (66 FR 50340). Critical habitat has not been designated. A recovery plan was developed in 1998; however, at this time the species was only a candidate for listing and the recovery plan did not comprehensively address the entire range of the species (Service 1998).

The Ohlone tiger beetle was first described in 1993 (Freitag et al. 1993). Ohlone tiger beetle larvae are currently undescribed. The adult Ohlone tiger beetle is a relatively small beetle measuring 0.37 to 0.49 inch long. Adults have large, prominent eyes and metallic green, leathery forewings with small light spots (Freitag et al. 1993). Their legs are long, slender, and coppery-green. Freitag et al. (1993) describe features that distinguish this species from closely related species of purple tiger beetle (*Cicindela purpurea*) and other *purpurea* group taxa.

Ohlone tiger beetles are found in association with coastal terrace prairies, which are often characterized by the presence of California oatgrass (*Danthonia californica*) and purple needlegrass. The ground surface consists of shallow, pale, poorly drained clay or sandy clay soil that bakes to a hard crust by summer following winter and spring rains (Freitag et al. 1993). Ohlone tiger beetle habitat is associated with specific soil types (i.e., Watsonville loam and Bonnydoon soil types) in Santa Cruz County.

Adult Ohlone tiger beetles are found more often on level or nearly level slopes along trails (e.g., foot paths, dirt roads, and bicycle paths) that are adjacent or near remnant patches of native grassland on coastal terraces. Adults also use bare areas among low or sparse vegetation within the grassland. Ohlone tiger beetles require these open areas for construction of larval burrows, thermoregulation, and foraging (Knisley in litt. 2000). The density of larval burrows decreases with increasing vegetation cover (Hayes in litt. 1997). Adults will fly to more densely vegetated areas when disturbed (Freitag et al. 1993; Richard Arnold, pers. comm. 1995 as cited in 66 FR

50340). Egg laying and subsequent larval development also occur in this coastal prairie habitat (i.e., open areas among native vegetation) (Cheap in litt. 1997).

Two principal distinguishing features of the Ohlone tiger beetle are its early seasonal adult activity period and its disjunct distribution. While other tiger beetle species (e.g., *Cicindela purpurea*) are active during spring, summer, or early fall (Nagano 1982; Freitag et al. 1993), the Ohlone tiger beetle is active from late January to early April (Freitag et al. 1993). The Ohlone tiger beetle is the southernmost of *purpurea* group species in the Pacific coast region. Its distribution is geographically separated from those of similar species (Freitag et al. 1993).

The immature stages (i.e., egg, larva, and pupa) of the Ohlone tiger beetle have not been formally described. However, larvae of other species of tiger beetles are much more uniform in appearance than adults, and have a grub-like appearance. Tiger beetle burrows measure approximately 0.16 to 0.23 inch with circular and flat surface openings and no dirt piles or mounds surrounding the circumference. These burrows are similar to larval burrows belonging to other tiger beetle species. Both larvae and inactive adult Ohlone tiger beetles utilize these burrows (Cheap in litt. 1997).

The Ohlone tiger beetle is endemic to Santa Cruz County, California. Specimens of this species were first collected northwest of the city of Santa Cruz, California, in 1987 (Freitag et al. 1993). The historic range of the Ohlone tiger beetle cannot be precisely assessed because the species was only recently discovered, and no historic specimens or records are available. Based on available information on topography, substrates, soils, and vegetation, it is likely that suitable habitat for the Ohlone tiger beetle was more extensive and continuous prior to the increase in urban development and agriculture. Historically, potentially suitable habitat may have extended from southwestern San Mateo County to northwestern Monterey County, California (Freitag et al. 1993). However, we have no evidence or data indicating that this species occurred beyond the present known occupied areas of Santa Cruz County. Currently, the extent of potentially suitable habitat for the Ohlone tiger beetle is estimated at 200 to 300 acres in Santa Cruz County, California (Freitag et al. 1993).

Most of the areas where Ohlone tiger beetles are known are threatened by habitat fragmentation, degradation, and destruction due to residential development and recreational activities (i.e. ballfields, parks). Disturbance of the substrate, and removal or elimination of vegetation by urban development, kills or injures individuals and precludes others from feeding, sheltering, or reproducing. Additionally, Ohlone tiger beetle habitat is threatened due to invasions of nonnative vegetation (e.g., French broom, velvet grass (*Holcus lanatus*), filaree, and eucalyptus trees (*Eucalyptus* sp.)) and vulnerability to local extirpations from random natural events. Without management efforts to reduce and control vegetation encroachment by nonnative species, it is believed that the Ohlone tiger beetle will likely decline and may become extirpated in all of the locations where the species is known presently.

Zayante Band-Winged Grasshopper

The Zayante band-winged grasshopper was federally listed as endangered in 1997 (63 FR 3616). A recovery plan has been published (Service 1998). Critical habitat was designated for the species in 2001 (66 FR 9219).

Adult male Zayante band-winged grasshoppers measure about 0.50 to 0.75 inch in length; females are slightly longer, approximately 0.75 to 0.9 inch. The body and forewings of the Zayante band-winged grasshopper are pale gray to light brown with dark bands on the forewings. Basal areas of the hindwings are pale yellow. A cream-colored, mask-like marking surrounds the eyes. The tibiae of the Zayante band-winged grasshopper's hindlegs are grey-blue like several other members of the genus *Trimerotropis*. The species' common name derives from its close association with the Zayante area of Santa Cruz County and the Zayante sandhills. Collection records (BUGGY Database 2004), observations by Weissman (presented in Hovore 1996b) and studies by Arnold (1999a,b; 2000b; 2002a,b; and 2004b) indicate that the Zayante band-winged grasshopper is univoltine. Immature Zayante band-winged grasshoppers, known as nymphs, look like adults except for the absence of wings. The nymphs are diurnal and are observed as early as May, while the adults become more prevalent beginning in July. Adults are also diurnal and remain active until the first ground-soaking rains, generally in late October or early November (Arnold 2000a,b; 2002a,b; and 2004b).

Six plant communities characterize the Zayante sandhills. These plant communities include: silverleaf manzanita chaparral with ponderosa pine, sand chaparral, mixed silverleaf manzanita chaparral, ponderosa pine forest, dense sand parkland, and open sand parkland. These plant communities form a mosaic at some locations in the Zayante sandhills. The preferred habitat of the Zayante band-winged grasshopper is barren or sparsely-vegetated, sunlit sand, which are features of the open sand parkland plant community. This community is characterized by a diverse assemblage of specialty herbs indigenous to the Zayante sandhills, including the endangered Ben Lomond wallflower.

In the original description of the Zayante band-winged grasshopper, Rentz and Weissman (1984) noted that the habitat at the type locality (Lonestar's Olympia Quarry) was "sandy substrate sparsely covered with *Lotus* sp. and grasses at the base of pines above a rock quarry." Hovore (1996b) stated that he and Weissman most frequently encountered the Zayante band-winged grasshopper within ruderal and successional scrub habitats, where the soils were largely exposed, and in open, sunny flats beneath ponderosa pine.

Arnold (1999a,b) further examined the habitat associations and conditions where adult Zayante band-winged grasshoppers were observed along several transects at the Hanson Quarry, the Freeman property, and the North, South, and Western Ridges of Quail Hollow Quarry. The "transects" used for monitoring the Zayante band-winged grasshopper were a series of existing trails that traversed a variety of plant communities and habitat conditions at these study sites. Arnold found the preferred habitat of the Zayante band-winged grasshopper to be open sand parkland with widely scattered tree and shrub cover, sunlit ground, and extensive areas of bare or

sparsely vegetated ground characterized by loose sand and relatively flat topography. Zayante band-winged grasshoppers were also observed in sunlit grassy or barren patches within or at the edges of silverleaf manzanita chaparral, sand chaparral, or dense sand parkland areas. During subsequent capture-recapture studies and season-long transect counts along these same trails, a much greater proportion of Zayante band-winged grasshoppers have consistently been captured or observed in more open portions of these trails (Arnold 2000b; 2002a,b; and 2004b). Today, the amount of open sand parkland habitat for the Zayante band-winged grasshopper is quite limited throughout the sandhills. This habitat is generally seen along lightly-used trails and the upper slopes of ridges, at or below the crest, but above the limit of dense shrub or tree cover. The Zayante band-winged grasshopper does not occur in sandhill habitats characterized by dense herbaceous, shrub, or tree cover, or heavily utilized areas.

Chu (2002) examined microhabitats and food plant preferences of the Zayante band-winged grasshopper at the North and South Ridge areas of Quail Hollow Quarry. She found the Zayante band-winged grasshopper associated with more open sand (i.e., less total vegetative cover) areas and areas characterized by fewer invasive plant taxa. Chu microscopically examined Zayante band-winged grasshopper frass (i.e., excrement) pellets to identify the food plants of the species. The species composition of plant fragments in the frass was compared to the plant species diversity at locations where the grasshoppers used in the study were captured. The frass samples contained a significantly higher percentage of native plant species than was found in the surrounding plant community; these results indicate that native plants were preferred food plants of the Zayante band-winged grasshopper.

To date, the Zayante band-winged grasshopper has not been observed in revegetated portions of the Quail Hollow, Hanson, or Lonestar quarries. However, at the South Ridge conservation area of Quail Hollow Quarry, Zayante band-winged grasshoppers are commonly observed at the edge of and atop the hydrologically-mined portion of the quarry (Arnold 1999a, 2002a, and 2004b). Mining activities ceased here approximately 50 years ago. Subsequently, gradual recolonization by plants from the adjacent unmined habitat has resulted in a sparse assemblage of native forbs and scattered subshrubs.

Specific life history information for the Zayante band-winged grasshopper is unknown, but can be inferred from related species. Grasshoppers undergo an incomplete (i.e., hemimetabolous) metamorphosis, meaning that they develop from an egg to the adult through a sequence of progressively larger nymphal stages, without a discrete larval or pupal stage as do insects that have a complete (i.e., holometabolous) metamorphosis. Presumably the entire life cycle (i.e., egg, nymph, and adult) is completed within one year. Eggs are laid in the soil and the majority of the life cycle is probably spent as a subterranean egg.

Weissman (cited in Hovore 1996b) noted that characteristics of the topsoil may be a critical determinant of presence or absence of any particular *Trimerotropis* species. Soil consolidation, texture, grain size, and perhaps also chemistry all affect the ability of female Zayante band-winged grasshoppers to oviposit into the substrate. Based on occurrences of the Zayante band-winged grasshopper in the Zayante sandhills, this species appears to require sandy substrates

with loose, relatively fine upper layers (Arnold 1999a,b). The Zayante band-winged grasshopper has not been observed at locations in the sandhills where the Zayante sands are more indurate, or where fine-grained sand has been removed.

Arnold (2002a) observed male and female Zayante band-winged grasshoppers feeding on silver bush lupine, while Chu (2002) observed adults feeding on both silver bush lupine and sessileflower false goldenaster between June and September. The majority of plant fragments identified in Chu's (2002) frass analysis were silver bush lupine at 61.2 percent and sessileflower false goldenaster at 14.6 percent, while two grasses (rattail fescue and silver hairgrass (*Aira caryophllea*)) combined for 16.5 percent and two asters (California cottonrose (*Filago californica*) and smooth cat's ear (*Hypochaeris glabra*) combined for 7.7 percent of the plant fragments found.

Most adult Zayante band-winged grasshoppers occur on sandy substrate where their cryptic color and markings offer good camouflage against the background of sand and sparse leaf litter. Less frequently, adults are also observed on vegetation, in particular among the foliage of silver bush lupine, where the grasshopper's disruptive coloration and the filtered light of the lupine canopy provide good camouflage (Arnold 2002a). Adults may also rest in the canopy of silver bush lupine and use it as part of their thermoregulatory behavior, especially on hot days.

When approached by an observer, Zayante band-winged grasshoppers generally rely on their camouflage and will usually remain motionless until nearly stepped upon. Then they make short, usually looping flights. During the later portion of their flight, they often close their wings, making it difficult for observers to see where they land on the sand. Males crepitate, making a rapid buzzing-like sound for approximately 1 second in duration. The buzz pattern and duration differs from that made by Thalassica grasshopper (*Trimerotropis thalassica*), which occurs in silverleaf manzanita (*Arctostaphylos silvicola*) and chaparral-dominated portions of the sandhills.

When flushed in the field, adult Zayante band-winged grasshoppers generally move rather short distances (i.e., 1 to 25 feet). Dispersal data from capture-recapture studies confirmed that most adult males are quite sedentary, with home ranges of no more than a few acres (Arnold 2000b and 2002a). Even when sampling at approximately weekly intervals, 29 to 40 percent of recaptures occurred in the same trail interval or study subsite (i.e., bare areas or grassy areas within the overall study site) as the prior handling or sighting event. The average dispersal distance at Hanson Quarry was 91 feet, while at the Freeman property it was 123 feet (Arnold 2000b). At Quail Hollow Quarry, the average dispersal distance was 105 feet and the longest observed dispersal distance was 930 feet (Arnold 2002a). These studies were not designed to find adults that may have dispersed longer distances between different demes (i.e., local interbreeding groups) or populations of the Zayante band-winged grasshopper. Nonetheless, Arnold (2002c) observed two dispersing adult Zayante band-winged grasshoppers at the former Geyer Quarry, which does not currently support a resident population of the grasshopper.

Movements of a related species, lichen grasshopper (*Trimerotropis saxatilis*), were studied by Gerber and Templeton (1996). This grasshopper was studied in the Ozark Mountains of

Missouri, where it inhabits lichen-covered rocks in glade habitats that are separated by dense stands of trees and shrubs. This study found that the lichen grasshopper moved freely within a particular glade, but dispersal between adjacent glades was rarely observed, even when the distance between adjacent glades was less than the observed within-glade movements. The researchers speculate that the dense tree cover growing between glades limits dispersal of this grasshopper. In the Zayante sandhills, dense tree cover may also limit dispersal of the Zayante band-winged grasshopper. Arnold (1999a,b; 2000b; 2002a,b; and 2004b) observed daily and seasonal shifts in the use of suitable habitats at the Hanson Quarry, Freeman mitigation site, and Quail Hollow Quarry based on daily and seasonal changes in the position of the sun and corresponding changes in the locations of sunlit bare ground at these study sites. Therefore, between-deme dispersal of the Zayante band-winged grasshopper may require sunlit openings or corridors in the surrounding forest or chaparral with sunlit barren or sparsely-vegetated loose sandy soils to facilitate movement of the grasshopper.

Chu (2002) observed adult behaviors, but followed several individual Zayante band-winged grasshoppers as long as possible and often noted different behaviors during the period of observation for a particular individual. Observed behaviors included: walking, flying, feeding, cleaning, resting, thermoregulating, courtship, mating, male posturing, and female oviposition. Chu (2002) found that individual Zayante band-winged grasshoppers spend most of their time resting (46 percent), or walking, jumping, or flying (45 percent), while reproductive (4 percent) and feeding (5 percent) activities occurred much less frequently.

The historical distribution of the Zayante band-winged grasshopper is not well understood. Arnold (1999b) reviewed museum specimens and other reported records for the species, plus visited known and potential locations for the Zayante band-winged grasshopper throughout the Zayante sandhills. These records are stored in the BUGGY Database (2004). Based on this review, Arnold (1999b) concluded that the Zayante band-winged grasshopper had historically been observed at about 20 locations within the Zayante sandhills. However, different wording on several specimen labels or in written accounts that described these sites may have actually referred to the same locations. Valid occurrences of the Zayante band-winged grasshopper were found to be restricted to the loose and fine-grained Zayante sandy soils (Bowman and Estrada 1980) that occur in the Scotts Valley-Mount Hermon- Felton-Ben Lomond area of the Santa Cruz Mountains (i.e., the Zayante sandhills).

Three reported potential occurrences of the Zayante band-winged grasshopper by Randy Morgan (BUGGY Database 2004) are from Bonny Doon, a ridge west of Boyer Creek, and Canham Road (near Mt. Roberts) areas of Santa Cruz County; however, additional specimens need to be examined to verify if these locations actually support the species. More indurate Zayante sand formations, such as those at Bonny Doon, may not be favorable for the Zayante band-winged grasshopper, which prefers loose sands for egg-laying.

Several locations in the Zayante sandhills were surveyed, but found the Zayante band-winged grasshopper only at only three locations: Quail Hollow Ranch County Park, and the North and South Ridge portions of Quail Hollow Quarry (White *in litt* 1993). Hoekstra (1998) identified

eight populations of the Zayante band-winged grasshopper. Between 1990 and 2003, Arnold (2004c) visited over 200 individual properties in the Zayante sandhills to assess habitat conditions or to perform presence-absence surveys for the Zayante band-winged grasshopper and the Mount Hermon June beetle. During these surveys, Arnold confirmed the occurrence of the Zayante band-winged grasshopper at three new locations. Subsequently, however, the species has probably been extirpated from at least one of these new locations.

Lifespan data from capture-recapture studies of the Zayante band-winged grasshopper suggest that adults live several weeks to a few months (Arnold 2000b, 2002a). One male was observed during a 58-day period, while a second male was observed throughout a 65-day period. Seventeen of 183 recaptured individuals lived at least 42 days. Adults of a related species, the Occidental grasshopper (*Trimerotropis occidentalis*), were found to live as long as 156 days, with an average lifespan of about 70 days (Weissman and French 1980). Despite high recapture rates (56 to 63 percent), the estimates of longevity for the Zayante band-winged grasshopper may underestimate actual adult lifespan because the capture-recapture study periods were shorter than the full adult season (Arnold 2000b, 2002a).

The Zayante band-winged grasshopper was originally listed as endangered in 1997 because of historical loss of habitat and several actual or potential future actions that could further reduce the amount of suitable habitat that supports the grasshopper. Throughout most of its range, the primary threats to the species are loss of habitat from sand mining and urbanization, and habitat degradation due to invasive plants and unnatural succession. In addition, land uses such as agricultural conversion and recreation (e.g., hiking, horseback riding, mountain biking, and off-road vehicle use) have resulted in loss or degradation of habitat. Herbicide or insecticide use and overcollection by insect collectors are also considered potential threats to the Zayante band-winged grasshopper or its habitat.

The Zayante band-winged grasshopper occurs primarily in the open sand parkland plant community of the Zayante sand hills. Today, this habitat is limited in acreage and highly fragmented, resulting in overall small patches of habitat which supports small populations of the Zayante band-winged grasshopper. Natural disturbances such as fire and erosion, including sand blow outs and land slides retard succession and create sunlit openings with sparse herbaceous vegetation cover or bare sand that is favored by the Zayante band-winged grasshopper. Although several areas within the Zayante sandhills have been protected from further loss of habitat, the suppression of fire and other natural disturbances has allowed the cover of herbs, shrubs, and trees to increase, which degrade habitat quality for the Zayante band-winged grasshopper by reducing the amount of barren or sparsely-vegetated loose sands, and by shading the ground. Also, various non-native plants continue to invade the sandhills and become established there; these plants outcompete native plants that the Zayante band-winged grasshopper depends upon for food and shelter, colonize patches of barren sands, and shade the ground. Therefore, management activities at protected habitat locations will need to focus not only on maintaining the sites where Zayante band-winged grasshopper occurs, but also managing the vegetation to create new areas of habitat with sunlit, bare or sparsely-vegetated loose sands to benefit the species.

The recovery plan describes three actions necessary to downlist or delist the Zayante band-winged grasshopper. These actions include: protection of the 10 known collection sites (consisting of 7 discrete areas) of sand parkland habitat via fee-title acquisition, conservation easement, or Habitat Conservation Plans (HCP); development and implementation of a management plan for the Quail Hollow Ranch County Park (county of Santa Cruz); and ensuring stable or increasing population numbers of the Zayante band-winged grasshopper.

Tidewater Goby

The tidewater goby was listed as endangered on March 7, 1994 (59 FR 5494). On June 24, 1999, the Service proposed to remove the populations occurring north of Orange County, California, from the endangered species list (64 FR 33816). In November 2002, the Service withdrew this proposed delisting rule and determined to retain the tidewater goby's listing as endangered throughout its range (67 FR 67803).

We originally designated critical habitat for the tidewater goby on November 20, 2000 (65 FR 69693). In November 2006, we proposed to revise that designated critical habitat (71 FR 68914), and subsequently designated critical habitat in January 2008 (73 FR 5920). A recovery plan for the tidewater goby was completed on December 12, 2005 (Service 2005).

Much of the information in this species account is summarized from the following sources: Wang (1982), Irwin and Soltz (1984), Lafferty et al. (1999a, 1999b), Swift et al. (1989, 1993, 1997), Worcester (1992), Swenson (1995, 1999), and Swenson and McCray (1996).

The tidewater goby is endemic to California and typically inhabits coastal lagoons, estuaries, and marshes; preferring relatively low salinities of approximately 12 parts per thousand (ppt). Tidewater goby habitat is characterized by brackish estuaries, lagoons, and lower stream reaches where the water is fairly still but not stagnant. They tend to be found in the upstream portions of lagoons. Tidewater gobies can withstand a range of habitat conditions and have been documented in waters with salinity levels that range from 0 to 42 ppt, temperatures from 46 to 77 degrees Fahrenheit, and depths from approximately 10 inches to 6.5 feet.

The tidewater goby is primarily an annual species in central and southern California, although some variation in life history has been observed. If reproductive output during a single season fails, few (if any) tidewater gobies survive into the next year. Reproduction typically peaks from late April or May to July and can continue into November or December depending on the seasonal temperature and amount of rainfall. Males begin the breeding ritual by digging burrows (3 to 4 inches deep) in clean, course sand of open areas. Females then deposit eggs into the burrows, averaging 400 eggs per spawning effort. Males remain in the burrows to guard the eggs. They frequently foregoing feeding which may contribute to the mid-summer mortality observed in some populations. Within 9 to 10 days, larvae emerge and are approximately 0.20 to 0.27 inch in length. They live in vegetated areas in the lagoon until they are 0.60 to 0.70 inch long. When they reach this life stage, they become substrate-oriented, spending the majority of time on the bottom rather than in the water column. Both males and females can breed more

than once in a season, with a lifetime reproductive potential of 3 to 12 spawning events. Vegetation is critical for over-wintering tidewater gobies because it provides refuge from high water flows.

Tidewater gobies feed on small invertebrates, including mysids, amphipods, ostracods, snails, aquatic insect larvae, and particularly chironomid midge larvae. Tidewater gobies of less than 0.30 inch probably feed on unicellular phytoplankton or zooplankton similar to many other early stage larval fishes.

Historically, the tidewater goby occurred in at least 126 California coastal lagoons and estuaries from Tillas Slough near the Oregon border south to Agua Hedionda Lagoon in northern San Diego County. The southern extent of its distribution has been reduced by approximately 8 miles. The species is currently known to occur in about 98 locations, although the number of sites fluctuates with climatic conditions. Currently, the most stable populations are in lagoons and estuaries of intermediate size (5 to 124 acres) that are relatively unaffected by human activities.

In Santa Barbara County during the fall of 1994, tidewater gobies were reported as common in the Santa Ynez River at 4 miles distance above the lagoon, however, by January, 1995, they were absent at the upstream sites. Tidewater gobies that are found upstream of the lagoons in summer and fall tend to be juveniles. The highest densities of tidewater gobies are typically present in the fall.

Tidewater gobies enter the marine environment when sandbars are breached during storm events. The species' tolerance of high salinities (up to 60 ppt) for short periods of time enables it to withstand marine environment conditions where salinities are approximately 35 ppt, thereby allowing the species to re-establish or colonize lagoons and estuaries following flood events. However, genetic studies indicate that individual populations rarely have contact with other populations so natural recolonization may be rare.

Native predators are not known to be important regulators of tidewater goby population size in the lagoons of southern California. Rather, population declines are attributed to environmental conditions. During high flows streams, flood and breach lagoon barriers that create strong tidal conditions. As a result, populations plummet. Populations typically recover quickly in summer, with mean densities of between 54 to 323 fish per square foot recorded. Tidewater goby densities are greatest among emergent and submergent vegetation (Moyle 2002).

The decline of the tidewater goby is attributed primarily to habitat loss or degradation resulting from urban, agricultural, and industrial development in and around coastal wetlands. Tidewater gobies have been extirpated from water bodies that are impaired by degraded water quality (e.g., Mugu Lagoon, Ventura County), but still occur in others (e.g., Santa Clara River, Ventura County). Some extirpations are believed to be related to pollution, upstream water diversions, and the introduction of non-native predatory fish species (most notably, centrarchid sunfish and bass). These threats continue to affect some of the remaining populations of tidewater gobies.

California Red-legged Frog

The California red-legged frog was federally listed as threatened on May 23, 1996 (61 FR 25813). A recovery plan has been published (Service 2002). On March 17, 2010, the Service published a revised critical habitat designation for California red-legged frog (75 FR 12816).

Detailed information on the biology of California red-legged frogs can be found in Storer (1925), Stebbins (2003), and Jennings et al. (1992). This species is the largest native frog in the western United States, ranging from 1.5 to 5.1 inches in length. The abdomen and hind legs of adults are largely red; the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers, and dorsolateral folds are prominent on the back. Tadpoles range from 0.6 to 3.1 inches in length and are dark brown and yellow with dark spots.

California red-legged frogs spend most of their lives in and near sheltered backwaters of ponds, marshes, springs, streams, and reservoirs. Deep pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha* spp.) are considered optimal habitat. Eggs, larvae, transformed juveniles, and adults have also been found in ephemeral creeks and drainages and in ponds that do not have riparian vegetation. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting population numbers and distribution. Some California red-legged frogs have moved long distances over land between water sources during winter rains. Adult California red-legged frogs have been documented moving more than 2 miles in northern Santa Cruz County “without apparent regard to topography, vegetation type, or riparian corridors” (Bulger et al. 2003). Most of these overland movements occur at night.

California red-legged frogs breed from November through March with earlier breeding records occurring in southern localities. California red-legged frogs are often prolific breeders, typically laying their eggs during or shortly after large rainfall events in late winter and early spring. Female California red-legged frogs deposit egg masses on emergent vegetation so that the masses float on the surface of the water. Egg masses contain about 2,000 to 5,000 moderate-sized (0.08 to 0.11 inch) in diameter, dark reddish brown eggs. Embryos hatch 6 to 14 days after fertilization and larvae require 3.5 to 7 months to attain metamorphosis. Tadpoles probably experience the highest mortality rates of all life stages, with less than 1 percent of eggs laid reaching metamorphosis. Sexual maturity is normally reached at 3 to 4 years of age; California red-legged frogs may live 8 to10 years. Juveniles have been observed to be active diurnally and nocturnally, whereas adults are mainly nocturnal.

The diet of California red-legged frogs is highly variable. Invertebrates are the most common food items for adults, although vertebrates such as Pacific treefrogs (*Pseudacris regilla*), and California mice (*Peromyscus californicus*) can constitute over half of the prey mass eaten by larger frogs (Hayes and Tennant 1985). Larvae likely eat algae.

The California red-legged frog has been extirpated or nearly extirpated from 70 percent of its former range. Historically, the range of the California red-legged frog extended coastally from southern Mendocino County and inland from the vicinity of Redding, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985; Storer 1925). The species was found throughout the Central Valley and Sierra Nevada foothills. Its occurrence in those areas has become extremely limited, although four additional occurrences have been recorded in the Sierra Nevada foothills since listing, bringing the total to five extant populations, compared to approximately 26 historical records (75 FR 12816). Currently, California red-legged frogs are only known from 3 disjunct regions throughout 26 California counties, and 1 disjunct region in Baja California, Mexico (Grismer 2002; Fidenci 2004; R. Smith and D. Krofta *in litt*. 2005).

The most secure aggregations of California red-legged frogs are found in aquatic sites that support substantial riparian and aquatic vegetation and lack non-native predators. Over-harvesting, habitat loss, non-native species introduction, and urban encroachment are the primary factors that have negatively affected the California red-legged frog throughout its range (Jennings and Hayes 1985, Hayes and Jennings 1988). Ongoing threats to the species include habitat loss due to stream alteration and disturbance to wetland areas; indirect effects from expanding urbanization, competition or predation from non-native species; and chytrid fungus (*Batrachochytrium dendrobatidis*), a water-borne fungus that can decimate amphibian populations.

California Tiger Salamander

The Service recognizes three distinct populations of the California tiger salamander; in Sonoma County (68 FR 13498), in Central California (69 FR 47212), and in northern Santa Barbara County (65 FR 57242). On September 21, 2000, we listed the Santa Barbara County distinct population of the California tiger salamander as endangered (65 FR 57242). On March 19, 2003, we listed the Sonoma County distinct population segment of the California tiger salamander as endangered (68 FR 13498). On August 3, 2004, we published a final rule listing the California tiger salamander as threatened range-wide, including the previously identified Sonoma and Santa Barbara distinct population segments (69 FR 47212). On August 19, 2005, the U.S. District Court vacated the Service's downlisting of the Sonoma and Santa Barbara populations from endangered to threatened. Thus, the Sonoma and Santa Barbara populations are once again listed as endangered, and the Central California population is listed as threatened. On November 24, 2004, we designated critical habitat for the Santa Barbara County population of California tiger salamander (69 FR 68568). On August 23, 2005, we designated critical habitat for the California tiger salamander, Central population, in four regions: Central Valley, Southern San Joaquin Valley, East Bay, and Central Coast (70 FR 49380). On December 14, 2005, we designated critical habitat for the Sonoma County distinct population segment of the California tiger salamander (70 FR 74138).

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). Three distinct populations are recognized by the Service: in the coastal ranges of Sonoma County; in

Central California including the San Francisco Bay area, the Central Valley, southern San Joaquin Valley, and the Central Coast Ranges; and 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). 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 recent 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).

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 in 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 (65 FR 57242). 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 (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 savannah, but includes grasslands with scattered oak trees, and scrub or chaparral habitats (Shaffer et al. 1993, 65 FR 57242). 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 and Botta's pocket gophers (*Thomomys bottae*) (Storer 1925, Loredo and Van Vuren 1996, Trenham 1998, Pittman 2005). The creation of burrow habitat 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 (69 FR 47212). 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 (69 FR 47212). During a mark and recapture study in the Upper Carmel River Valley, Monterey County, Trenham et al. (2001) observed California tiger salamanders dispersing up to 2,200 ft between breeding ponds between years. In research at Olcott Lake, Solano County, Trenham and Shaffer (2005) captured California tiger salamanders in traps installed 1,312 feet from the breeding pond.

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 (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). 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 inches 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 (Anderson 1968). Larger larvae have been known to consume smaller tadpoles of Pacific treefrogs and California red-legged frogs (Anderson 1968). The larvae are among the top aquatic predators in the 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 (change into a different physical form) 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 (Pechmann et al. 2001). The larvae perish if a

site dries before they complete metamorphosis (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).

Lifetime reproductive success for California and other tiger salamanders is low. Trenham et al. (2000) found the average female bred 1.4 times over a lifetime, and produced 8.5 young that survived to metamorphosis, per reproductive effort. This resulted in approximately 12 metamorphic offspring over the lifetime of a female. Trenham et al. (2000) also reported that most California tiger salamanders in their study did not reach sexual maturity until 4 or 5 years old, and that less than 5 percent of juveniles survived to reach sexual maturity.

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 (65 FR 57242, 68 FR 13498, 69 FR 47212). Additional threats to the species include hybridization with introduced non-native barred tiger salamanders (*A. tigrinum mavortium*) (65 FR 57242, 69 FR 47212), destructive rodent and mosquito control techniques (e.g., deep-ripping of burrow areas, use of fumigants/pesticides) (68 FR 13498), reduced survival due to the presence of mosquitofish (*Gambusia* spp.) and other nonnative aquatic species, and mortality on roads due to vehicles (65 FR 57242).

Santa Cruz Long-toed Salamander

The Santa Cruz long-toed salamander was federally listed as endangered on March 11, 1967 (32 FR 4001). A recovery plan was published in 1977 (Service 1977), and revised in 1985-86 (Service 1986) and 1998-99 (Service 1999). A draft revision is currently in progress. Critical habitat was proposed in 1978 (43 FR 26759); the proposal was withdrawn in 1979 (44 FR 12382). The Santa Cruz long-toed salamander is a fully protected species under California law; see California Fish and Game Code, Section 5515. Unless otherwise indicated, information in this account was obtained primarily from Anderson (1960, 1961, 1963, 1967, 1968, 1972), Reed (1979, 1981), Ruth (1988a, 1988b), and Ruth and Tollestrup (1973).

Santa Cruz long-toed salamanders are small, dark colored salamanders with a series of discrete, irregular dull orange or metallic-yellow dorsal markings. Head markings are small scattered dots and are often absent anterior to the eyes. The ventral surface is sooty black, with bluish to

whitish flecks on the sides. They are thought to be long-lived creatures, possibly living for a decade or more. The Santa Cruz long-toed salamander is one of five subspecies of long-toed salamander; isolated by 150 miles from the nearest other subspecies (Stebbins 2003).

Santa Cruz long-toed salamanders spend most of their lives underground in small mammal burrows and among the root systems of plants in upland mesic coastal scrub and woodland areas of coast live oak (*Quercus agrifolia*) or Monterey pine (*Pinus radiata*) as well as riparian strips of arroyo willows (*Salix lasiolepis*) and other species. These areas are desirable because they are protected from the heat and drying rays of the sun. The soil is usually a sandy loam, formed from old marine terraces. The breeding ponds are usually shallow, ephemeral, freshwater ponds; however, the species also breeds in ponds containing water throughout the year.

To date, 24 breeding sites for Santa Cruz long-toed salamanders have been identified; 17 of the breeding sites occur in southern Santa Cruz County, and 7 are in northern Monterey County. At the time of listing, the subspecies was known from three sites in Santa Cruz County. The subspecies likely has been extirpated from two locations; Bennett Slough/Struve Pond in Monterey County and Rancho Road Pond in Santa Cruz County. We do not know whether two other previously known breeding locations (Green's Pond and Anderson's Pond) in Santa Cruz County still exist. Additionally, breeding has not been documented at Lower Moro Cojo Slough (in Monterey County) since 1990. Breeding has been documented at 19 of the 24 known locations since the last draft revised recovery plan for the subspecies was published (Service 2009e).

The distance between known aquatic and upland locations varies from site to site and apparently depends on soil type, slope, aspect, vegetation structure and composition, and the size of the breeding pond. During studies at Valencia Lagoon and the Ellicott site, up to 90 percent of the adults were captured within 125 meters (400 feet) of the breeding pond and subsequently not caught in more distant trap lines (Reed 1979, 1981). However, in Reed's research, few trap lines were installed greater than 125 meters from the breeding pond, and were not uniformly distributed, likely due to limited available upland habitat among developed parcels. Continuing research on overland movements between upland retreats and aquatic breeding locations has shown that adult Santa Cruz long-toed salamanders migrate farther to and from breeding ponds than was previously presumed. Ruth (1988b) found that significant numbers (22 percent) of Seascape Pond's adult salamanders were migrating more than 250 meters (800 feet) through grasslands to reach suitable sheltering habitat in oak woodlands. Data from Ruth's (1994) study at Willow Canyon indicated that Santa Cruz long-toed salamanders could migrate up to 800 meters (2,640 feet) between breeding ponds and upland habitats. Based on data from pitfall trap studies at a known breeding pond (Seascape Pond 1) and adjacent uplands (Willow Canyon), Biosearch (2002) estimated that between 26 percent and 36 percent of the adult population of Santa Cruz long-toed salamanders from the pond traveled at least 335 meters (1,100 feet) to reach suitable upland habitat. Biosearch (2002) recaptured 49 percent of adult Santa Cruz long-toed salamanders that were captured and marked (toe-clipping method) while migrating towards Seascape. This high recapture rate suggests that adult Santa Cruz long-toed salamanders return to the uplands areas from which they migrated earlier in the breeding season.

Adult Santa Cruz long-toed salamanders leave their upland retreats with the onset of the rainy season in mid- to late-November or December and begin their annual nocturnal migration to the breeding ponds. They often forage for invertebrates, especially isopods, on the surface in and around breeding sites during the rainy season. Adult Santa Cruz long-toed salamanders migrate primarily on nights of rain or mist (Anderson 1960, 1967; Ruth and Tollestrup 1973; Reed 1979, 1981), or one night following a rain event. Adults arrive at the breeding ponds from November through March, with most arriving between December and February. Peak breeding occurs during January and February because earlier rains are usually insufficient to fill the breeding ponds. Adults may skip breeding for one or more seasons if no surface water is present during drier years (Russell and Anderson 1956). As individuals enter the pond, they pair up, court, and breed. Males apparently remain in ponds twice as long (1 to 5 weeks) as females and may successfully breed with more than one female each season. Female Santa Cruz long-toed salamanders have specialized and selective egg-laying habits. Eggs are laid singly on submerged stalks of spike rush (*Eleocharis* spp.) or other vegetation about 2 to 3 centimeters apart. Free floating, unattached, and clustered eggs have also been observed. Each female lays about 300 (range 215 to 411) eggs per year. After courtship and egg-laying, most adults leave the pond by March or April and return to the same general areas where they spent the previous summer, often foraging for food while en route. Some adults may remain in the vicinity of the breeding site for a year or more before returning to more distant terrestrial retreats. The eggs and the subsequent larvae are left unattended by the adults.

According to Reed (1979, 1981) and Ruth (1988a), eggs usually hatch into the aquatic larval stage 15 to 30 days after laying. The exact amount of time for development depends on water temperature. The larvae, which subsist largely on aquatic invertebrates, such as worms and mosquito larvae, other larval amphibians such as Pacific treefrogs and conspecifics, remain in the pond environment for 90 to 145 days until they reach a minimum size of about 1.3 inches snout to vent length. Once this general size is reached, the larvae may metamorphose in a relatively short period of time if the pond environment becomes unsuitable for continued larval growth. However, a complex set of factors determines the timing of metamorphosis in ambystomid salamanders. Metamorphosis typically occurs from early May to mid-August. In the closely related mole salamander (*Ambystoma talpoideum*), metamorphosis can be induced in the laboratory by starvation, water pollution, increased water temperatures, or drying of the aquatic habitat (Shoop 1960). If water is available to the larvae for a longer period of time, remaining in the pond may be advantageous for the juveniles. A larger body size at metamorphosis increases resistance to desiccation, makes the individual less vulnerable to predation, and increases the size range of food items that can be eaten (Werner 1986). As the pond begins to dry, the juveniles move at night and may seek refuge underground, in decaying plant matter at the pond site, or in adjacent willow stands (Anderson 1967; Reed 1979, 1981). Following transformation, metamorphs seek cover in the vicinity of the breeding ponds (Jennings 1995). During the onset of winter rains, metamorphs disperse farther away from the pond, not returning until they reach sexual maturity at 2 to 3 years (Ruth 1988a; Laabs 2004).

Santa Cruz long-toed salamanders are vulnerable to several predators. Eggs and larvae may be preyed upon by mosquitofish and crayfish (*Procambarus* spp.). These introduced species have

also been implicated in the declines of other amphibian species (Gillespie and Hero 1999). Larvae are also eaten by adult Santa Cruz long-toed salamanders and California tiger salamander (Blau 1972). Larvae and metamorphs probably are preyed upon by herons (*Ardea herodias, Butorides striatus, Egretta* spp.), grebes (*Podilymbus podiceps, Podiceps* spp.), and belted kingfishers (*Ceryle alcyon*). Mammalian predators of Santa Cruz long-toed salamanders include introduced Virginia opossums, striped skunks, and raccoons. Metamorphs and adults are prey to California tiger salamanders, coast garter snakes (*Thamnophis atratus*), western terrestrial garter snakes (*T. elegans*), and common garter snakes (*T. sirtalis*) (Ruth 1988a). Burrowing mammals such as California moles (*Scapanus latimanus*) apparently avoid Santa Cruz long-toed salamanders because of toxic skin secretions (Anderson 1963). Predation of adult salamanders is minimized by the availability of sufficient cover and by the nocturnal activities of adults, which move primarily during rain events. In addition, larval Santa Cruz long-toed salamanders are parasitized by a flatworm (Family: Plagiochiidae) which causes the creation of supernumerary limbs as well as other limb deformities (Sessions and Ruth 1990).

The principal threats to the Santa Cruz long-toed salamander's continued existence include degradation of existing breeding ponds, the destruction of upland and breeding habitats by land use practices such as urbanization and highway construction, vehicles, siltation, growth of excessive aquatic vegetation, saltwater intrusion, increased vulnerability to weather conditions (e.g., prolonged periods of drought), runoff from adjacent agricultural and urban areas, and predation by introduced and native organisms. The restricted and disjunct distribution of Santa Cruz long-toed salamander populations has made the species particularly susceptible to population declines.

Marbled Murrelet

The Washington, Oregon, and California population of the marbled murrelet was federally listed as threatened on September 28, 1992 (57 FR 45328). Critical habitat was first designated on May 24, 1996 (61 FR 26256). On July 31, 2008, the Service proposed a revised critical habitat rule for the species (73 FR 44678); however, this proposed rule has not yet been finalized. The Service released a recovery plan for the marbled murrelet in 1997 (Service 1997). The State listed the marbled murrelet as Endangered on March 12, 1992.

The marbled murrelet is a small diving seabird in the family Alcidae. Male and female marbled murrelets have identical plumages. Breeding adults have sooty-brown to brownish-black upper parts with reddish scapulars, while underparts are light, mottled brown. Wintering adults have balckish-brown upper parts except for a white band below the nape that extends up from white underparts and white scapulars. The plumage of fledged young is similar to that of adults in winter.

Marbled murrelets feed primarily on fish and invertebrates in near-shore marine waters. They forage by pursuit, diving in waters generally up to 260 feet deep and 0.2 to 1.2 miles off-shore. Marbled murrelets spend the majority of their time on the ocean, roosting and feeding, but come inland up to 50 miles to nest in forest stands with old growth forest characteristics. These dense,

shady forests are generally characterized by large trees with large branches or deformities for use as nest platforms. The listed population nests in stands varying in size from several acres to thousands of acres. However, larger, unfragmented stands of old growth appear to be the highest quality habitat for marbled murrelet nesting. Nesting stands are dominated by Douglas-fir (*Pseudotsuga menziesii*) in Oregon and Washington and by old-growth coast redwoods in California. Nesting occurs in trees throughout the forested portion of the range, but marbled murrelets are known to nest on the ground in non-forested portions of the range.

The marbled murrelet employs a unique life history strategy for a seabird that involves flying inland to nest in mature conifers. Marbled murrelets appear to be solitary in their nesting and feeding habitat, but interact in groups over the forest and at sea (Sealy and Carter 1984, Nelson and Hamer 1995a). Nesting occurs over an extended period from late March to late September (Carter and Erickson 1992, Hamer and Nelson 1995). Nests are not built; the sexually mature marbled murrelet (i.e., at 2 or 3 years of age) lays a single egg in a small depression or cup made in moss or other debris on the limb. Incubation lasts approximately 28 to 30 days (Sealy 1974, Simons 1980, Hirsch et al. 1981); fledging takes another 27 to 40 days (Nelson 1997). Both sexes incubate the egg in alternating 24-hour shifts (Simons 1980; Singer et al. 1991 and 1995; Nelson and Hamer 1995a; Nelson and Peck 1995). Not all sexually mature marbled murrelets nest every year. Research has indicated that marbled murrelets breed later or not at all during years of low food abundance (e.g., during El Niño ocean conditions) (Speckman 1996).

Marbled murrelet young are semi-precocial; i.e., after hatching, the chick is helpless and dependent on the adults for food. The adults feed the chick from 1 to 8 times per day, returning to the nest site (primarily at dawn, dusk, and midday) from feeding on the ocean, carrying one fish at a time (Nelson and Hamer 1995a). After the chick is 2 to 3 days old, it is left alone at the nest for much of the day while both parents forage at sea; the chick is therefore vulnerable to predation for the 24 to 37 days it is alone on the nest (Nelson 1997). Parents feed the chick one fish at a time up to eight times a day (Nelson and Hamer 1995a). Fledglings appear to fly directly from the nest to the sea. Marbled murrelets probably do not reach sexual maturity until at least their second year, and most birds probably do not lay eggs until they are three years of age or older. Marbled murrelets are estimated to live an average of ten years (Beissinger 1995). Marbled murrelets exhibit a high level of philopatry (i.e. nest site fidelity), often returning to the same tree or even the same branch to breed (Nelson 1997).

Marbled murrelets feed on a variety of marine fish and invertebrates. Small schooling fish are the main prey taken in the breeding season. Fish species taken include Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea harengus*), northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), rockfishes (*Sebastes* sp.) and smelts (family Osmeridae). Krill, mysids, and gammarid amphipods are the main foods taken in winter and spring. Marbled murrelets forage at the surface and underwater, using their wings for swimming during dives.

Marbled murrelets breed along the Pacific coast of North America from the Aleutian Archipelago and southern Alaska, south to central California. Within their current range,

marbled murrelets are found on land and at-sea in portions of the following six geographic zones: Puget Sound, Western Washington Coast Range, Oregon Coast Range, Siskiyou Coast Range, Mendocino, and Santa Cruz Mountains. In California, marbled murrelets are concentrated in two areas that correspond to the largest remaining blocks of older coastal forests. These forest blocks are separated by areas of little or no habitat, which correspond to locations at-sea where few marbled murrelets are found. Gaps in the species' distribution include central California, northwestern Oregon, and southwestern Washington where marbled murrelets persist in small numbers (Service 1997). A 300-mile gap exists in the southern portion of the marbled murrelet's breeding range between Humboldt/Del Norte Counties in the north and San Mateo/Santa Cruz Counties to the south (Nelson 1997). Marbled murrelets winter throughout the breeding range and also occur in small numbers off southern California.

The species is declining due to loss of older forests used for nesting sites (Ralph et al. 1995, Service 1997). Estimates indicate that the population throughout North America has declined by 50 to 82 percent. The size of the listed population in Washington, Oregon, and California was estimated at 18,550 to 32,000 birds (Ralph et al. 1995, Nelson 1997). Two vastly different population estimates for Oregon account for the large range: Varoujean and Williams (1995) estimated 6,600 birds along the Oregon coast in August and September 1993, based on aerial surveys; Strong et al. (1995) estimated the Oregon population at 15,000 to 20,000 birds, based on boat surveys.

In the 1990's, approximately 6,450 individual marbled murrelets inhabited the area along the coast of California (Ralph and Miller 1995). Using known population numbers relative to remaining suitable nesting habitat, it has been estimated that historically 60,000 marbled murrelet pairs may have been found in this same area. Loss of viable nesting habitat is thought to be a primary factor responsible for an estimated annual 4-to 7-percent decline in marbled murrelet populations in Washington, Oregon, and California (Beissinger 1995). The marbled murrelet employs a life history strategy involving a relatively long life span, delayed sexual maturity, and low annual reproductive potential. This strategy may allow individuals to reproduce successfully over their lifetimes despite periodic adverse conditions (Service 1997). This strategy also relies on high survivorship of adults to increase population size. It is unlikely that population numbers will increase rapidly due to the naturally low reproductive rate; the continued loss of nesting habitat indicates that the recovery of the species is likely to take decades.

The primary cause of marbled murrelet population decline is the loss and modification of nesting habitat in old growth and mature forests through commercial timber harvests, human-induced fires, and land conversions, and to a lesser degree, through natural causes such as wild fires and wind storms. In general, forest management practices that maximize timber production cut and replant forest stands every 40 to 60 years. Because it takes 100 to 250 years to "grow" marbled murrelet nesting habitat, this time frame frequently does not allow old-growth characteristics to develop, thereby precluding large areas from providing future nesting habitat. Continued harvest of old growth and mature forests also perpetuates the loss and fragmentation of remaining habitat. Changing the existing habitat by fragmenting the forest into small patches of suitable

habitat surrounded by open space also decreases habitat quality. Increased forest fragmentation can reduce nesting success by allowing increased predation of nests by raptors (e.g., great horned owls (*Bubo virginianus*), sharp-shinned hawks (*Accipiter striatus*), and peregrine falcons (*Falco peregrinus*) and corvids (e.g., Steller's jays (*Cyanocitta stelleri*), common ravens (*Corvus corax*), and crows (*Corvus brachyrhynchos* and *C. Caurinus*). In the marbled murrelet's marine habitat, oil spills and gill-net fishing also threaten the population. Recent oil spills off the coast of California and Oregon have contributed to direct mortality of marbled murrelets and other seabirds.

The marbled murrelet was federally listed in 1992 due to the high rate of nesting habitat loss and fragmentation, and mortality associated with net fisheries and oil spills. Currently, the primary threats to the marbled murrelet are the harvesting of old-growth forest nesting habitat and predation on eggs and chicks. Suitable marbled murrelet habitat has declined throughout the listed subspecies' range due to timber harvest. Marbled murrelets have high nest predation rates, and corvids are suspected to have caused the majority of known nest failures (Luginbuhl et al. 2001). As of 2001, the fates of only 71 marbled murrelet nests were known for all of North America. Only one third of these nests fledged young, and it is estimated that between 38 and 59 percent of nests were depredated (Luginbuhl et al. 2001). Nelson and Hamer (1995b) reported that 8 of 14 nests (57 percent) in California, Oregon, and Washington had failed as a result of predation. Some loss of marbled murrelet habitat is also attributable to development and natural disturbance, such as fire and wind-throw. Because of their extensive use of nearshore waters, marbled murrelets are very susceptible to the impacts of oil spills and have been given one of the highest oil spill vulnerability index values among seabirds (King and Sanger 1979).

Although much of the marbled murrelet nesting habitat on private lands has been degraded or eliminated by logging, suitable habitat remains on Federal- and State-owned lands. The Service designated areas of critical habitat in 1996 within the tri-state area (California, Oregon, and Washington) to identify essential habitat and promote the recovery of the species (61 FR 26256). These areas include approximately 3,000,000 acres of Federal lands and almost 1,000,000 acres of State, county, city and private lands. Over the next 50 to 100 years, the protected areas on Federal lands should provide for an increase in suitable nesting habitat.

Critical Habitat for the Monterey Spineflower

The Service first designated critical habitat for the Monterey spineflower on May 29, 2002 (67 FR 37497). On January 9, 2008, the Service published a revised critical habitat designation for Monterey spineflower (73 FR 1525). In total, 11,055 acres were designated as critical habitat for the Monterey spineflower within Monterey and Santa Cruz County, California. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

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, we consider those physical and biological features (PCEs) that are essential to the conservation of the species, and within areas

occupied by the species at the time of listing, that may require special management considerations and protection. Because not all life-history functions require all the PCEs, not all areas designated as critical habitat will contain all the PCEs. 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, and 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. Based on our current knowledge of the life-history, biology, and ecology of the Monterey spineflower, we determined that the PCE for critical habitat for this species 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 (PCE1).

The nine units designated as critical habitat for the Monterey spineflower are located either along the coast or inland within Santa Cruz County and Monterey County. All of the critical habitat units for Monterey spineflower contain the PCE required by the species for survival. The program-specific critical habitat units are described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the Robust Spineflower

Critical habitat was designated for the robust spineflower on May 28, 2002 (67 FR 37336). In total, 469 acres were designated as critical habitat for the robust spineflower within Santa Cruz County, California. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

Based on our current knowledge of the life-history, biology, and ecology of the robust spineflower, we determined that the PCEs of critical habitat for this species consist of:

1) Sandy soils associated with active coastal dunes and inland sites with sandy soils;

2) Plant communities that support associated species, including coastal dune, coastal scrub, grassland, maritime chaparral, and oak woodland communities, and have a structure such that there are openings between the dominant elements (i.e. scrub, shrub, oak trees, clumps of herbaceous vegetation);

3) Plant communities that contain little or no cover by nonnative species which would complete for resources available for growth and reproduction of robust spineflower*;* and

4) Physical processes, such as occasional soil disturbance, that support natural dune dynamics along coastal areas.

There are six critical habitat units designated for the robust spineflower. Approximately 50 percent of critical habitat for robust spineflower is comprised of privately owned lands. The program-specific critical habitat units are described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the Santa Cruz Tarplant

Critical habitat for the Santa Cruz tarplant was designated on October 16, 2002 (67 FR 63968) and encompasses 2,902 acres in Contra Costa, Monterey, and Santa Cruz Counties, California. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

Based on our current knowledge of the life-history, biology, and ecology of the Santa Cruz tarplant, we determined that the PCEs of critical habitat for this species consist of:

1) Soils associated with coastal terrace prairies, including the Watsonville, Tierra, Elkhorn, Santa Inez, and Pinto series;

2) Plant communities that support associated species, including native grasses such as needlegrass and California oatgrass*;* native herbaceous species such as members of the genus *Hemizonia* (other tarplants), Gairdner's yampah (*Perideridia gairdneri*), San Francisco popcorn flower (*Plagiobothrys diffuses*), and Santa Cruz clover (*Trifolium buckwestiorum*); and

3) Physical processes, particularly soils and hydrologic processes, that maintain the soil structure and hydrology that produce the seasonally saturated soils characteristic of Santa Cruz tarplant habitat.

Designated critical habitat for the Santa Cruz tarplant consists of 11 units within Contra Costa, Santa Cruz, and Monterey County. The program-specific critical habitat units are described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the Scotts Valley Polygonum

Critical habitat for the Scotts Valley polygonum was designated on April 8, 2003 (68 FR 16979) and encompasses 287 acres in Santa Cruz County, California. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

For critical habitat of the Scotts Valley polygonum, we identified the following PCEs essential to the conservation of the species:

1) Thin soils in the Bonnydoon series that have developed over outcrops of Santa Cruz mudstone and Purisima sandstone;

2) "Wildflower field" habitat that has developed on these thin-soiled sites;

3) A grassland plant community that supports "wildflower field" habitat and that supports the pollinator activity and seed dispersal mechanisms that typically occur within the grassland plant community;

4) Areas around each colony to allow for recolonization to adjacent suitable microhabitat sites; and

5) Habitat within the subwatersheds upslope to the ridgelines to maintain the edaphic and hydrologic conditions and slope stability that provide the seasonally wet substrate for growth and reproduction of the Scotts Valley polygonum.

There are two critical habitat units for the Scotts Valley polygonum. The program-specific critical habitat units are described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the Scotts Valley Spineflower

Critical habitat for the Scotts Valley spineflower was designated on May 29, 2002 (67 FR 37336) and encompasses 287 acres in Santa Cruz County, California. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule (67 FR 37336).

Based on our current knowledge of the life-history, biology, and ecology of the Scotts Valley spineflower, we determined that the PCEs of critical habitat for this species consist of:

1) Thin soils in the Bonnydoon series that have developed over outcrops of Santa Cruz mudstone and Purisima sandstone;

2) "Wildflower field" habitat that has developed on these thin-soiled sites;

3) A grassland plant community that supports "wildflower field" habitat that is stable over time and in which nonnative species are absent or are at a density that has little or no adverse effect on resources available for growth and reproduction of Scotts Valley spineflower;

4) Sufficient areas around each population to allow for recolonization to adjacent suitable microhabitat sites in the event of catastrophic events;

5) Pollinator activity between existing colonies of Scotts Valley spineflower;

6) Seed dispersal mechanisms between existing colonies and other potentially suitable sites; and

7) Sufficient integrity of the watershed above habitat for the Scotts Valley spineflower to maintain soil and hydrologic conditions that provide the seasonally wet substrate for growth and reproduction of Scotts Valley spineflower.

There are two critical habitat units designated for the Scotts Valley spineflower. The program-specific critical habitat units are described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the Zayante Band-winged Grasshopper

Critical habitat for the Zayante band-winged grasshopper was designated on March 9, 2001 (66 FR 9219) and encompasses approximately 10,560 acres in Santa Cruz County. This area includes all areas known to be currently occupied by the species. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

Based on our current knowledge of the life-history, biology, and ecology of the Zayante band-winged grasshopper, we determined that the PCEs of critical habitat for this species consist of:

1) The presence of Zayante soils;

2) The occurrence of Zayante sand hills habitat and the associated plant species; and

3) Certain microhabitat conditions, including areas that receive large amounts of sunlight, widely scattered tree and shrub cover, bare or sparsely vegetated ground, and loose sand.

Designated critical habitat for the Zayante band-winged grasshopper is made up of one unit within Santa Cruz County. The program-specific critical habitat unit is described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the Tidewater Goby

We originally designated critical habitat for the tidewater goby on November 20, 2000 (65 FR 69693); however, on January 31, 2008, we published a revised critical habitat designation (73 FR 5920). The revised critical habitat designation for the tidewater goby encompasses approximately 10,003 acres. This is an increase of approximately 8,422 acres from the previously designated critical habitat. In the previous rule, critical habitat was designated only in Orange and San Diego Counties due to uncertainty over the future listing status of tidewater goby populations to the north. The revised critical habitat includes lands located within Del Norte, Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties, California. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

This revised designation identifies areas supporting primary constituent elements (PCEs) that exist at coastal lagoons, estuaries, backwater marshes, and associated freshwater tributaries, and

that are necessary to support the life history functions, of the tidewater goby. All of the areas of revised critical habitat for the tidewater goby are within the species' historical geographic range and contain PCEs to support at least one of the tidewater goby's essential life history functions. Based on our current knowledge of the life history, biology, and ecology of the tidewater goby and the requirements of the habitat to sustain the essential life history functions of this species, we have determined that the PCEs for the tidewater goby are:

1) Persistent, shallow (in the range of about 0.1 to 2 meters), still-to-slow-moving, aquatic habitat most commonly ranging in salinity from less than 0.5 ppt to about 10 to 12 ppt, which provides adequate space for normal behavioral, individual and population growth;

2) Substrates (e.g., sand, silt, mud) suitable for the construction of burrows for reproduction;

3) Submerged and emergent aquatic vegetation, that provides protection from predators; and

4) Presence of a sandbar(s) across the mouth of a lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary, thereby providing relatively stable water levels and salinity.

There are 44 units of critical habitat designated for the tidewater goby. The program-specific critical habitat unit is described in greater detail in the Environmental Baseline section of this document.

Critical Habitat for the California Red-legged Frog

On March 17, 2010, the Service published a revised critical habitat designation for California red-legged frog (75 FR 12816). In total, 1,636,609 acres were designated as critical habitat for the California red-legged frog in 27 California counties. The current designation better reflects the lands containing those essential habitat features necessary for the conservation of the California red-legged frog than did earlier designations that had been subject to litigation. A detailed discussion of the methods used in developing proposed critical habitat can be found in the final rule.

All of the areas of revised critical habitat for the California red-legged frog are within the species' historical geographic range and contain PCEs to support at least one of the California red-legged frog's essential life history functions. Based on our current knowledge of the life-history, biology, and ecology of the California red-legged frog, we determined that the PCEs of California red-legged frog critical habitat consist of:

1) Aquatic breeding habitat consists of standing bodies of fresh water (with salinities less than 4.5 parts per thousand), including natural and manmade (stock) ponds, slow moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2) Aquatic non-breeding habitat consists of the freshwater habitats described for aquatic breeding habitat, that may or may not hold water long enough for the subspecies to complete the aquatic portion of its lifecycle, which provide for shelter, foraging, predator avoidance, and aquatic dispersal habitat for juvenile and adult California red-legged frogs.

3) Upland habitat consists of areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat, up to a distance of one mile in most cases (i.e., depending on surrounding landscape and dispersal barriers). Upland habitat may consist of various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog. Upland habitat should include structural features such as boulders, rocks and organic debris (e.g., downed trees or logs), small mammal burrows, or moist leaf litter.

4) Dispersal habitat consists of accessible upland or riparian habitat within and between occupied or previously occupied sites located within one mile of each other, where movement is supported between such sites. Dispersal habitat includes various natural habitats and altered habitats (e.g., agricultural fields) that do not contain barriers to dispersal (e.g., heavily traveled roads without bridges or culverts). Dispersal habitat does not include moderate- to high-density urban or industrial developments with large expanses of asphalt or concrete, nor does it include large lakes or reservoirs over 50 acres in size, or other areas that do not contain those features identified in PCE 1, 2, or 3 as essential to the conservation of the species.

There are 48 units of critical habitat designated for the California red-legged frog. The program-specific critical habitat unit is described in greater detail in the Environmental Baseline section of this document.

Proposed Critical Habitat for the Marbled Murrelet

Critical habitat was first designated for the marbled murrelet on June 24, 1996 (61 FR 26256). On July 31, 2008, the Service proposed a new, revised rule to designate approximately 3,633,800 acres as critical habitat for the marbled murrelet, removing approximately 254,070 acres in northern California and Oregon from the 1996 designation based on new information indicating that these areas do not meet the definition of critical habitat (73 FR 44678).

Both terrestrial habitat (and associated forest stands) and marine foraging habitat used during the breeding season are considered biologically essential for the survival of the marbled murrelet. Based on our current knowledge of the life-history, biology, and ecology of the marbled murrelet, the PCEs of marbled murrelet critical habitat remain the same as those listed in the 1996 critical habitat rule for the species:

1) Individual trees with potential nesting platforms; and

2) Forested areas within 0.5 mile of individual trees with potential nesting platforms, and with a canopy height of at least one-half the site-potential tree site. Individual nest trees include large trees, generally more than 32 inches diameter breast height with the presence of potential nest platforms or deformities such as large or forked limbs, broken tops, dwarf mistletoe infections, witches' brooms, or other formations providing platforms of sufficient size to support adult murrelets.

There are 29 units of critical habitat for the marbled murrelet proposed under the revised designation, reflecting the proposal to remove 3 units entirely and reduce the size of 12 units to better reflect areas that appropriately meet the definition of critical habitat for the species. The program-specific critical habitat unit is described in greater detail in the Environmental Baseline section of this document.

ENVIRONMENTAL BASELINE

Service regulations define the action area as "all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). We are considering the area within the boundaries of Santa Cruz County as the action area for this consultation. Despite the fact that we do not consider the action area to extend beyond the boundaries of Santa Cruz County, we have provided information on the status of several species (e.g., the Santa Cruz long-toed salamander) outside the boundaries of Santa Cruz County in this biological opinion because the restoration and enhancement activities proposed by the NRCS have the potential to affect the survival and recovery of the subspecies throughout its range.

Overview of the Program Area

The proposed Program area would encompass all of Santa Cruz County, which consists of approximately 282,240 acres (441 square miles). The majority of projects implemented under the Program would occur on private lands. In general, the NRCS and SCCRCD do not conduct projects within the city limits of Santa Cruz, Scotts Valley, or Watsonville.

The topography in Santa Cruz County varies drastically from the forested Santa Cruz Mountains, which comprise approximately 75 percent of the county in the north and northeast, to marine terraces along the coast, and the agriculturally-productive Pajaro Valley in the south and southeast portions of the county. Steep slopes dominate the Santa Cruz Mountains, which also include small narrow mountain valleys. Elevations in Santa Cruz County range from zero to approximately 3,000 feet above sea level.

The Pajaro and Corralitos Valleys are alluvial plains. The area near the Pajaro Valley has been eroded to a rolling surface topography with areas of old dunes near the coast. The coastal plains that extend from the Pajaro Valley to Davenport are remnants of marine terraces, which are ancient sea floors planed flat by waves and then uplifted by tectonic forces. The area north of the city of Santa Cruz consists mainly of relatively small, irregularly-shaped remnants of terraces bounded by entrenched streams. Elevations in this area range from approximately 20 to 600 feet

above sea level. Rangeland lies along the coast northeast of the Pajaro Valley and north of the city of Santa Cruz. Rangelands northeast of the Pajaro Valley consist of foothills and slopes that extend to the forested areas at higher elevations, while the rangelands on the north coast lie above irrigated terraces and below the forested areas.

Many hillside areas of Santa Cruz County are susceptible to erosion and landslides, particularly in areas with steeper slopes such as the San Lorenzo Valley, Moore Creek Canyon, the East and West Cliff Drive areas, Arana Gulch, DeLaveaga Park, and many coastal areas. Erosion and habitat degradation are evident throughout many of the watersheds of Santa Cruz County. The NRCS and SCCRCD have been working successfully with public groups, private groups, and individual landowners to improve watershed management practices.

The primary land uses in Santa Cruz County are agriculture, industry, timberlands, public open space, and residential and urban development. Urban development in Santa Cruz County is concentrated in the four incorporated cities of Santa Cruz, Scotts Valley, Watsonville, and Capitola as well as the unincorporated areas of Live Oak, Soquel, Aptos, and portions of the Pajaro Valley and Carbonera. These areas are located within the county's Urban Services Line (USL). The USL guides the extension of public services and, thereby, the creation of new urban densities, effectively guiding where growth will occur within Santa Cruz County. The majority of the population of Santa Cruz County lives in urbanized areas along the coast between the city of Santa Cruz and Aptos. There are also several urban enclaves outside the USL, which are defined by a Rural Services Line (RSL). The communities of Davenport, Boulder Creek, Felton, Sunset Beach, and Pajaro Dunes are among those included within the RSL.

<u>Key Watersheds in the Program Area (From North to South)</u>

Año Nuevo Creek

The Año Nuevo watershed is located in the northwestern portion of Santa Cruz County along the border of San Mateo County. The watershed drains an area of approximately 10 square miles. The headwaters of this watershed begin in Santa Cruz County and empty into Año Nuevo Bay along the San Mateo County coastline. The portion of this watershed in Santa Cruz County includes Willows Gulch and Whitehouse, Cascade, Elliot, Wilson, Green Oaks, Año Nuevo, and Finney Creeks. Big Basin Redwoods State Park is in the eastern portion of the Año Nuevo Creek watershed. Other land uses in the watershed include residential and agricultural land uses.

Waddell Creek

The Waddell Creek watershed drains an area of approximately 27 square miles and is comprised by Last Chance Creek, East and West Waddell Creeks, and numerous unnamed tributaries. East Waddell Creek is fed by Blooms, Sempervirens, Maddocks, Rogers, Opal, and Union Creeks. West Waddell is fed by Henry and Berry Creeks. Big Basin Redwoods State Park constitutes the majority of land in the watershed, with small pockets of rural residential and agricultural use near the coast.

Pescadero Creek

Pescadero is a small watershed in northern Santa Cruz County located between the Waddell Creek and San Lorenzo River watersheds. The headwaters of the streams feeding the Pescadero watershed begin in Santa Cruz County, but drain into the Pacific Ocean at Año Nuevo Bay along the San Mateo County coastline. This watershed covers approximately 3.5 miles, and is comprised of Pescadero Creek and several unnamed streams. Land uses in the watershed are parkland and mountain rural residential.

Swanton Bluffs

Swanton Bluffs is a small watershed adjacent to the Scotts Creek and Waddell Creek watersheds. This watershed encompasses approximately 5 square miles, and consists of two unnamed streams. Land use is predominantly agriculture, with small strips of parkland along the coast as well as some small residential areas.

Scotts Creek

Scotts Creek is a 39-square-mile watershed; its major tributaries are Big Creek and Little Creek. Smaller tributaries include Dead Man's Gulch; Queseria, Berry, Boyer, Winter, Mill, and Archibald Creeks; and numerous unnamed streams. Principal land uses in the watershed include agriculture, timber, residential, recreation, and industrial (particularly in the vicinity of lands held by Lockheed-Martin). Scotts Creek is the only stream south of San Francisco Bay in which coho salmon (*Oncorhynchus kisutch*) naturally spawn. Severe aggradation has occurred in the lower reaches of Scotts Creek, resulting in accelerated sedimentation that threatens to further degrade the quality of aquatic and riparian habitat in these areas. Invasive and exotic plant species such as French broom, cape ivy, and other non-natives are also present and of concern throughout the riparian corridors of the watershed.

Davenport

The Davenport watershed drains an area of approximately 8 square miles. Molino Creek and several unnamed streams comprise this watershed. Major land uses in this area include agriculture, mountain residential, and commercial, as well as residential uses in the town of Davenport.

San Vicente Creek

The San Vicente Creek watershed drains an area of approximately 14 square miles, and is comprised of San Vicente Creek, Mill Creek, and several unnamed tributaries. Land use in the watershed is predominantly residential, with the exception of two quarries (one on Mill Creek and one on an unnamed tributary to San Vicente Creek). This watershed also contains a small pocket of agricultural land along the coast.

Liddell Creek

The Liddell Creek watershed drains an area of approximately 8 square miles, and consists of Liddell Creek, West Liddell Creek, and Yellow Banks Creek. Land use in the watershed is predominantly agriculture (approximately 60 percent), with the remainder comprised of mountainous residential areas.

Laguna Creek

The Laguna Creek watershed drains an area of approximately 8 square miles, and is comprised of Laguna Creek, Reggiardo Creek, and several unnamed streams. Approximately half of the lands in the watershed are in agricultural land use, while the remaining area supports residential and resource conservation uses.

Majors Creek

The Majors Creek watershed is located between the Laguna and Baldwin/Wilder watersheds. This watershed drains an area of approximately 5 square miles, and consists of Majors Creek and three unnamed tributaries. Land use is predominantly parkland, with the remainder consisting of rural residential and a small area of agricultural production.

Baldwin/Wilder Creeks

The Baldwin/Wilder watershed drains an area of approximately 20 square miles just to the south of the Majors Creek watershed. The Baldwin/Wilder watershed is comprised of Baldwin Creek, Lombardi Gulch, Sandy Flat Gulch, Old Dairy Gulch, Wilder Creek (Peasley Gulch, Adams Creek, and Cave Gulch), and Moore Creek. The majority of this watershed consists of Wilder Ranch State Park, with some agriculture along the coast and a quarry along Old Dairy Gulch.

San Lorenzo River

The San Lorenzo River drains 138 square miles; it is the largest watershed lying completely within Santa Cruz County. Originating in the Santa Cruz Mountains, the watershed consists of a 25-mile long main stem and nine principal tributaries. That include the following (associated waterways are shown in parentheses): Branciforte (Glen Canyon Creek, Redwood Creek, Granite Creek, Crystal Creek, Tie Gulch, and Blackburn Gulch), Carbonera (Camp Evans Creek and several unnamed streams), Zayante (Lompico Creek, Mill Creek, and Mountain Charlie Gulch), Bean, Fall, Newell (Loch Lomond Reservoir), Bear (Hopkins Gulch, Whalebone Gulch, Deer Creek, Connely Gulch, and Shear Creek), Boulder (Foreman, Silver, Pea Vine, Bracken Brae, Jamison, and Hare Creeks), and Kings (Logan's Creek) Creeks. Smaller creeks and waterways include: Powder Mill, Eagle, Shingle Mill, Bull, Bennett (Fall Creek and South Fall Creek), Mason, Love (Smith and Fritch Creeks), Alba, Clear, Malosky, Two Bar, and Spring Creeks; Gold, Hubbard, and Spring Creek Gulches; and numerous unnamed streams. The watershed includes the cities and communities of Santa Cruz, Scotts Valley, Felton, Ben

Lomond, and Boulder Creek. Much of the watershed is forested with the exception of these urban areas. The San Lorenzo River is listed on the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments for sediment, pathogens, and nutrients. The Regional Board has adopted a sediment Total Maximum Daily Load (TMDL) for the San Lorenzo River and its associated tributaries of Carbonera, Lompico, and Shingle Mill Creeks.

Arana Gulch/Rodeo

The Arana Gulch/Rodeo watershed drains a 3.5-square-mile area at the eastern edge of the city of Santa Cruz. Major waterways and water bodies in this watershed include Arana Gulch, Leona Creek, Schwann Lake, Rodeo Creek Gulch, and several unnamed waterways. Principal land uses in the watershed are urban, residential, commercial, and light industrial, as well as institutional areas such as schools, hospitals, and cemeteries. Habitat types present in the watershed include wetlands and freshwater marsh, riparian corridors, mixed evergreen/broadleaf forest, and a few patches of coastal scrub/chaparral habitat. High sediment loads diminish the quality of aquatic habitat in Arana Gulch. The NRCS and SCCRCD's principal goals for the Arana Gulch watershed include: reducing the delivery of sediment to Arana Gulch, its tributaries, and the Santa Cruz Small Craft Harbor; and providing passage for anadromous fish to the eastern and central branches of Arana Gulch.

Soquel Creek

Located between the cities of Santa Cruz and Watsonville, the Soquel Creek watershed drains an area of 42 square miles. Major tributaries include Fern and Ashbury Gulches; the west branch of Soquel Creek (Burns, Laurel, Hester, Hinkley, and Amaya Creek; and numerous unnamed waterways) and the main branch of Soquel Creek (Moore's Gulch, Grover Gulch, Love Creek, and Bate's Creek). Smaller tributaries of Soquel Creek include Noble Gulch, Porter Gulch, Tannery Gulch, and Borregas Creek. Principal land uses in the watershed include urban development, rural residential development, agriculture, parks and recreation, mining, and timber harvesting. The unincorporated town of Soquel and the city of Capitola are both located in the lower reaches of the watershed. Sedimentation and impairment of aquatic habitat are the principal resource concerns in this watershed. Soquel Lagoon is listed on the Clean Water Act Section 303(d) List of Water Quality Limited Segments for nutrients, pathogens, and sedimentation/siltation.

Aptos Creek

The Aptos Creek watershed drains an area of approximately 25 square miles in south-central Santa Cruz County. Aptos Creek and its tributary of Valencia Creek are the principal streams in the watershed. Aptos Creek is joined by Valencia Creek approximately 1 mile upstream of its outlet to Monterey Bay. Bridge Creek and Mangels Gulch are tributaries of Aptos Creek, and Trout Gulch empties into Valencia Creek. Land use in this watershed consists of forested lands, lands owned by the California Department of Parks and Recreation (State Parks), and some rural residential areas. More than half of the Aptos Creek portion of the watershed is forested, with

the majority of the creek running through the southern portion of the Nisene Marks State Park. Land use in the Valencia Creek portion of the watershed is primarily rural residential and urban development. There are historical and modern-day logging sites in both sub-watersheds. Excessive sedimentation, low stream flow resulting from overpumping of groundwater in the region, fish passage barriers, loss of channel complexity, and poor water quality in the coastal lagoon are NRCS' principal resource concerns in the Aptos Creek watershed.

San Andreas

The San Andreas watershed is bordered on the north and east by the Pajaro River watershed, and to the west by the Aptos Creek watershed. The San Andreas watershed drains an area of approximately 15 square miles, and is comprised of Bush Gulch and two unnamed streams. Land use in this watershed is predominantly agriculture with some rural and urban residential areas.

Watsonville Slough

Watsonville Slough drains 14 square miles from the hills of southern Santa Cruz County into the Pajaro River and Monterey Bay. The Watsonville Slough system is comprised of six individual sloughs, including Watsonville Slough, Harkins Slough, Gallighan Slough, Hanson Slough, the main branch of Struve Slough, and the western branch of Struve Slough. The sloughs represent significant water supply resources, part of which are being used to offset salt contamination in coastal wells of the region. Nutrient loading, which is often exacerbated by the absence of marsh vegetation, coupled with poor water circulation has resulted in eutrophic conditions in many areas of the sloughs. Watsonville Slough is listed on the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments for pathogens, pesticides, and sedimentation/siltation.

Pajaro River

The Pajaro River watershed drains an area of approximately 1,300 square miles in Santa Clara, Santa Cruz, San Benito, and Monterey Counties. Approximately 15 percent, or 200 square miles, of the Pajaro River Basin lies within Santa Cruz County. The Pajaro River watershed is comprised of the Watsonville Slough System (fed by Gallighan Slough, Harkins Slough, and Struve Slough), Corralitos Creek (fed by Rider Creek, Eureka Gulch, Diablo Gulch, Redwood Creek, Browns Creek, and Ramsey Creek), and Salsipuedes Creek (fed by College Creek, Green Valley Creek, Hughes Creek, Pinto Lake, Casserly Creek, and Gaffey Creek). Predominant land use practices adjacent to the Lower Pajaro River and its tributaries include irrigated croplands, rangelands, timberlands, urbanization, and rural residential development. The watershed supports several special-status species, including the tidewater goby, steelhead trout, Santa Cruz long-toed salamander, and the California red-legged frog. The Regional Board considers the Pajaro River and several of its tributaries to be water quality impaired due to sedimentation.

Vegetation Communities in the Program Area

The varied topography and soil types of Santa Cruz County support diverse habitats, which in turn support diverse assemblages of species. Some of the principal plant communities and their occurrence in Santa Cruz County are summarized below.

Grassland

Much of the Santa Cruz County's coastal terrace prairie has been converted to agriculture and development. The remaining areas have been invaded by exotic weeds, such as annual fescues (*Vulpia* spp.), bromes (especially *Bromus diandrus*), velvet grass, and thistles (especially *Carduus pycnocephalus*). The remaining, intact areas of coastal terrace prairie are characterized by the patchy presence of California oatgrass and/or wildflowers, such as native bulbs (*Brodiaea* sp. and *Triteleia* sp.), lupines, self-heal (*Prunellus vulgaris*), and many others. The most intact remaining areas of coastal terrace prairie in Santa Cruz County are at the University of California, Santa Cruz upper campus (Marshall Fields) and the Gray Whale Unit of Wilder Ranch State Park.

Coastal Scrub

The coastal scrub vegetation community grows on marine bluffs and hills, where plants are subjected to salt air, fog, and strong winds. Plants are generally less than 6 feet tall and include buckwheat (*Eriogonum* sp.), California sage (*Artemisia californica*), yarrow (*Achillea millefolium*), lupine, and coyote bush (*Baccharis pilularis*).

Coastal Dunes

European beachgrass and iceplant, which were introduced to stabilize sand dunes, have dramatically changed the vegetation patterns of the local coastal dunes. In native dune stands, a low ground canopy is formed by perennial forbs, grasses, and low shrubs, including such plants as beach sand-verbena (*Abronia maritima*), beach-pea (*Lathyrus littoralis*), American dune grass (*Leymus mollis*), and coyote brush. Sand dunes remain at Wilder and Waddell beaches in the north part of the county and at Sunset Beach in the south.

Coastal Salt Marsh

Though much of the original salt marshes have been destroyed, several remain at creek mouths, especially along the northern coast of Santa Cruz County. Common plant species of this community include cordgrass (*Spartina foliosa*), pickleweed (*Salicornia* sp.), and saltgrass (*Distichlis spicata*). Brackish marshes may also contain bulrushes (*Scirpus* sp.) and cattails.

Freshwater Marsh

Seasonally or permanently flooded areas along streams, lakes, ponds, and springs provide habitat for fresh water marsh plant species, which include bulrushes, sedges (*Carex* sp.), cattails, and rushes (*Juncus* sp.). The mouths of some creeks in Santa Cruz County form marshes that consist of brackish water at the downstream end and fresh water at the upstream end.

Riparian Woodland

Along stream banks a constant water supply and winter flooding create substantial riparian corridors. The overstory is formed by deciduous trees such as bigleaf maple (*Acer macrophyllum*), alder (*Alnus* spp.), cottonwood (*Populus fremontii* ssp. *fremontii* and *P. balsamifera* ssp. *trichocarpa*), and sycamore (*Platanus racemosa*). Understory trees are typically willows and dogwoods (*Cornus* spp.); herbaceous plants are often dense in these areas.

Redwood Forest

The redwood forest community is found in the Santa Cruz Mountains, generally west of this range. This forest community favors moist areas, especially canyons, north-facing slopes, and spots moistened by summer fogs. Because of the thick tree canopy and layer of acidic duff in the redwood forest, the diversity of associated plant species is restricted. Associated plants include sword ferns (*Polystichum munitum*), huckleberry (*Vaccinium ovatum*), western trillium (*Trillium ovatum*), and redwood sorrel (*Oxalis oregana*).

Zayante Sandhills

Near the towns of Ben Lomond and Bonny Doon, parts of an ancient sandy sea floor have been uplifted, eroded, and exposed, creating a unique ecosystem. The combination of deep, well-drained sandy soils and the relatively humid coastal climate results in unusual "biological islands," containing many disjunct coastal relicts and other rare and endemic species. The sandy soil lacks organic matter and nutrients, and its light color reflects and magnifies the heat of the summer sun. Plants and animals of the Zayante sandhills have developed unique adaptations to these features. Many of the plants in this area thrive in soil that is too poor in nutrients for more-common species. Most plant species in the Zayante sandhills tend to be annual or summer-dormant, growing only in the cool and moist seasons.

Many species of plants found in the Zayante sandhills otherwise occur along the immediate coast, in distant locations, or nowhere else in the world. Two plants found in the Zayante sandhills, the ponderosa pine and pussy paws (*Clyptridium umbellatum*) otherwise occur primarily in the Sierra Nevada Mountains. Other unique plant species of the Zayante sandhills include the Ben Lomond spineflower, Ben Lomond wallflower, and silverleaf manzanita.

Closed-cone Coniferous Forest

Two types of the closed-cone coniferous forest include species that are extremely rare in native stands – the Monterey pine and Santa Cruz cypress. The Monterey pine grows on dry coastal terraces, while the Santa Cruz cypress occurs on rocky ridges with granitic or sandstone-derived soils. Knobcone pines (*Pinus attenuata*) also grow in rocky areas and are often found growing near Santa Cruz cypress as well as in the Zayante sandhills.

Mixed Evergreen Forest

Another vegetation community commonly found in the Santa Cruz Mountains is the mixed evergreen forest. This forest type is frequently located adjacent to redwood forest, but occupies drier and more-inland areas. Common tree species in the mixed evergreen forest include interior live oak (*Quercus wislizenii*), coast live oak, tanoak (*Lithocarpus densiflorus*), madrone (*Arbutus menziesii*), California bay-laurel (*Umbellularia californica*), and California buckeye (*Aesculus californica*). Common understory plants include coffeeberry (*Rhamnus californica*), poison oak (*Toxicodendron diversilobum*), and various species of ceanothus (*Ceanothus* spp.).

Chaparral

Occupying the hottest and driest slopes of the Santa Cruz Mountains, chaparral plants form dense thickets and are adapted to wildfire and dry conditions. Leaves of chaparral plants are often small, thick, light green or greyish, waxy, and retained year-round. Manzanita (*Arctostaphylos* spp.), coyote brush, chamise (*Adenostoma fasciculatum*), ceanothus, monkey flower (*Mimulus* spp.), and black sage (*Salvia mellifera*) are common chaparral plants.

Foothill Woodlands

Foothill woodlands commonly form the transition between grasslands and mixed evergreen forests on the eastern side of the crest of the Santa Cruz Mountains. Common foothill woodland plant species include foothill pine (*Pinus sabiniana*), blue oak (*Quercus douglasiana*), coast live oak, interior live oak, California buckeye, ceanothus, redbud (*Cercis occidentalis*), and gooseberry (*Ribes quercetorum*).

Oak Savanna/Grassland

Oak savanna and grasslands occasionally form on the tops of south-facing ridges in the Santa Cruz Mountains. Valley oak (*Quercus lobata*) is the dominant tree species of this community, with the ground-level vegetation typically comprised of needlegrass (*Nassella cernua*, *N. pulchra*, and *N. lepida*), fescue, melic (*Melica* spp.), wildrye (*Hordeum* spp.), and bluegrass (*Poa* spp.).

Baseline of Federally Listed Species and Critical Habitat in the Program Area

Current and historical occurrences of the Ben Lomond spineflower, Ben Lomond wallflower, Monterey spineflower, robust spineflower, Santa Cruz cypress, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, white-rayed pentachaeta, Mount Hermon June beetle, Ohlone tiger beetle, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet are found within Santa Cruz County. The general distribution and, in some cases, documented population trends or recent occurrence information, for each of these species within Santa Cruz County are described below.

Ben Lomond Spineflower

The entire range of the Ben Lomond spineflower occurs in the Ben Lomond sandhills communities of the Santa Cruz Mountains. Most occurrences of Ben Lomond spineflower are found in the area generally bounded by the communities of Ben Lomond, Glenwood, Scotts Valley, and Felton in Santa Cruz County. There were 21 populations at the time of listing and 3 more unconfirmed populations have been discovered since then. There is no recent monitoring data for the majority of the populations. Land use in the area is generally characterized by privately owned land that is zoned rural residential. Outlying populations are located near Bonny Doon, Boulder Creek, Big Basin State Park, and Gray Whale Ranch State Park (Service 1998). Historically, Zayante sand hills habitat was estimated to have covered 6,265 acres. Currently, it is estimated that only about half of that remains in a natural state. Portions of the Zayante sandhills ecosystem are protected under County or State ownership in only three locations: the Quail Hollow Ranch County Park, Bonny Doon Ecological Reserve, and Henry Cowell Redwoods State Park (NRCS 2010).

Ben Lomond Wallflower

The entire range of the Ben Lomond wallflower includes 20 populations (3 of which are considered extirpated) spread throughout pockets of sandstone soils in the Ben Lomond sandhills communities of the Santa Cruz Mountains. Eighteen populations occur within the area generally bounded by the communities of Ben Lomond, Glenwood, Scotts Valley, and Felton, with an additional outlying population 5 miles west of Felton in the Bonny Doon area and another located in Beulah Park (approximately 3 miles to the south) (Service 2008). Land use in the area is characterized by rural residential properties. Roughly 25 percent of all the populations are under some form of conservation management while approximately 75 percent are not.

Of the 20 populations considered in the Service's 5-year review for the species, 5 of the populations were considered to be decreasing in numbers (most recent surveys show reduction of 40 percent or more of individuals from highest recorded numbers) and 3 extirpated; however, many of the populations have not recently been surveyed. CNDDB data show that this species has never had very high numbers of individuals. Only 2 of the known populations have supported total annual numbers of individuals in the thousands, and only 6 populations have

supported 100 or more individuals annually. These numbers are the highs reported and likely correlate with favorable climatic conditions. In most years at these sites, population numbers were much lower. The annual total of individuals over all populations has ranged between 1,000 and 3,000 individuals per year in the most productive recent years (Service 2008).

Monterey Spineflower

The current range of Monterey spineflower extends along the rim of the Monterey Peninsula in northern Monterey County to Southern Santa Cruz County and inland to the Salinas Valley (Reveal and Hardham 1989; Ertter 1990). The northern portion of the species' range extends into southern Santa Cruz County to Manresa State Beach. The species is known to occur at Sunset and Manresa State Beaches in Santa Cruz County and scattered occurrences have been found as far north as Day Valley (Service 2003). Approximately one third of the total range (coastal and inland populations) for the species lies within the southern portion of Santa Cruz County on mostly privately owned land, which is primarily used for agriculture.

Robust Spineflower

Historically, the robust spineflower was known from Alameda, San Mateo, Santa Cruz and Santa Clara Counties; however, the current distribution of the species is restricted to coastally influenced areas within southern Santa Cruz County, ranging from Pogonip Park in the city of Santa Cruz to Sunset State Beach. Land use along this stretch is primarily urban with some agriculture near the southern portion of the County near Sunset State Beach. Land in this area is predominantly privately owned with portions occupied by the cities and communities of Santa Cruz, Soquel, Capitola, Aptos, and Watsonville and the Henry Cowell Redwoods and Forest of Nisene Marks State Parks.

The robust spineflower is currently known from a total of eight locations, six of which are within designated critical habitat for the species. One of these sites is located on active coastal dunes (Sunset State Beach) while the other sites are located inland from the immediate coast in sandy openings within scrub, maritime chaparral, or oak woodland habitats. In addition to the six sites included as critical habitat for robust spineflower, the taxa is known to occur at two additional sites, including a location to the south of Empire Grade and north of Wilder Ranch State Park on private lands and two places in Manresa State Beach. Population estimates for this species range from several hundred at Manresa State Beach to approximately a million individuals at Sunset State Beach (Service 2010b).

Santa Cruz Cypress

This species is limited to five small groves in the Santa Cruz Mountains in San Mateo and Santa Cruz Counties. In Santa Cruz County, the species occurs mostly on private lands near Bonny Doon (approximately 3,000 plants in 2007), Eagle Rock (greater than 3,500 plants in 2007), and Braken Brae Creek (from 10,000 to 20,000 individuals in 2005), and between Majors Creek (more than 22,500 in 2007) and Butano Ridge (more than 2,500 individuals in 2007). The 5

known occurrences comprise slightly more than 47,000 individuals occurring within approximately 356 acres along a 15 mile stretch. More than 90 percent of the current range for this species is located on private land in areas dominated by upland redwood and mixed evergreen vegetation (Service 2009d).

Santa Cruz Tarplant

Santa Cruz tarplant historically occurred as far north as the San Francisco Bay; however, all of the native San Francisco Bay area populations have since been extirpated. Santa Cruz tarplant is currently known from a total of 21 populations (13 are remaining native populations and 8 are a result of experimental seedings). All of the known native populations occur in Santa Cruz County. Seven of these populations occur around the city of Santa Cruz and Soquel. The remaining six native populations occur around the city of Watsonville, scattered from Watsonville Airport to Hall Road. Four of these are generally bounded by Corralitos Creek, Harkins Slough, Watsonville Slough, and the city of Watsonville and two populations are outliers near Spring Hills Golf Course and Porter Ranch. Based on the presence of other fragments of remaining coastal prairie habitat and a general lack of recent surveys, there is a possibility that additional populations of Santa Cruz tarplant may occur within the known current range that have not been detected. In particular, older coastal terraces that lie north of the cities of Santa Cruz and Soquel may contain a viable seed bank, even if no plants are found (Service 2011).

Scotts Valley Polygonum

Scotts Valley polygonum is an endemic species from northern Scotts Valley in Santa Cruz County. Scotts Valley polygonum is found at two sites (considered to be two populations) about 1 mile apart at the northern end of Scotts Valley; the Glenwood site and Polo Ranch (both occur within critical habitat). Seventeen colonies have been recorded for this species: Polo Ranch (12 colonies); Salvation Army land (4 colonies); and the Scotts Valley High School Preserve (1 colony). The total area of all colonies combined comprises less than 1 acre (Service 2009f).

At the Glenwood site, construction of a high school was initiated in June 1998. According to the 5-year review for Scotts Valley polygonum, the eight surveys conducted at the high school site from 1991to 2003 recorded approximate numbers in the following range: from 250 individuals in 1997, to 88 individuals in 2003. In addition, the nine surveys conducted at the four colonies on the Salvation Army land from 1990 to 2008 have recorded approximate numbers in the following range: from 2,000 individuals in 1998 to 50 individuals in 1990 and "several dozen" individuals in 2008. A housing development is proposed for the Polo Ranch site which would consist of 40 housing units on 12 acres and 101 acres of open space. As summarized in the 5-year review for the species, the seven surveys at the Polo Ranch site from 1990 to 2006 have recorded approximate numbers in the following range: from 2,138 individuals in 1997 to 0 individuals in 2006 (Service 2009f).

Scotts Valley Spineflower

The entire range of the Scotts Valley spineflower occurs on four privately owned parcels over a stretch of 1.5 miles in northern Scotts Valley. In 1990, the total population of Scotts Valley spineflower was estimated to be about 300,000 individuals, but recent estimates have been much lower (CNDDB 2011, Denise Duffy and Associates 1998). These fluctuations in numbers of this short-lived annual most likely have been tied to changes in climatic conditions.

The distribution of colonies of Scotts Valley spineflower is generally concentrated at two sites: the Glenwood site and the Polo Ranch site, similar to the Scotts Valley polygonum. The Glenwood site contains a large number of colonies of Scotts Valley spineflower that occur on three privately owned parcels of land (CNDDB 2011).

In addition to direct removal of habitat, habitat fragmentation and nearby development affect the long-term conservation of the species by reducing connectivity among colonies and populations, by altering microsite drainage patterns, and by providing access to vectors that cause secondary impacts, such as the spread of nonnative species. Because the Scotts Valley High School is located within the central portion of the Glenwood unit, its construction significantly fragmented the grasslands that were once contiguous and that provided connectivity between the Salvation Army, School District, and Glenwood colonies. Two access roads, one on each side of Glenwood Drive, have been constructed in the last several years; one was placed between colonies of Scotts Valley spineflower, and the other was placed between colonies and other patches of wildflower fields. The Polo Ranch site is located just east of Highway 17 and north of Navarra Drive in northern Scotts Valley, approximately 1 mile east of the Glenwood site. Abundance and distribution of the Scotts Valley spineflower may have been reduced as a result of disturbance to the site by illegal off-highway vehicle use since that time (Service *in litt*. 2000).

In 2008, two spineflower colonies located in the Scotts Valley High School preserve were covered with soil, sod, and concrete mix by adjacent landowners (Cheap *in litt*. 2008). Due to their small size, the proposed preserves and open space areas intended to protect Scotts Valley spineflower are inadequate for maintaining viable populations of this species (Service *in litt*. 1998). Studies on habitat fragmentation and preserves established in urbanized settings have shown that these preserves gradually become destabilized from external forces (i.e., changes in the hydrologic conditions, soil compaction, etc.), resulting in preserves that are no longer able to support the species that they were established to protect (Kelly and Rotenberry 1993).

White-rayed Pentachaeta

The white-rayed pentachaeta is known from only one location, in a serpentine bunchgrass community in San Mateo County. Historically, white-rayed pentachaeta was known from at least nine sites in Marin, San Mateo, and Santa Cruz Counties. According to the Service, other populations (including those historically known in Santa Cruz County) have been destroyed by urbanization, off-road vehicles, or highway construction over the past 50 years (60 FR 6675). Three populations in Marin County and two in San Mateo County were destroyed by

development. One Marin County occurrence was destroyed by off-road vehicles. Two sites in Santa Cruz County no longer support white-rayed pentachaeta. The single remaining confirmed population of white-rayed pentachaeta in San Mateo County was bisected by construction of California Interstate 280 in the late 1960s. The largest portion of the population occurs in the Triangle, on land administered by the San Francisco Water Department. A small remnant of this population is located to the east of Interstate 280, on Edgewood County Park (Service 2010b).

Because there are no known populations that currently occur in Santa Cruz County, the percentage of the species' overall range that occurs in the project area is difficult to estimate. However, based on the historic range for the species, a very gross estimate may assume that approximately a third of the species potential range occurs in Santa Cruz County.

Mount Hermon June Beetle

As discussed in the Status of the Species section of this biological opinion, the Mount Hermon June beetle is endemic to Santa Cruz County with 8 populations (2 of which were recently discovered in 2008) that occur within an area that is approximately less than 10 square miles (Service 2009g). Therefore, the status of this species within the Program area (i.e., the environmental baseline) is described to some extent previously in this document. The following discussion presents data obtained from several population monitoring studies of the Mount Hermon June beetle.

There are currently eight populations for Mount Hermon June beetles, as described in the 5 year review for the species (Service 2009g). The first 5 population sites overlap with areas known to contain populations of Zayante band-winged grasshoppers. Area 1 is within Quail Hollow County Park and is therefore protected from mining and residential development; however, the park has not yet prepared any recreational or resource vegetation oriented management plan and has not yet implemented any recovery actions for the Mount Hermon June beetle or the Zayante band-winged grasshopper. Area 2, the Quail Hollow Quarry, includes three main subdivisions: North Ridge, West Ridge, and South Ridge. The majority of this area is owned by the quarry and is managed according to an HCP. Some occupied habitat adjacent to South Ridge is privately owned without any conservation measures in place and another 23 acres of occupied habitat adjacent to West Ridge is owned by the Zayante Conservation Bank and is slated for conservation. Area 3 is between East Zayante Road, Olympia Wellfield, and Mount Hennon Road and contains the Freeman Site, the old Olympia and Geyer Quarries, the old Ferrari Quarry, and the land separating the quarries. The Freeman Site is being managed as a mitigation site under an HCP for the Hanson Quarry. This HCP is now expired and the site is being managed by the Center for Natural Lands Management. The rest of these sites are unmanaged, and both the Zayante band-winged grasshopper populations at the old Olympia and Geyer quarries are believed to be extirpated (CNDDB 2011). Area 4 ranges between Mount Hermon and the old Kaiser/Hanson Quarry. The area directly around Mount Hermon includes property adjacent to Mount Hermon Peak and is privately owned with no fee title acquisitions or easements in place or in progress. This area is undergoing habitat conversion and no vegetation management activities are being undertaken. The Hanson Quarry area was managed under an

HCP until the recent expiration of that plan. Long-term management is now being carried out by the Center for Natural Lands Management. Area 5 is located on private property between Kings Village Road/Blue Bonnet Lane and Green Valley Road in the city of Scotts Valley. Very little is known about the populations of Mount Hermon June beetle and Zayante band-winged grasshopper at this site at this time.

Population sites 6 through 8 do not overlap with known Zayante band-winged grasshopper populations. Area 6 is north of Quail Hollow County Park in a residential neighborhood. This is privately owned land and is not secure at this time. Area 7 is located in the Redwood Glen area off Bean Creek Road, Scotts Valley. This population was only discovered in August of 2008. This population is on private property where only one individual has been observed. Area 8 is on privately-owned land west of the Bonny Doon Ecological Reserve. This occupied habitat was only recently discovered in June of 2008; little is known about this population and the land is not secure at this time. Approximately 613 acres of sandhills habitat exists in this area. The distribution and abundance of Mount Hermon June beetles in this area has not been determined at this time.

Hazeltine (1993) briefly sampled various locations and reported numbers of Mount Hermon June beetles that were attracted to a portable black light. Because the amount of time spent at each location varied, the tallies are not directly comparable. Hovore (1996a) provided the first estimates of Mount Hermon June beetle abundance based on black light trap counts. A total of 177 males were captured at 20 trap locations within the Quail Hollow Quarry during a 3-night survey in June 1996. In 1999, Arnold (1999a) tallied 190 males during a 3-night survey at 13 trap locations at the Quail Hollow Quarry.

Population studies of the Mount Hermon June beetle have been performed as part of the annual monitoring activities that occur at the Hanson Quarry, Freeman property, and Quail Hollow Quarry (Arnold 2003a,b; 2006a) in accordance with HCPs developed for these sites (Hanson Aggregates 1999, Thomas Reid Associates 1998). There is no recent population data available for the other sites that are not covered under an HCP. A variety of techniques have been used to estimate various population parameters, such as population numbers, adult lifespan, and dispersal. In addition, Arnold has described the Mount Hermon June beetle's seasonal population curve to derive an estimate of total seasonal population numbers.

Population estimates of the Mount Hermon June beetle were generated for the Quail Hollow Quarry in 2002, 2004, and 2006 (Arnold 2003a, 2006a) and at the Hanson Quarry and Freeman property in 2003 and 2005 (Arnold 2003b, 2006a). The earlier surveys were completed by using trap counts at fixed locations throughout the full adult activity period, whereas the later surveys were completed using new methodology of releasing male Mount Hermon June beetles at distances ranging from 10 to 160 feet to compile recapture frequencies for each release distance and to estimate the overall detectability function of a light trap. Population estimates for the Mount Hermon June beetle at Quail Hollow Quarry ranged from 273,014 to 296,007 males in 2006 (Arnold 2006a), from 1,310,083 to 1,411,839 males at the Hanson Quarry in 2005, and from 860,679 to 927,523 males at the Freeman property in 2005 (Arnold 2005). These

population estimates are just for male Mount Hermon June beetles; therefore, because Mount Hermon June beetles have a 1:1 sex-ratio, the numbers described above should be doubled to include females.

The majority of the Zayante sandhills habitat, and thereby the majority of the habitat of the Mount Hermon June beetle, is on privately-owned property where access is difficult. Therefore, it is difficult to ascertain specific trends in the abundance of individual Mount Hermon June beetles in the Zayante sandhills of Santa Cruz County. As ongoing population monitoring studies continue, the data generated by these studies will permit the identification of trends in abundance and should inform future management of Mount Hermon June beetle habitat. To date, trends in Mount Hermon June beetle abundance have been largely inferred from a decline in the amount of habitat available for this species.

As discussed previously in the Status of the Species section of this biological opinion, current threats to the Mount Hermon June beetle include sand mining, urban development, recreational activities, and agriculture. Over 40 percent of the Zayante sandhills habitat is estimated to have been lost to, or altered by, these activities. Historically, Zayante sandhills habitat was estimated to have covered 6,265 acres. Currently, less than 3,600 acres remain. Suppression of periodic wildfires, which are important for the maintenance of Zayante sandhills habitat, has resulted in increased litter and understory vegetation such that wildfires now may be more intense and widespread, and thereby detrimental to the survival of the Mount Hermon June beetle. The increased amount of vegetation in the Zayante sandhills that has resulted from prolonged fire suppression has also reduced the quality of available habitat for this species.

Ohlone Tiger Beetle

The Ohlone tiger beetle is endemic to Santa Cruz County, California, where it is currently known only from coastal terraces supporting remnant patches of native grassland habitat from the city of Scotts Valley to the eastern edge of the city of Santa Cruz (66 FR 50340). At the time of the 2001 final listing rule, the Ohlone tiger beetle was known from 16 occurrences on 11 different properties distributed within 4 narrow geographic areas within Santa Cruz County. Although the Ohlone tiger beetle was described as occurring across four geographic areas at the time of listing, the Service now believes that it is most appropriate to consider these as five distinct geographic areas. One occurrence to the north of the city of Santa Cruz is isolated, both by distance and habitat fragmentation, from the occurrences to the west of the city of Santa Cruz, and is now considered to be a separate geographic area. The historic or current abundance of individuals in the five geographic areas is unknown (Service 2009c). As summarized in the 5 year review for the species (Service 2009c), the five currently recognized geographic areas are:

West of the City of Soquel
The Ohlone tiger beetle was known from one parcel of private property. The last year that Ohlone tiger beetles were observed at this location was in 2008; no beetles were observed during multiple visits in 2009. Although additional research is needed, Ohlone tiger beetles are potentially extirpated from this geographic area.

City of Scotts Valley
The Ohlone tiger beetle is known to occur at one parcel owned by the city of Scotts Valley. This property is currently managed by The Land Trust of Santa Cruz County for the benefit of the Ohlone tiger beetle as well as the federally endangered Scotts Valley spineflower. Ohlone tiger beetles have been observed at this occurrence every year since 2003.

North of the City of Santa Cruz
The Ohlone tiger beetle was known from one parcel owned by the city of Santa Cruz within this geographic area. The city maintains this property as an open space preserve; however, no management specific to the Ohlone tiger beetle is conducted in this area. No Ohlone tiger beetles have been observed at this area since 2004. Therefore, Ohlone tiger beetles are potentially extirpated from this geographic area.

West of the City of Santa Cruz
At the time of the final listing rule, the Ohlone tiger beetle was known from seven occurrences at five parcels.

Northwest of the City of Santa Cruz
Ohlone tiger beetles are known from two properties in this area. One property, owned by the California Department of Parks and Recreation (CDPR), supports one occurrence that was documented as occupied by Ohlone tiger beetles in 2009. The other property, owned by the University, has supported up to five separate occurrences of the Ohlone tiger beetle. Active Ohlone tiger beetle larval burrows were detected at only 1 occurrence in 2009. Another occurrence had active adult Ohlone tiger beetles, although no larval burrows were observed. No Ohlone tiger beetles have been detected at the remaining three occurrences for 5 or more years each.

Zayante Band-winged Grasshopper

Along with the Ohlone tiger beetle and Mount Hermon June beetle, the Zayante band-winged grasshopper is endemic to Santa Cruz County. Therefore, the status of this species within the Program area (i.e., the environmental baseline) is described to some extent in the Status of the Species section of this biological opinion. The following discussion presents data obtained from several population monitoring studies of the Zayante band-winged grasshopper, as summarized in the 5 year review for the species (Service 2009g).

Currently, the Zayante band-winged grasshopper is known from five primary locations distributed over approximately 4 square miles in the Zayante sandhills, as described above under the Mount Hermon June beetle environmental baseline section (BUGGY Database 2004, Service 2009g). Specifically, these locations include: 1) Quail Hollow Ranch County Park; 2) Quail Hollow Quarry (4 subsites that may actually represent separate demes or populations, including West Ridge, North Ridge, South Ridge, and Buffer Zone); 3) the area between East Zayante Road, Olympia Wellfield, and Mount Hermon Road; 4) Mount Hermon area between Graham Hill and Mount Hermon Roads and from the old Kaiser/Hanson Quarry to East Zayante Road;

and 5) the area between Kings Village Road/Blue Bonnet Lane and Green Valley Road in the city of Scotts Valley (recently discovered to be occupied in 2007). At least one population of Zayante band-winged grasshoppers (to the southwest of Los Gatos in the town of Alma) was likely extirpated when the area was inundated by the filling of Lexington Reservoir in 1952.

Similar to the Mount Hermon June beetle, population surveys for the Zayante band-winged grasshopper have been conducted only at locations where HCPs have been approved. These locations are: Quail Hollow Quarry; Hanson Quarry; and the off-site mitigation parcel for Hanson Quarry, the Freeman Site. Hovore (1996b) provided the first estimates of Zayante band-winged grasshopper abundance based on a single count along three, 100-foot long transects established on the North, South, and West Ridges of Quail Hollow Quarry. Densities were calculated per 100 square feet and ranged from 2 to 3 individuals for the North Ridge and West Ridge to 3.6 individuals for the South Ridge. Arnold (1999a) also calculated Zayante band-winged grasshopper densities at Quail Hollow Quarry, but used approximately 1.3 miles of the existing network of trails as transects. Zayante band-winged grasshopper densities ranged from 0.00 to 0.65 individual per 100 square feet during three survey visits (Arnold 1999a). Arnold's (1999a) lower observed densities were attributed to the variation in habitat quality along transects, in comparison to Hovore's (1996b) transects being entirely situated in prime habitat where Zayante band-winged grasshopper numbers would likely be greater. Similarly, Arnold (1999b) estimated daily densities of Zayante band-winged grasshoppers at the Hanson Quarry and Freeman property. The densities ranged from 0.00 to 0.03 individuals per 100 square feet. Three transects, collectively measuring about 0.41 mile and traversing a variety of plant communities, were used during 11 survey dates between late August and early November of 1999.

Population estimates of the Zayante band-winged grasshoppers were generated for the Quail Hollow Quarry in 2003, 2005, and 2007 and at the Hanson Quarry and Freeman property in 2004 and 2006. Population estimates for the Zayante band-winged grasshoppers were approximately 23,805 individuals at Quail Hollow Quarry in 2007 (Arnold 2007), 3,361 individuals at the Hanson Quarry in 2006, and 18,134 individuals at the Freeman property in 2006 (Arnold 2006b).

As with the Mount Hermon June beetle, population monitoring methods for the Zayante band-winged grasshopper continue to be refined. It is difficult to discern trends in the abundance of individual Zayante band-winged grasshoppers in the Zayante sandhills for the same reasons as outlined in the Environmental Baseline section for the Mount Hermon June beetle in this biological opinion (i.e., much private property, difficulty in obtaining access, etc.). Therefore, population trends in the Zayante band-winged grasshopper have thus far been inferred from a notable decline in the amount of habitat available to the species.

The Zayante band-winged grasshopper occurs primarily in sand parkland habitat. Based on aerial photographs taken in 1943, an estimated 1,000 acres of sand parkland existed historically. Recent habitat assessments estimate that approximately 193 acres of sand parkland remains. Only 49 acres of sand parkland habitat are publicly owned: 9 acres are protected within Quail Hollow Ranch County Park; 20 acres are protected in Bonny Doon Ecological Reserve, owned

and managed by the CDFG; and approximately 20 acres occur in Henry Cowell Redwoods State Park. The Zayante band-winged grasshopper is not known to occur in the Bonny Doon Ecological Reserve or Henry Cowell Redwoods State Park. The remaining 144 acres, or approximately 75 percent of the total extent of sand parkland habitat, are privately owned. Additionally, "open" sand parkland that is suitable for Zayante band-winged grasshopper, makes up only a small portion of the remaining sand parkland (approximately 57 acres or 5.7 percent of the 1943 extent, distributed across 14 locations).

As is the case for the Mount Hermon June beetle, current threats to the Zayante band-winged grasshopper include sand mining, urban development, recreational activities, fire suppression, and agriculture. Suppression of wildfire is particularly detrimental to the persistence of open sand parkland, the primary habitat for the Zayante band-winged grasshopper. The long-term persistence of the Zayante band-winged grasshopper depends heavily on managing vegetation in the Zayante sandhills in ways that create and maintain areas with sunlit, bare or sparsely-vegetated loose sands.

Tidewater Goby

Tidewater gobies have been documented in several of the coastal watersheds of Santa Cruz County. Tidewater goby populations in the central California area are important to the recovery of the species because the northern, central, and southern populations are genetically distinct from each other (65 FR 69693). The following information, unless otherwise noted, is summarized from the recovery plan (Service 2005) and the 5-year review for the species (Service 2007).

The Greater Bay recovery unit extends from Salmon Creek in Sonoma County to the Salinas River Valley in Monterey County. Five recovery sub-units within Santa Cruz County are identified in the recovery plan. For each of these five sub-units, the amount of available habitat for the tidewater goby, any available survey information, and recommended recovery actions are summarized below.

GB6 sub-unit: Waddell, Scott, and Laguna Creeks
This sub-unit is the first of a number of sub-units that are relatively closely spaced along the steep, intermittently rocky shores from north of Santa Cruz to the Salinas Valley. This sub-unit includes Waddell, Scott, and Laguna Creeks. Of these three sites, two (Scott Creek and Laguna Creek) are currently known to be occupied by tidewater gobies.

Waddell Creek:
The available tidewater goby habitat at Waddell Creek Lagoon encompasses approximately 10 to 17.5 acres. The north side of the lagoon is in Rancho del Oso State Park; the south side is privately owned. The original tidewater goby population at Waddell Creek Lagoon was considered extirpated by Swift, et al. (1989), but tidewater gobies were re-introduced in 1991 from Scott Creek by J. Smith (Associate Professor, San Jose State University). Tidewater gobies were present in low numbers in 1996, and were absent during surveys from 1997 to 2000. A

lack of backwater habitat may limit the ability of this location to sustain long-term tidewater goby populations. Waddell Creek is designated as "Water Quality Limited" by the State Water Resources Control Board. Pollutants and stressors include nutrients, potentially from municipal point sources.

Scott Creek:
The available tidewater goby habitat at Scott Creek consists of approximately 10 acres. Scott Creek bisects the Swanton Pacific Ranch, which is owned by California Polytechnic State University, San Luis Obispo. Scott Creek dried to low levels in the early 1990's, but the fresh or brackish pond to the south has been considered a refuge during floods and drought. Tidewater gobies were not found in either the lagoon or pond during limited sampling in 1996, and their status at the time was described as uncertain. Tidewater gobies were present but apparently scarce during surveys in 2003, and tidewater gobies appeared more common during surveys in 2005. Scott Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board. In addition, tidewater gobies were found in September 2004 during construction activities in Queseria Creek, which is a tributary to Scott Creek. Queseria Creek flows into Scott Creek approximately 1 mile upstream from the Scott Creek coastal lagoon. Queseria Creek is on the Swanton Pacific Ranch and is not designated as "Water Quality Limited" by the State Water Resources Control Board

Laguna Creek:
The available tidewater goby habitat at Laguna Creek encompasses approximately 2.5 to 3.75 acres. The estuary is privately owned, but is committed to State Parks. State Parks owns the creek on the east side of Highway 1, upstream of the estuary. Limited farming occurs on lands adjacent to Laguna Creek. Laguna Creek was nearly dry during the 1988-1992 drought, and the tidewater goby population here may have survived the drought. Tidewater gobies were found here in 1996, 2000, and 2004. Water withdrawals at this location are a potential threat. Laguna Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board.

GB7 sub-unit: Baldwin, Lombardi, Old Dairy, Wilder, and Moore Creeks and Younger Lagoon
The GB7 sub-unit consists of a group of closely-spaced localities, including Baldwin Creek, Lombardi Creek, Old Dairy Creek, Wilder Creek, Moore Creek, and Younger Lagoon. All six of these localities are occupied by tidewater gobies.

Baldwin Creek:
The available tidewater goby habitat at Baldwin Creek consists of approximately 1.75 to 2.5 acres. Wilder Ranch State Park owns the creek and estuary; limited cattle grazing occurs upstream of the estuary. J. Smith collected tidewater gobies in two freshwater ponds upstream of the lagoon that connect with the creek. Tidewater gobies were present at Baldwin Creek during surveys in 2004. Baldwin Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board.

Lombardi Creek:
The available tidewater goby habitat at Lombardi Creek encompasses approximately 0.49 acre. State Parks (Wilder Ranch State Park) owns the creek and estuary; limited cattle grazing occurs upstream of the estuary. Tidewater gobies were present during surveys here in 2002. Lombardi Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board.

Old Dairy Creek:
The extent of available tidewater goby habitat at Old Dairy Creek is approximately 1 acre. The creek mouth is within Wilder Ranch State Park. A small population of tidewater gobies was found here during surveys in 2003. Old Dairy Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board.

Wilder Creek:
The available tidewater goby habitat at Wilder Creek comprises approximately 3.7 to 6.2 acres. The creek and estuary are within Wilder Ranch State Park; limited cattle grazing occurs upstream of the estuary. Tidewater gobies were present during surveys conducted here in 2000. Wilder Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board.

Moore Creek:
Moore Creek supports approximately 0.75 to 1.7 acres of tidewater goby habitat. The creek mouth is within State Parks property (Natural Bridges State Beach). Portions of the Moore Creek drainage upstream from the mouth include Moore Creek Preserve (246 acres), which is a city of Santa Cruz park, and University of California, Santa Cruz property. Antonelli pond, upstream of the lagoon, captures most of the watershed's runoff in drought years. Puddles remained during the drought of the late 1980's, and tidewater gobies may have not been extirpated as a result. Tidewater gobies were collected at Moore Creek in 1992 and 1996, and were also present during surveys conducted in 2000. Moore Creek is not designated as "Water Quality Limited" by the State Water Resources Control Board.

Younger Lagoon:
The extent of available tidewater goby habitat at Younger Lagoon is approximately 15 to 20 acres. Younger Lagoon Reserve was accepted as a reserve in the University of California Natural Reserve System in 1986. The lagoon is located adjacent to the Long Marine Lab, which is managed by the University of California, Santa Cruz. Tidewater gobies were present during surveys here in 2004. Younger Lagoon is not designated as "Water Quality Limited" by the State Water Resources Control Board.

GB8 sub-unit: San Lorenzo River Lagoon, Corcoran Lagoon, and Moran Lake
This sub-unit includes the San Lorenzo River Lagoon, Corcoran Lagoon, and Moran Lake. All three of these localities are occupied by tidewater gobies.

San Lorenzo River:
The available tidewater goby habitat in the San Lorenzo River encompasses approximately 66 acres. The river flows through the city of Santa Cruz, and city-owned beaches are adjacent to the lagoon. Tidewater gobies were documented at this locality for the first time on May 11, 2004, during seining for a fish relocation effort associated with a U.S. Army Corps of Engineers bank stabilization project. The lower river and lagoon are channelized between levees, with little refuge from high water flows, and the sandbar is frequently breached in summer months. Tidewater gobies were also found in Branciforte Creek (a tributary to the lower San Lorenzo River) downstream of Ocean Street in September 2004 (Hagar Environmental Science 2004). The San Lorenzo River Lagoon is designated as "Water Quality Limited" by the State Water Resources Control Board. Pollutants and stressors in the San Lorenzo River Lagoon include pathogens; potential sources of the stressors include urban runoff and storm sewers.

Corcoran Lagoon:
The available tidewater goby habitat at Corcoran Lagoon consists of approximately 15 to 20 acres. Twin Lakes State Beach comprises approximately 10 to 20 percent of land adjacent to the lagoon; the remaining adjacent land is owned by the community of Twin Lakes. Tidewater gobies were present during surveys conducted here in 2000. Corcoran Lagoon is not designated as "Water Quality Limited" by the State Water Resources Control Board.

Moran Lake:
The available tidewater goby habitat at Moran Lake encompasses approximately 5 to 6 acres. This locality occurs within a 9.2-acre regional park (Moran Lake Park). The adjacent "26th Avenue Beach" is owned by Santa Cruz County, and private homes are adjacent to the beach and park. Tidewater gobies were present here during surveys conducted in 1997. Tidewater gobies were not found during intensive surveys in 2000, but were present in again 2001. The species may have been present (and undetected) in 2000, or it is possible that tidewater gobies from Corcoran Lagoon recolonized Moran Lake. Moran Lake is not designated as "Water Quality Limited" by the State Water Resources Control Board.

GB9 sub-unit: Soquel and Aptos Creeks
The GB9 sub-unit includes Soquel and Aptos Creeks. This sub-unit consists of one occupied tidewater goby locality (Aptos Creek).

Soquel Creek:
The available tidewater goby habitat at Soquel Creek consists of approximately 5 to 7.5 acres. This locality occurs within the city of Capitola. Tidewater gobies were discovered here in the late 1980's, and have been intermittently observed here since then. Tidewater gobies were present here during surveys in 1992, and were absent during surveys conducted in 1994; tidewater gobies may recolonize this location from the nearby Corcoran Lagoon. One individual tidewater goby was found during surveys at Soquel Creek in 1997, and no tidewater gobies were found during surveys conducted from 1998 through 2002. Soquel Creek lacks backwater refugia from high water flows associated with winter storms. Soquel Creek is designated as "Water Quality Limited" by the State Water Resources Control Board. Pollutants and stressors, and

their potential sources (in parentheses), include: nutrients (septic disposal and non-point sources); pathogens (urban runoff/storm sewers, natural sources, and non-point sources); and sedimentation/siltation (construction and other land development).

Aptos Creek:
The available tidewater goby habitat at Aptos Creek encompasses approximately 5 to 7.5 acres. This locality is within the city of Capitola. Tidewater gobies were present here during surveys conducted in 1999. Aptos Creek is channelized, and the lack of backwater refugia puts the tidewater goby population here at risk of loss during high water flows associated with winter storms. Aptos Creek is designated as "Water Quality Limited" by State Water Resources Control Board. Pollutants and stressors, and their potential sources (in parentheses), include pathogens (urban runoff/storm sewers) and sedimentation/siltation (land development and channel erosion).

GB10 sub-unit: Pajaro River Watershed
The GB10 sub-unit includes the Pajaro River and its tributaries (e.g., Watsonville Slough). This sub-unit is considerably isolated from other tidewater goby localities in the region. This sub-unit is not currently known to be occupied by the tidewater goby.

The available tidewater goby habitat in the Pajaro River itself consists of approximately 125 to 150 acres. An additional 25 acres of tidewater goby habitat exists in Watsonville Slough, which flows into the Pajaro River approximately 0.25 mile upstream of its mouth at the Pacific Ocean. Approximately 5 percent of the tidewater goby habitat at this locality is within Sunset State Beach; the remainder is privately-owned. Tidewater gobies were assumed extirpated here as of 1989, but were rediscovered in 1991. The Pajaro River population of tidewater gobies was probably not extirpated, but remained present in the deeper portions of the lagoon and nearby Watsonville Slough where sampling for the species is difficult. The Pajaro River is designated as "Water Quality Limited" by State Water Resources Control Board. Pollutants and stressors, and their potential sources (in parentheses), include nutrients (irrigated crop production, agricultural subsurface drainage, agricultural irrigation tailwater, agricultural return flows, urban runoff/storm sewers, wastewater, channelization, removal of riparian vegetation, and non-point sources) and sedimentation/siltation (agriculture, irrigated crop production, grazing, agricultural runoff, resource extraction, surface mining, hydromodification, channelization, habitat modification, removal of riparian vegetation, streambank modification/destabilization, and channel erosion).

During the drought years of the late 1980's and early 1990's, many small lagoons in San Luis Obispo, Santa Barbara, and Santa Cruz Counties went dry or nearly so. This natural drought was often exacerbated by water tables lowered from additional water withdrawals upstream (Rathbun 1991). Examples of such lagoons in Santa Cruz County include Laguna Creek and Moore Creek. In the cases of Laguna and Moore Creeks, tidewater gobies were subsequently observed in these localities during surveys conducted after the drought had passed (i.e., Laguna Creek: 1996, 2000, and 2004; Moore Creek: 1992, 1996, and 2000). The increased understanding of the tidewater goby's tolerance for a range of habitat conditions, its resiliency and recovery

following catastrophic events (e.g., the recolonization of Laguna Creek and Moore Creek following extirpations during the drought of the late 1980's and early 1990's), and the growing number of known extant populations suggests that the threat of extinction may be less severe than originally thought.

In Santa Cruz County, the lagoons of Baldwin, Wilder, Moore, and Scott's Creeks and the Pajaro River are believed to have large and stable populations. Most of these populations are located in state parks. These five lagoons represent approximately 6 percent of the total number of existing, known populations of the tidewater goby.

California Red-legged Frog

Almost all coastal drainages from the Santa Cruz/San Mateo County line south to the city of Santa Cruz are occupied by California red-legged frogs. Wilder Ranch State Park, Watsonville Slough, and the Pajaro River are also occupied by the species. The 2002 Recovery Plan for the species reports a total of 17 streams in Santa Cruz County supporting red-legged frog (Service 2002). Santa Cruz County represents probably less than 1 percent of the total range for the species. However, in comparison to the other recovery units throughout the species' range, the central California coast supports the greatest number of drainages currently occupied by California red-legged frogs (Service 2002). Año Nuevo State Park supports large numbers of California red-legged frogs.

Most of the California red-legged frog occurrences documented within Santa Cruz County lie to the north of the city of Santa Cruz or south of Aptos Creek. California red-legged frogs have not been documented in the lower San Lorenzo River watershed. Loss of habitat and the introduction of aquatic predators, including bullfrogs and non-native fish, have drastically reduced populations of the California red-legged frog throughout its range, including the watersheds of Santa Cruz County. California red-legged frog upland habitat areas north of the city of Santa Cruz and within the Pajaro River Valley have been converted to agricultural croplands, thereby reducing the amount of available upland dispersal and foraging habitat as well as the water quality of the adjacent stream and river areas.

The recovery plan for the California red-legged frog identifies two core areas within the central California coast recovery unit for the recovery of the California red-legged frog (Service 2002). These two core areas (i.e., South San Francisco Bay and Watsonville Slough-Elkhorn Slough) include all or parts of the Año Nuevo, Davenport, Pescadero Creek, Aptos-Soquel, Santa Cruz Mountains, and Watsonville hydrologic sub-areas. The recovery plan for the California red-legged frog defines core areas as specific areas within which recovery actions will be focused. Consequently, the long-term management of the California red-legged frog in the watersheds of Santa Cruz County is important to the recovery of this species.

California Tiger Salamander

The information below is primarly summarized from the final listing rule for the species, unless stated otherwise. The California tiger salamander is currently known from only two sites in Santa Cruz County, Ellicott and Buena Vista Ponds. Ellicott Pond and Buena Vista Pond are both located in the vicinity of the city of Watsonville in southern Santa Cruz County. Both of these sites are protected from future development. Ellicott Pond is owned and managed by the Service as part of the Ellicott Slough National Wildlife Refuge. Buena Vista Pond is currently owned by the CDFG and managed by the Service (CNDDB 2011). Although Ellicott and Buena Vista Ponds are the only locations in Santa Cruz County that are currently known to support the California tiger salamander, additional breeding sites may occur on private property that has not been adequately surveyed for the species.

The California tiger salamander has been eliminated from an estimated 55 to 58 percent of its historic breeding sites and has lost an estimated 75 percent of its habitat. Santa Cruz County represents a small percentage of the total range of the salamander (likely less than 5 percent of the total range based on current distribution maps for the species). In general, the ponds available to California tiger salamanders have been lost or adversely affected by rapid development. Only the most southern portion of the county appears to contain potential breeding habitat for this species. Much of this area has been disturbed due to conversion to agricultural use.

Santa Cruz Long-toed Salamander

The information in this account was obtained primarily from the draft revised recovery plan for the subspecies (Service 1999), internal recovery files (Service 2006), and the 5-year review for the subspecies (Service 2009e). As of 2009, 24 breeding sites for Santa Cruz long-toed salamanders have been identified; 17 of these breeding sites in are Santa Cruz County and 7 are in Monterey County. Since the publication of the draft revised recovery plan, Santa Cruz long-toed salamander reproduction has been documented at 19 locations. Of the 24 known historic breeding sites, current breeding status is unknown at 2 sites (Anderson's Pond and Green's Pond) in Santa Cruz County.

Prior to large-scale urbanization and conversion of lands for agricultural uses, it is probable that suitable upland sheltering and dispersal habitats were more widespread and contiguous in Santa Cruz and Monterey Counties. Similarly, freshwater wetlands likely occurred in greater abundance, in comparison to the present. Terrestrial and aquatic habitats suitable for Santa Cruz long-toed salamanders have been removed and altered due to urbanization and agricultural activities, and barriers to dispersal have been created, resulting in subpopulations that are isolated from each other.

The draft revised recovery plan for the subspecies describes the distribution of breeding sites of the Santa Cruz long-toed salamander as occurring within three metapopulations, based upon available survey data, and the speculation that large rivers, sloughs, or extensive areas of coastal

scrub and grasslands separated subpopulations from each other. The draft revised recovery plan refers to these metapopulations as the "Northern" or "Santa Cruz" metapopulation (in Santa Cruz County), the "Central" or "McClusky" metapopulation, and the "Southern" or "Moro Cojo" metapopulation (in Monterey County). The terms "subpopulation" and "complex" were used interchangeably in the draft revised recovery plan, and were not precisely defined.

A revision of the draft revised recovery plan is currently in progress. The Service is considering replacing the term "complex," as used in the draft revised recovery plan, with the term "recovery unit." Based on the current distribution of Santa Cruz long-toed salamanders, and preliminary results of genetic research by Wes Savage (doctoral candidate, University of California, Davis), we currently describe the Monterey County subpopulations of Santa Cruz long-toed salamander as comprising one metapopulation rather than two. We currently recognize only the Pajaro River, in its present state, as a substantial barrier to the dispersal of Santa Cruz long-toed salamanders between Santa Cruz and Monterey Counties. Therefore, we recognize two metapopulations for the Santa Cruz long-toed salamander: the Santa Cruz County metapopulation and the Monterey County metapopulation. The Santa Cruz County metapopulation contains four recovery units, and the Monterey County metapopulation contains two recovery units. This information is derived from the Service's current recovery planning efforts for the subspecies.

Table 2. Recovery units, geographic location, and associated breeding ponds for the Santa Cruz long-toed salamander in Santa Cruz County, California.

Recovery Unit	Geographic Location	Associated Breeding Locations
Santa Cruz County		
Valencia-Seascape	This recovery unit is bounded by the Pacific Ocean to the west, Highway 1 to the north and east, and Mar Monte Drive to the south	1) Valencia Lagoon 2) Seascape Pond 1 3) Seascape Pond 2 4) Seascape Pond 3
Ellicott-Buena Vista	This recovery unit is bounded by the Pacific Ocean to the west, Mar Monte Drive to the north, Highway 1 to the east, and the Pajaro River to the south.	5) Anderson's Pond 6) Buena Vista Pond 7) Ellicott Pond 8) Green's Pond 9) Rancho Road Pond
Freedom	This recovery unit is bounded by Freedom Boulevard and Hames Road to the north, Highway 1 to the west, Corralitos Road to the east and White Road to the south. The Freedom recovery unit includes areas described in Service (1999) as occurring in the "Pleasant Valley-Corralitos Complex".	10) Merk Pond 11) Millsap Pond 12) Palmer Pond 13) Tucker Pond
Larkin Valley	This recovery unit is bounded by White Road to the north, Highway 1 to the west and south, Freedom Boulevard to the east, the northwestern limits of the city of Watsonville to the southeast. The Larkin Valley recovery unit includes areas described in Service (1999) as occurring in the "Larkins (sic) Valley Complex".	14) Calabasas Pond 15) Olives Pond 16) Suess Pond

The Ellicott Slough National Wildlife Refuge is managed by the San Francisco Bay National Wildlife Refuge Complex, and comprises a total of 200.5 acres, containing two breeding ponds at two different locations (Ellicott Pond and Calabasas Pond), and one recently-constructed supplemental pond (Prospect Pond) in which breeding has not yet been documented. The Ellicott Slough National Wildlife Refuge (139 acres) and the Santa Cruz Long-Toed Salamander Ecological Reserve (30.5 acres) were acquired in 1975 and are jointly managed by the Service and CDFG through a Memorandum of Understanding. In 1999 the Service and CDFG acquired Calabasas Pond and adjacent upland habitat (31 acres), which is managed as the Calabasas Unit of the Ellicott Slough National Wildlife Refuge.

The 289-acre Buena Vista property, located just east of the Ellicott Slough National Wildlife Refuge, is owned by CDFG. The Service will manage the recently-acquired (in 2004) Buena Vista Property as part of the Ellicott Slough National Wildlife Refuge, under a cooperative agreement with CDFG. Collectively, the Buena Vista Property, the nearby Ellicott Slough National Wildlife Refuge, and the Santa Cruz Long-toed Salamander Ecological Reserve comprise 458.5 acres of upland habitat near five presumed or known extant breeding ponds (Anderson's Pond, Buena Vista Pond, Ellicott Pond, Green's Pond, and Rancho Road Pond) in the Ellicott-Buena Vista Complex.

Marbled Murrelet

As summarized in the 2009 5-year review for the marbled murrelet (Service 2009a), the recovery team identified six conservation zones for the marbled murrelet, three of which are in California: zone 4 (Del Norte and northern Humboldt County), zone 5 (Mendocino County), and zone 6 (Santa Cruz and San Mateo County). Recent surveys conducted within zone 6 found only 174 birds in this area in 2008 (down from 699 birds in 2003 and 367 birds birds in 2007) (Peery et al. 2008). Marbled murrelets aggregate along the coast of northern Santa Cruz and southern San Mateo Counties, in the vicinity of Point Año Nuevo and Año Nuevo Island. This aggregation is associated with Waddell Creek in Santa Cruz County, considered the last remaining near-to-pristine coastal watershed in the lower two-thirds of California, draining Big Basin Redwoods State Park and adjacent private land.

The central California marbled murrelet population is important to maintaining a well-distributed population in the tri-state area (Service 1997). The marbled murrelet's geographic range includes two small, discrete sub-populations at its northern and southern extremes; one in the Santa Cruz Mountains, and the other on Attu Island in the western Aleutians, both of which are particularly vulnerable to extirpation (Ralph et al. 1995). The small population in the Santa Cruz Mountains nests primarily on State Park land, including Big Basin Redwoods, Butano, and Portola State Parks. The recovery plan emphasizes that this population is especially vulnerable due to its small size and isolation from other marbled murrelet populations (Service 1997). As noted by Ralph et al. (1995), it is possible that some populations of the marbled murrelet have distinct genetic characteristics. The loss of these peripheral populations would likely reduce genetic diversity in the population as a whole, and could reduce the species' ability to adapt to long-term environmental change.

In California, marbled murrelets nest in large old-growth and mature coast redwood and Douglas-fir trees, which provide suitable nesting platforms (Baker et al. in press, Hamer and Nelson 1995). In the Santa Cruz Mountains, marbled murrelet nests have been found up to 10 miles inland (Evans Mack et al. 2003). Peery et al. (2004) found that only 31 percent of 32 radio-marked adults in central California nested during a 2-year study.

Few marbled murrelet nests have been monitored, particularly during the 30-day incubation period (Golightly et al. 2002). Therefore, it is difficult to determine the number of marbled murrelet nests in a given area of forest, and the success of these nests. The Pacific Seabird Group's accepted protocol for conducting marbled murrelet surveys in forests (Evans Mack et al. 2003) relies upon the observation of "occupied behavior" to indicate a high likelihood of murrelet nesting in the vicinity.

There are several factors that may be negatively impacting marbled murrelets in the Santa Cruz Mountains. These include limited nesting habitat, nest predation, and possibly reduced prey availability as a function of oceanographic events (Command Trustees 2004). Historic logging of old-growth redwoods in the Santa Cruz Mountains has greatly reduced the amount of available marbled murrelet nesting habitat. The species has also been adversely impacted by habitat fragmentation and other human disturbance. In addition, the central California marbled murrelet population is threatened by the high probability of large oil spills and significant chronic oil and other marine pollution (Service 1997).

The central California population of marbled murrelets (i.e., in the Santa Cruz Mountains) have an exceptionally low nesting success rate. Peery et al. (2004) summarized the fate of the 19 marbled murrelet nests monitored in the region up to and including their study, and reported an 84 percent nest failure rate, due primarily to predation. Of the nine nests for which the cause of failure was determined conclusively, six were depredated, including four by corvids. All 7 of the Santa Cruz Mountains nests located during the 2 years of Peery's study failed.

Peery et al. (2004) suggested that reproduction is limited by food availability in some years and by nest predation in others. Marbled murrelets face threats from the declining availability of their prey (small schooling marine fishes) and increases in populations of avian nest predators, especially corvids. Corvid predation of marbled murrelet chicks and eggs around campgrounds in the Santa Cruz Mountains has been witnessed on several occasions (Singer et al. 1991, Suddjian 2003). Predation of marbled murrelet adults at the nest site can also occur. Given the difficulty in observing such an event, it is more likely that these few observations are indicative of regular occurrences, rather than chance observations of unusual events. The importance of corvid predation on murrelet nests is not well documented because so few active murrelet nests have been found. Nonetheless, in two studies of predation on simulated murrelet nests, corvids were the most important predator during the incubation stage (Luginbuhl et al. 2001). Peery et al. (2004) reported that predation on marbled murrelet nests in the Santa Cruz Mountains region, primarily by Steller's jays and common ravens, was frequently observed.

Critical Habitat for the Monterey Spineflower

Three of the nine critical habitat units for the Monterey spineflower (comprising approximately 203 acres) are located within Santa Cruz County (and as such, are located within the Program area) and are described in more detail below. Each of these units supports some or all of the PCE's required by the species for survival. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

Coastal units
Unit 1: Sunset Unit
Unit 1 includes approximately 85 acres of critical habitat satisfying the PCE1 requirement for Monterey spineflower and includes coastal beaches, dunes, and bluffs west of Watsonville in southern Santa Cruz County. The unit is entirely within Sunset State Beach on State lands and includes the area from Sunset Beach Road south to the gate on Shell Road, just north of the mouth of the Pajaro River, and west of the main road that extends the length of the park. This unit supports a population of Monterey spineflower that numbers in the tens of thousands and may require special management considerations due to threats posed by invasive species and recreation.

Unit 6: Manresa Unit
Unit 6 consists of approximately 94 acres of critical habitat satisfying the PCE1 requirement for the species that occur within State owned lands on the coastal bluffs south of Seacliff State Beach and north of Sunset State Beach. This unit is important because it is the most northerly coastal-based occurrence and provides connectivity with the Sunset Unit Monterey spineflower populations. This unit is currently occupied and may require special management considerations due to threats posed by invasive species and recreation.

Inland Units
Unit 5: Freedom Boulevard Unit
Unit 5 includes approximately 24 acres of critical habitat that satisfy PCE1 for the species. The unit consists of privately owned lands containing a mix of grassland, maritime chaparral, and oak woodland habitat near the western terminus of Freedom Boulevard and northeast of Highway 1 in Santa Cruz County. This unit currently supports a population of Monterey spineflower that numbers in the thousands in favorable years, but many fewer in unfavorable years, and may require special management considerations due to threats posed by invasive species. This unit is important because it is the northernmost occurrence away from the immediate coast.

Critical Habitat for the Robust Spineflower

All six of the critical habitat units for the robust spineflower (comprising approximately 468 acres) are located within Santa Cruz County and are described in more detail below. Each of these units supports some or all of the PCE's required by the species for survival. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

Unit A: Pogonip Unit
Unit A consists of 159 acres of sandy openings within mixed forest habitat within Pogonip Park in the city of Santa Cruz. Approximately 152 acres are owned and managed by the city and 7 acres are privately owned. As of the year 2009, two occurrences with greater than 4,000 individuals total occupied this site (Service 2010a). This unit is important to the conservation of the taxon because it supports extant populations of robust spineflower and includes habitat that is important for the expansion of and connectivity between the two occurrences.

Unit B: Branciforte Unit
Unit B consists of 9 privately owned acres of mostly grassland habitat within the city limits of Santa Cruz. As of the year 2009, this unit supported a robust spineflower population of more than 650 individuals (Service 2010a). This unit includes habitat that is important for the expansion of the existing population and is in close proximity to Unit A.

Unit C: Aptos Unit
Unit C consists of 70 privately owned acres on sandy soils within maritime chaparral. As of the year 2000, this unit supported a robust spineflower population of approximately 3,000 individuals. This unit includes habitat that is important for the expansion of the existing population.

Unit D: Freedom Unit
Unit D consists of 9 acres of grassland habitat and sandy areas in openings within maritime chaparral and oak woodland that are both privately owned and Pajaro Unified School District lands. As of the year 2009, this unit supported a robust spineflower occurrence of approximately 500 individuals, including some individuals which occur just outside the critical habitat boundary (Service 2010a). This unit includes habitat that is important for the expansion of the colony contained within the unit and connectivity between other colonies.

Unit E: Buena Vista Unit
Unit E consists of 135 privately owned acres of grassland within maritime chaparral and oak woodland. As of 2009, this unit supported an occurrence of robust spineflower comprising greater than 6,000 individuals (Service 2010a). This unit includes habitat that is important for the expansion of the existing colonies and connectivity between the multiple colonies contained within the unit. This site also supports the Santa Cruz long-toed salamander.

Unit F: Sunset Unit
Unit F consists of 86 State-owned acres of coastal dune habitat within Sunset State Beach, and is identical to critical habitat that is being designated for the Monterey spineflower. As of 2009, this unit supported the largest occurrence of robust spineflower, with approximately 1 million individuals (Service 2010a). This unit includes habitat that is important for the expansion of the existing colonies into areas that were historically occupied and for maintaining connectivity between the multiple colonies contained within the unit. The unit is also important because it is the most southerly location known for the species.

Critical Habitat for the Santa Cruz Tarplant

Eight of the 11 critical habitat units for Santa Cruz tarplant (comprising approximately 1,492 acres or 50 percent of the total area designated) are located in Santa Cruz County and are described below. Each of these units supports some or all of the PCE's required by the species for survival. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

Unit B: Graham Hill
This unit is 30 acres of privately owned coastal terrace prairie on the west side of Graham Hill Road, about one mile north of the city of Santa Cruz in Santa Cruz County. The tarplant population on this unit represents the western limit of the cluster of populations that are found at the northern end of Monterey Bay. In 1994, this population numbered 12,000 individuals. By 2001, it had declined to about 500 individuals.

Unit C: De Laveaga
This 5-acre parcel of nearly level coastal terrace prairie consists of state lands managed by the California National Guard within De Laveaga Park just north of the city of Santa Cruz. This unit, as well as the Arana Gulch, Twin Lakes, Rodeo Gulch, Soquel, and Porter Gulch units, support a cluster of populations found at the northern end of Monterey Bay and is important for connectivity between these populations.

Unit D: Arana Gulch
This 65-acre unit of relatively flat coastal prairie grassland is owned and managed by the city of Santa Cruz. It is contained in an open space reserve just north of Woods Lagoon in Santa Cruz, and is bounded on west, east, and north sides by existing development and on the south side by the Santa Cruz Harbor. There have been large fluctuations in the number of individuals found within this critical habitat unit, ranging from approximately 100,000 individuals in the early 1980's to no individuals in 1995. As of 2002, there were approximately 10,000 Santa Cruz tarplant individuals within the unit. This unit provides connectivity between several other units and occurrences.

Unit E: Twin Lakes
This 26-acre unit of relatively flat coastal prairie is state-owned and is located just north of Schwan Lagoon in Twin Lakes State Park within the city of Santa Cruz. This unit supports a relatively small population of Santa Cruz tarplant and is important for connectivity between populations.

Unit F: Rodeo Gulch
This 26-acre unit is privately-owned and straddles the Arana Gulch and Rodeo Gulch drainages north of the community of Soquel in Santa Cruz County. It is coastal terrace prairie that is bounded on the north, east and south by existing development; the western side is bounded by lands that have not been developed. This unit is important because it supports a seedbank and

habitat that may allow for future expansion of the existing population, and provides connectivity between other known occurrences and critical habitat units.

Unit G: Soquel
This 100-acre unit of coastal terrace prairie straddles Rodeo Gulch and Soquel Creek drainages north of the community of Soquel in Santa Cruz County. It is bounded on the north, east, and south by existing development; the western side is bounded by lands that have not been developed. About 53 acres are within Anna Jean Cummings Regional Park, which is managed by Santa Cruz County, and the remainder is privately owned. This unit is important because it is currently occupied with a small number of individuals, supports a seedbank and habitat that may allow for future expansion of the existing population, and provides connectivity between other known occurrences and critical habitat units.

Unit H: Porter Gulch
This 35-acre unit of privately-owned grassland is on a coastal terrace that straddles the Bates Creek and Porter Gulch drainages north of the community of Soquel in Santa Cruz County. It is surrounded by undeveloped lands. This unit supports a population of Santa Cruz tarplant that ranges from several hundred to several thousand individuals.

Unit I: Watsonville
This 1,205-acre unit of grasslands and drainage areas occurs west of the city of Watsonville in Santa Cruz County. The northern and eastern boundaries are near the Corralitos Creek drainage where the boundaries abut existing development; the southeastern and southern boundary is the Pajaro River drainage; the western boundary generally follows Buena Vista Drive until it intersects with the northern perimeter of the Watsonville Airport. The unit excludes the paved areas of the Watsonville Airport and includes the unpaved portions surrounding the runways. Part of the unit is owned by the city of Watsonville. A small portion is under easement to the State and to the CDFG reserve. The remainder is privately owned. This unit overlaps with an area that is targeted for regional conservation planning by the CDFG. The area supports multiple populations of the Santa Cruz tarplant, and is one of only three areas where populations of the tarplant grow in the central Monterey Bay area and in the southern end of the range of the species.

Critical Habitat for the Scott's Valley Polygonum

Both of the two critical habitat units for the Scotts Valley polygonum occur within Santa Cruz County and encompass an area of 287 acres in northern Scotts Valley. Both of these units contain some combination of the PCE's required by this species for survival. These are the same units designated as critical habitat for the Scotts Valley spineflower and are described in more detail below.

Unit 1: Glenwood
Unit 1 represents approximately 74.6 percent (in area) of the total critical habitat designated throughout the range of the species and consists of approximately 214 acres to the west of

Glenwood Drive and north and northwest of Casa Way, in the city of Scotts Valley. This unit includes land owned and managed by the Salvation Army and by the Scotts Valley High School District as a preserve. Most of the land within this unit is privately owned, except the 9 acres owned by the local high school district. This unit is essential because it supports approximately 25 to 50 percent of all of the known Scotts Valley polygonum plants, in addition to other suitable patches of unoccupied wildflower field habitat that is dedicated as "open space". The unit also consists of grassland habitat that supports the pollinators and seed dispersers that are important to the survival and conservation of Scotts Valley polygonum.

Unit 2: Polo Ranch Site
Unit 2 consists of approximately 73 privately owned acres to the east of Carbonera Creek and Highway 17 and northeast of Navarra Drive, in the city of Scotts Valley. This unit is essential because it supports approximately 50 to 75 percent of all known Scotts Valley polygonum plants, in addition to other suitable patches of unoccupied wildflower field habitat. The unit also consists of grassland habitat that supports the pollinators and seed dispersers that are important to the survival and conservation of Scotts Valley polygonum.

Critical Habitat for the Scott's Valley Spineflower

Both of the two critical habitat units for the Scotts Valley spineflower occur within Santa Cruz County and encompass an area of 287 acres in northern Scotts Valley. Both of these units contain some combination of the PCE's required by this species for survival. These are the same units designated as critical habitat for the Scotts Valley polygonum and are described in more detail below. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

Unit 1: Glenwood Site
Unit 1 represents approximately 74.6 percent (in area) of the total critical habitat designated throughout the range of the species and consists of approximately 214 acres to the west of Glenwood Drive and north and northwest of Casa Way, in the city of Scotts Valley. This unit includes land owned and managed by the Salvation Army and by the Scotts Valley High School District as a preserve. Most of the land within this unit is privately owned, except the 9 acres owned by the local high school district. This unit is essential because it supports approximately 90 percent of all existing Scotts Valley spineflower plants, in addition to other suitable patches of unoccupied wildflower field habitat that could be colonized by the species; intervening habitat which supports the grassland community necessary for pollinators and seed dispersers; and a contiguous extent of the watershed that is necessary to maintain the hydrologic and soil conditions suitable for Scotts Valley polygonum.

Unit 2: Polo Ranch Site
Unit 2 consists of approximately 73 privately owned acres to the east of Carbonera Creek and Highway 17 and northeast of Navarra Drive, in the city of Scotts Valley. This unit is essential because it supports one of only two known occurrences of Scotts Valley spineflower, in addition to other suitable patches of unoccupied wildflower field habitat that could be colonized by the

species; intervening habitat which supports the grassland community necessary for pollinators and seed dispersers; and a contiguous extent of the watershed that is necessary to maintain the hydrologic and soil conditions suitable for Scotts Valley polygonum.

Critical Habitat for the Zayante Band-winged Grasshopper

The only critical habitat unit designated for the Zayante band-winged grasshopper encompasses approximately 10,560 acres between Highways 9 and 17 in Santa Cruz County. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated. Approximately 610 acres (about 6 percent of the total area) are located on public lands owned by local or state entities (310 acres in Henry Cowell Redwoods State Park, which is managed by California Department of Parks and Recreation and 300 acres in Quail Hollow Park, which is jointly owned and managed by the county of Santa Cruz and CDFG). The remainder, approximately 9,950 acres or about 94 percent, is located on lands which are privately owned. The critical habitat unit stretches across land from the southeastern portion of Henry Cowell Redwoods State Park, west to the city of Scotts Valley, and north to the communities of Ben Lomond, Lompico, and Zayante. This unit also includes a small area located east of Zayante in the vicinity of Weston Road. Areas covered in the Revised HCP for Quail Hollow Quarry and the HCP for Hanson Aggregates' Felton Plant have been excluded from designation as critical habitat for this species. This unit is considered to be essential to the recovery of the species because it supports all of the populations and suitable habitat that are currently known for the Zayante band-winged grasshopper throughout its range.

Critical Habitat for the Tidewater Goby

Five of the 44 critical habitat units for tidewater goby (comprising approximately 254 acres) are located in Santa Cruz County and are described below. Each of these units supports some or all of the PCE's required by the species for survival. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

Unit SC-1: Laguna Creek
Unit SC–1 consists of 26 acres of State land located approximately 7.5 miles west of the city of Santa Cruz. On an intermittent basis, SC–1 possesses a sandbar across the mouth of the lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary and thereby provides relatively stable conditions (PCE 4). Primary constituent elements 1, 2, and 3 also occur throughout the unit. This unit is the northernmost of the five Santa Cruz County units and is likely a source population for this region. This unit is currently occupied and may require special management considerations.

Unit SC-2: Baldwin Creek
Unit SC–2 consists of 17 acres of State land within Wilder State Park, located approximately 6 miles west of the city of Santa Cruz. On an intermittent basis, SC–2 possesses a sandbar across the mouth of the lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary and thereby provides relatively stable conditions (PCE 4). Primary

constituent elements 1, 2, and 3 also occur throughout the unit. This unit is likely a source population for this region, is currently occupied, and may require special management considerations.

Unit SC-3: Corcoran Lagoon
Unit SC–3 consists of 32 acres located approximately 3 miles east of the city of Santa Cruz. This unit occurs partially on State owned land within Twin Lakes State Beach; the remainder is on private land or on lands under local jurisdiction. On an intermittent basis, SC–3 possesses a sandbar across the mouth of the lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary and thereby provides relatively stable conditions (PCE 4). Primary constituent elements 1, 2, and 3 also occur throughout the unit. This unit is likely a source population for this region, is currently occupied, and may require special management considerations.

Unit SC-4: Aptos Creek
Unit SC-4 consists of 3 acres on State land located within the town of Aptos. Primary constituent elements 1, 2, and 3 occur throughout the unit. This unit is likely a source population for this region, is currently occupied, and may require special management considerations.

Unit SC-5: Pajaro River
Unit SC–5 is the southernmost critical habitat unit for the species within Santa Cruz County and consists of 176 acres of State, local, and privately owned land located approximately 5 miles southwest of the town of Watsonville. On an intermittent basis, SC–5 possesses a sandbar across the mouth of the lagoon or estuary during the late spring, summer, and fall that closes or partially closes the lagoon or estuary and thereby provides relatively stable conditions (PCE 4). Primary constituent elements 1, 2, and 3 also occur throughout the unit. This unit provides connectivity between source populations, thereby supporting gene flow and metapopulation dynamics for this region. This unit is currently occupied and may require special management considerations.

Critical Habitat for the California Red-legged Frog

Two of the 48 critical habitat units for California red-legged frog (comprising approximately 76,310 acres) are located in Santa Cruz County and are described below. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

SCZ-1: North Coastal Santa Cruz County
This unit is comprised of approximately 72,249 acres of land and is located along the coastline of northern Santa Cruz County, including a small area in southern San Mateo County from approximately Green Oaks Creek to Wilder Creek. The unit includes the following watersheds: Green Oaks Creek, Waddell Creek, East Waddell Creek, Scott Creek, Big Creek, Little Creek, San Vicente Creek, Laguna Creek, and Majors Creek. The unit is made up of Federal (226 acres), State (20,562 acres), and private (51,460 acres) lands, is currently occupied by the species, and contains all the PCEs required by the species for survival. This is the northernmost critical habitat unit for the species in Santa Cruz County, providing connectivity between

occupied sites along the coast and farther inland. In addition, it contains high-quality habitat, indicated by high density of extant occurrences throughout the unit. This unit may require special management considerations or protection due to water diversions, which may alter aquatic habitats and thereby result in the direct or indirect loss of egg masses, juveniles, or adults.

SCZ-2: Watsonville Slough
This unit is comprised of approximately 4,057 acres of land and is located along the coastal plain in southern Santa Cruz County, north of the mouth of the Pajaro River and southwest of California Highway 1. It includes portions of the Corralitos Lagoon, the mouth of the Pajaro River, and locations in the Watsonville Slough system, including all or portions of Gallighan, Hanson, Harkins, Watsonville, Struve, and the West Branch of Struve sloughs. The unit is made up a combination of Federal (115 acres) and private (3,942 acres) lands. Unit SCZ-2 is occupied and contains all the PCEs required by the species for survival. This is the southernmost critical habitat unit for the species in Santa Cruz County, providing connectivity between occupied sites along the coast and farther inland. This unit may require special management considerations or protection due predation by nonnative species, and due to urbanization and the presence of introduced invasive plants, both of which may alter aquatic or upland habitats and thereby result in the direct or indirect loss of egg masses or adults.

Proposed Critical Habitat for the Marbled Murrelet

Two of the complete proposed critical habitat units (CA-14-c and CA-15) and a portion of one of the proposed critical habitat units (CA-14-b) for the marbled murrelet are located within Santa Cruz County. Neither the total number of critical habitat units or size of the critical habitat units changed within Santa Cruz County under the revised proposed critical habitat and remain consistent with the 1996 final rule. All of the information is summarized below from the final critical habitat rule for the species, unless otherwise stated.

Critical habitat designated in central California is comprised of approximately 48,000 acres in southern San Mateo and northern and central Santa Cruz County, consisting of approximately 34,800 acres on State-owned lands, 8,000 acres on county-owned lands, 1,000 acres on lands under city-ownership, and 4,200 acres on private lands. The critical habitat for the marbled murrelet within Santa Cruz County is concentrated in Big Basin Redwoods State Park in northwestern Santa Cruz County, Castle Rock State Park in northern Santa Cruz County, Henry Cowell Redwoods State Park in the central portion of the county, and Wilder Ranch State Park near the city of Santa Cruz.

EFFECTS OF THE ACTION

Beneficial Effects of Program Activities

The conservation practices covered by the proposed Program would result in a net environmental benefit to the listed species of Santa Cruz County. The practices that would be conducted

through the Program emphasize stabilizing and restoring riparian areas, reducing and managing stormwater runoff, preventing sediment and other contaminants from entering waterways, eradicating non-native plant species, and restoring the ecological connectivity of wildlife habitats. Salts, soluble nutrients, and soluble pesticides would be collected with the runoff and would not be released to surface waters. Many of the practices would reduce concentrated off-site flow and associated erosion by metering out runoff following large storm events.

As a result of the practices, plant, fish, and wildlife habitat values on private land would likely increase, previously-unknown occurrences of listed plant and animal species may be identified and protected, and water quality would improve for the watersheds of Santa Cruz County. We expect the practices would also have beneficial effects on listed species by enhancing degraded sites and improving soil and water conditions. In addition, projects would improve ecosystem function (e.g., providing dispersal corridors between species occurrences, improving habitat to support pollinators or seed dispersers for plant species, etc.).

As proposed by the Corps, NRCS, and SCCRCD, the restoration and maintenance of suitable aquatic habitat, breeding habitat, riparian vegetation, and upland habitat would likely benefit the tidewater goby, California red-legged frog, California tiger salamander, and Santa Cruz long-toed salamander by controlling erosion, reducing sedimentation, and minimizing or eliminating the drying of ponds due to agricultural land use. Absent the protective measures and practices proposed by the Corps, NRCS, and SCCRCD, areas that are eroded, infested with non-native invasive species, or provide low-quality breeding habitat within the watersheds of Santa Cruz County would continue to impair the amount of available breeding, foraging, and dispersal habitat for the tidewater goby, California red-legged frog, California tiger salamander, and Santa Cruz long-toed salamander.

Adverse Effects of Program Activities

Direct impacts to listed plant and animal species could occur in the form of disturbance, injury, or mortality. Each of these direct impacts are outlined in the following sections, including those impacts associated with vehicles and foot traffic, movement of construction equipment, construction-related activities, loss or degradation of aquatic habitat, relocation of listed aquatic species from construction areas, inadvertent impacts associated with project employees, surveying or monitoring activities, and removal of exotic vegetation. When listed plant and animal species are identified within a project area, the Corps, NRCS, and SCCRCD propose to define and clearly mark the limits of project activities, relocate certain listed species (e.g., tidewater gobies, California red-legged frogs, California tiger salamanders, and Santa Cruz long-toed salamanders) from within construction areas to safer locations, and implement a variety of protective measures. All of these measures should be effective in reducing or avoiding injury or mortality of listed species during implementation and operation of the practices. If capture and translocation of listed species is necessary, some injury or mortality could occur as a result of these activities.

Vehicles and Foot Traffic

Vehicles associated with installation, repair, and maintenance activities could injure or kill any listed species within the project area by crushing or striking them. Species that use or dig burrows (e.g., Ohlone tiger beetle, California tiger salamander, or Santa Cruz long-toed salamander) could also be injured or killed by increased vehicle use of new or existing roads which contain appropriate substrates that may provide burrowing habitat. Vehicles could drive over burrow sites, crush animals or plants, compact soil, or cause burrows to collapse and entrap animals. Elevated levels of traffic associated with construction activities could increase the likelihood for animals to be struck. Foot traffic from workers associated with construction activities, biological surveys, and restoration activities could also injure or kill listed species of any life stage. The potential for any listed species to be injured or killed during these activities would be greatest when workers are concentrated in those areas.

The likelihood for Ohlone tiger beetles, Zayante band-winged grasshoppers, California tiger salamanders, Santa Cruz long-toed salamanders, and marbled murrelets to be injured or killed is low because relatively few of these species have been observed in the Program area to date and suitable habitat for these species is relatively well-defined. The likelihood of injury or mortality to all listed species addressed in this biological opinion will also be greatly reduced as a result of the worker education, project area demarcation, and sensitive habitat avoidance measures proposed by the Corps, NRCS, and SCCRCD.

Work activities conducted under the Program will be limited to daytime hours. Avoiding nighttime construction and minimizing off-road vehicle travel will minimize the potential for injury or mortality of listed animal species in areas where crepuscular or nocturnal species such as amphibians or Mount Hermon June beetles are actively foraging or dispersing at dusk or during nighttime hours.

Movement of Construction Equipment and Construction-related Activities

When heavy equipment is used in proximity to aquatic habitats, the potential exists that these sensitive areas may be temporarily destroyed or degraded to the detriment of the listed species which utilize this habitat. Construction activities in aquatic and upland habitats, such as movement of construction equipment throughout the work area and ground disturbance (e.g., excavation, grading, scraping, stream channel stabilization, placement of fill, preparing the ground surface for seeding or mulching, etc.) could adversely affect listed plant species, Ohlone tiger beetles, Mount Hermon June beetles, Zayante band-winged grasshoppers, tidewater gobies, California red-legged frogs, California tiger salamanders, or Santa Cruz long-toed salamanders by killing, crushing, or burying individuals.

Project activities conducted in or adjacent to old-growth forests, or in a potential flightpath between these areas and the ocean, could also adversely affect marbled murrelets if noise or disturbance levels substantially disrupt their breeding, feeding, or sheltering activities. The potential for Program activities to adversely affect marbled murrelets will be greatly reduced by

the avoidance and noise reduction measures outlined in the Description of the Proposed Action section of this biological opinion (e.g., avoiding work during the marbled murrelet breeding season, etc.).

Impacts to tidewater gobies, amphibian eggs, or tadpoles would be most severe if project activities were conducted in breeding ponds or pools in streams. Projects in upland habitat that involve installation of a permanent structure (e.g. sediment basin, irrigation regulating reservoir, tank trough) could negatively impact the quality of habitat through a loss of native vegetation. Habitat for any of the listed species addressed in this biological opinion could be affected in this way. Loss of riparian or shoreline habitat could diminish the amount of available burrowing, foraging, or breeding habitat for the tideswater goby, California red-legged frog, California tiger salamander, and Santa Cruz long-toed salamander. However, the net loss of riparian and upland habitats will be minimized by conducting habitat restoration, revegetation, and non-native species control projects that would restore or enhance the amount of suitable habitat for listed species.

Noise, ground-disturbance, and other project related activities could disturb Mount Hermon June beetles, Ohlone tiger beetles, or Zayante band-winged grasshoppers, tidewater gobies, California red-legged frogs, California tiger salamanders, Santa Cruz long-toed salamanders, and marbled murrelets to the extent that behavioral patterns (e.g., breeding, feeding, or sheltering) could be altered (e.g., animals could delay breeding or foraging activity, avoid dispersal routes, abandon refugia, etc.). Quantities of sediment or other contaminants could be washed into surface waters during grading, seedbed preparation, seeding, or mulching activities, thereby causing adverse effects to tidewater gobies, California red-legged frogs, California tiger salamanders, or Santa Cruz long-toed salamander that could occur downstream. However, restoration of project sites and removal of invasive, non-native vegetation, as proposed by the Corps, NRCS, and SCCRCD, would improve habitat and minimize possible long-term effects of project activities on listed species. Many of the practices will improve water quality, decrease sedimentation, and direct livestock away from sensitive habitat; this will improve the quality of those habitats and likely increase the populations of listed animal species in the Program area.

Loss or Degradation of Aquatic Habitat

Construction of earthen embankments (i.e., while enhancing stream banks or pond margins) could remove habitat for the tidewater goby, California red-legged frog, California tiger salamander, or Santa Cruz long-toed salamander. Many stream-side or pond-side projects will ultimately result in a net improvement of habitat conditions through such measures as restoration or erosion control, and will thereby provide a long-term benefit to listed species and their habitats. The direct placement of material, or the incidental runoff of sediments generated by the project, into aquatic habitats could result in the loss of wetlands and other aquatic habitat components through filling or the degradation of water quality. However, these effects would be temporary in nature. California tiger salamanders, for example, typically require shallow pools for breeding; these pools can be lost by the addition of relatively small amounts of material, either by direct filling or by the alteration of the substrate of the pool.

Aquatic species may also be particularly vulnerable to the release of toxic materials (e.g., an accidental spill of fuel or herbicides) because they generally use aquatic habitats with low flows. Under such environmental conditions, any toxins present may be more concentrated and lethal. The potential for Program activities to adversely affect listed species will be greatly reduced by the refuse, debris, and hazardous material conservation measures outlined in the Description of the Proposed Action section of this biological opinion. Careful placement and construction of embankments or other structures that would reduce or eliminate sediment run-off and bank erosion would provide long-term benefits to riparian habitat and any listed aquatic species in the project areas. Streams and creeks would be repaired and protected such that breeding pools for aquatic species would not be filled by additional materials from erosion. Pre-construction surveys and on-site monitoring by a Service-approved individual during construction would further minimize the potential for adverse effects to tidewater gobies, California red-legged frogs, California tiger salamanders, and Santa Cruz long-toed salamanders during these activities.

Effects Associated with Project-related Personnel

Employees of the NRCS or SCCRCD, or other personnel associated with project activities, could travel outside of areas where work occurs. Such activities, particularly with vehicles, could injure or kill listed species and damage their habitat by crushing listed plant species, Ohlone tiger beetles, Mount Hermon June beetles, Zayante band-winged grasshoppers, tidewater gobies, California red-legged frogs, California tiger salamanders, or Santa Cruz long-toed salamanders with vehicles, or by crushing Ohlone tiger beetles, California tiger salamanders, or Santa Cruz long-toed salamanders that are in burrows. Delineating and marking work areas, and minimizing work areas to the smallest area necessary, will likely help reduce the potential for these effects to occur. Careless workers could also release toxic materials, conduct activities outside of designated areas, or leave garbage that would attract predators of listed species.
To reduce the likelihood that such impacts would occur, the Corps, NRCS, and SCCRCD have proposed to educate workers regarding the presence of the listed species, the importance of keeping work sites clear of trash, and remaining within authorized work areas. Such education programs should be effective in minimizing the loss and degradation of habitat, or the loss of listed species.

Relocation of Listed Species from Construction Sites

The Corps, NRCS, and SCCRCD have proposed to remove tidewater gobies, California red-legged frogs, California tiger salamanders, and Santa Cruz long-toed salamanders from project sites where construction activities could injure or kill them or where surface flows would be diverted prior to the onset of ground-disturbing activities. If successfully implemented, such relocation efforts would reduce the number of tidewater gobies, California red-legged frogs, California tiger salamanders, and Santa Cruz long-toed salamanders that could be injured killed (e.g., buried by fill, crushed by equipment, etc.) by construction activities. Because relatively few locations in Santa Cruz County are known to support California tiger salamanders or Santa

Cruz long-toed salamanders, at this time, we expect the necessity of relocating these species to be low.

Biologists working in different areas and with different species could transmit diseases (e.g., chytrid, ranaviral disease, etc.) by introducing contaminated equipment into aquatic habitats. The chances of a disease being introduced into a new area are greater today than in the past due to the increasing occurrences of disease throughout amphibian populations in California and the United States. It is possible that chytrid fungus may exacerbate the effects of other diseases on amphibians or increase the sensitivity of the amphibian to environmental changes (e.g., water pH) that reduce normal immune response capabilities (Bosch et al. 2000). However, the Corps, NRCS, and SCCRCD plan to implement the "Declining Amphibian Populations Task Force Fieldwork Code of Practice" (see Enclosure 4) when working near aquatic habitat. Implementing these procedures during any aquatic survey activity will likely prevent the transfer of diseases through contaminated equipment or clothing.

Surveying or Monitoring Activities

The Corps, NRCS, and SCCRCD propose to conduct reconnaissance-level surveys followed by pre-construction surveys. Reconnaissance-level surveys are preliminary site assessments conducted by trained NRCS/SCCRCD staff to determine if potential habitat for listed plant or animal species is present within the project area. If suitable habitat is identified within the project area during reconnaissance-level surveys, then pre-construction surveys will be conducted by a Service-approved biologist prior to project activities to determine presence or absence of listed species. If listed plant or animal species are found in the project area, the Service-approved biologist will also monitor construction activities to help avoid or reduce effects to any listed species that may be present. Listed plant species and animal species (i.e., California red-legged frogs and tidewater gobies) in various life stages could be affected by trampling while the project sites are being accessed. Impacts to aquatic species would be most severe if projects are implemented in or adjacent to breeding sites. However, qualified NRCS/SCCRCD staff will train all employees conducting reconnaissance-level surveys to ensure that any potential or questionable habitat is adequately evaluated and surveyed. Care will be taken by all NRCS/SCCRCD staff to ensure that listed species or their habitat features (e.g., burrows, refugia, etc.) are not crushed or disturbed during survey efforts.

Removal of Exotic Vegetation

The removal of exotic plants from project areas would benefit all listed species because these invasive plants can reduce the abundance and diversity of native vegetation, and thereby degrade the overall quality of the habitat upon which many species depend. In aquatic habitat, for example, stands of giant reed and tamarisk (*Tamarix ramosissima*) reduce the amount of water available to native streamside or aquatic vegetation and provide poor foraging habitat for listed species such as California red-legged frogs. Non-native plants such as broom and acacia can rapidly degrade the quality of habitat for the Mount Hermon June beetle and Zayante band-winged grasshopper in the Zayante sandhills. Thick infestations of non-native annual grasses

and filaree reduce the amount of bare ground available for foraging and mating by the Ohlone tiger beetle. Non-native plants often take over habitat and out-compete native listed plant species, further reducing available suitable habitat for colonization and inhibiting recovery. Spread of non-native thistles (e.g., *Salsola* sp., *Sonchus* sp., *Centaurea solstitialis*, etc.) or medusa head (*Taeniatherum caput-medusae*) can overtake and fill vernal pools and wetlands, reducing the suitability of these areas for listed amphibians such as the California tiger salamander.

The removal of non-native plant species will provide long-term benefits to listed species by preventing further spread of these species and reducing the level of competition to native plant species. This will improve the condition of breeding, foraging, and dispersal habitat for each of the listed animal species in Santa Cruz County. The increased presence of native vegetation may increase the diversity and abundance of small mammal species and invertebrates, thereby improving prey availability for native species such as California red-legged frogs. Removing invasive plants in project areas where livestock occur will reduce the spread of these non-natives into habitats that could support tidewater gobies or California tiger salamanders. Although the dynamics of native vegetation regrowth, increased shading, and changes in invertebrate fauna and water flows cannot be accurately predicted at this time, we expect the overall habitat quality for all listed species to improve when exotic vegetation is removed.

The actual removal of exotic vegetation (which may involve workers moving through riparian, scrub, woodland, or grassland habitat) would involve cutting stems and treating discrete areas with herbicide. These actions could result in the injury or mortality of most of the listed species addressed in this biological opinion (with the exception of the marbled murrelet). Burial, trampling, or crushing of vegetation from equipment or foot traffic in riparian areas could further degrade existing habitat and injure or kill listed species in the project area. The NRCS and SCCRCD will use an approved glyphosate-based herbicide that is safe to use in or near aquatic habitats to reduce the potential for adverse effects to listed aquatic species. Overall, the removal of non-native vegetation would likely benefit all of the listed species addressed in this biological opinion by improving habitat conditions and allowing native plants to recolonize those areas where listed species may occur. If listed species are not found in the project area, the removal of non-native vegetation may also promote the recolonization of listed species in those areas.

Adverse Effects of Program Activities on Critical Habitat

Program activities may occur within designated critical habitat for the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet. However, projects carried out under the program are beneficial restoration projects that are rather small in size and would most often occur outside of designated critical habitat units for many of the listed species covered under this biological opinion.

If projects are proposed within designated critical habitat areas for the species covered under this biological opinion, Program-related activities could temporarily reduce the overall quality of

small portions of the designated critical habitat due to vegetation clearing, foot traffic, heavy equipment movement, and other associated activities. The project could also indirectly affect the critical habitat through accidental introduction of non-native plants by construction related vehicles or foot traffic, or the accidental release of construction materials, contaminants, or sedimentation. The potential for these adverse effects to occur would be reduced by implementing the protective measures for listed species proposed by the NRCS and SCCRCD. Uninformed workers may intentionally or unintentionally adversely affect critical habitat. The potential for this impact to occur would be reduced by informing workers of the presence and protected status of listed species within the Program area and their critical habitat.

The proposed Program would affect a small amount of, if any, designated critical habitat for Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet and any effect would only be temporary. Program activities are expected to have an overall beneficial effect on designated critical habitat and PCEs within critical habitat for listed species covered in this biological opinion. Because of the relatively small amount of critical habitat in the action area that will be affected by project actions, the temporary nature of the potential adverse effects resulting from the proposed Program activities, and because the NRCS and SCCRCD have proposed measures to protect Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet and their critical habitat, we anticipate that there will be no long-term adverse effects to critical habitat as a result of the proposed Program. Therefore, the function and conservation role of habitat within revised designated critical habitat for the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet will not be substantially affected by the proposed Program activities.

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 and, therefore, are not considered cumulative to the proposed project.

Agricultural land use within the Pajaro Valley region of Santa Cruz County is likely to increase due to the high productivity of soils within the area. Additionally, unauthorized actions of individuals, particularly unauthorized mining and flood control projects, are likely to result in the fragmentation, degradation, and loss of wetland and riparian habitats. Riparian areas in several of the watersheds of Santa Cruz County are also threatened in general by urban runoff, sedimentation effects of timber harvest, surface water diversions, and ground water pumping. However, for several reasons, including lack of access to many reaches of the streams, the degree to which these actions may affect species such as tidewater goby, California red-legged frog,

California tiger salamander, and Santa Cruz long-toed salamander cannot be accurately determined at this time.

We are currently unaware of other non-Federal actions that are reasonably certain to occur in the action area that may adversely affect the Ben Lomond spineflower, Ben Lomond wallflower, Monterey spineflower, robust spineflower, Santa Cruz cypress, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, white-rayed pentachaeta, Mount Hermon June beetle, Ohlone tiger beetle, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet.

CONCLUSION

After reviewing (1) the current status of the Ben Lomond spineflower, Ben Lomond wallflower, Monterey spineflower, robust spineflower, Santa Cruz cypress, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, white-rayed pentachaeta, Mount Hermon June beetle, Ohlone tiger beetle, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet; (2) the environmental baseline for these species in the action area; (3) the effects of the proposed action; and (4) the cumulative effects, it is our biological opinion that the Corps' proposed authorization of the NRCS/SCCRCD Santa Cruz County Partners in Restoration Permit Coordination Program is not likely to jeopardize the continued existence of any of these species or destroy or adversely modify their designated critical habitat.

We have reached this conclusion because:

1. Adverse effects on California tiger salamanders, Santa Cruz long-toed salamanders, and marbled murrelets will be minimal because relatively few of these species have been observed in the Program area to date;

2. A small proportion of the ranges of the tidewater goby, California red-legged frog, California tiger salamander, and marbled murrelet would be affected by the proposed action;

3. If tidewater gobies, California red-legged frogs, California tiger salamanders, or Santa Cruz long-toed salamander are found in the project area, they will be relocated to areas where they are unlikely to be impacted by project activities;

4. If project areas support suitable habitat for any of the listed species addressed in this biological opinion, the NRCS and SCCRCD will avoid these areas during project design to the greatest extent possible;

5. Conservation practices implemented as a result of the Program, such as planting vegetation in critically eroding areas, constructing troughs to remove livestock from

creekbeds, and removing exotic vegetation will provide a substantial long-term benefit to listed species and their habitat; and,

6. The NRCS and SCCRCD have proposed extensive species protective measures as part of the Program. These measures will avoid or reduce adverse effects of the Program on listed species and their habitat.

Critical Habitat

1. The project would potentially result in the temporary loss of critical habitat containing the PCEs of the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet, within the Program area; however, as a result of protective measures included as part of the proposed Program, the stated function of the critical habitat units will be maintained.

2. The proposed Program would affect a small amount of, if any, designated critical habitat for Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet and any effect would only be temporary.
3. Program activities are expected to have an overall beneficial effect on designated critical habitat and PCEs within critical habitat for listed species covered in this biological opinion.

4. The Program would not appreciably reduce the ability of the critical habitat units within Santa Cruz County to support the recovery of the Monterey spineflower, robust spineflower, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, and marbled murrelet.

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 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 intentional or negligent actions that create the likelihood of injury to listed species 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.

The measures described below are non-discretionary and the Corps must implement them and include them as binding conditions of any contracts associated with the proposed action, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps fails, or fails to require its' contractors, to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to its authorization, or contracts, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps 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)].

We expect the level of incidental take of the Mount Hermon June beetle, Ohlone tiger beetle, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet to be very low because: (1) relatively few of these species have been observed in the Program area to date; (2) the habitats where these species occur is distinct and readily identifiable; and (3) because NRCS/SCCRCD's authorization to conduct the Program under the Corps will require cooperators in the Program to implement measures to reduce the extent of incidental take. However, we anticipate that incidental take of the Mount Hermon June beetle, Ohlone tiger beetle, Zayante band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet may occur as a result of the following activities that are evaluated in this biological opinion: capture and relocation, modification of habitat features (e.g., small mammal burrows, California red-legged frog breeding ponds, etc.), soil excavation and grading, preparation of the ground for seeding and mulching, grade and stream channel stabilization, channel excavation, construction of earthen embankments, placement of fill, burial, trampling or crushing from equipment and foot traffic, limited removal of vegetation, use of equipment, or noise generated by workers and project activities.

All listed animal species relocated as a result of the Program are considered taken as a result of their capture. A subset of these captured individuals may be killed or injured as a result of their handling and relocation to other habitats, or if they attempt to return to the project site after they have been relocated. The precise number of individuals of each listed animal species that could be injured or killed as a result of implementation of the Program is unknown because the specific timing, location, duration, and number of actions covered by this biological opinion are unknown at this time. However, we anticipate that any incidental take that occurs will be minimal. Because we are unable to reasonably anticipate the actual number of listed animal species that would be taken by the proposed project, we are including measures within the Terms and Conditions that define the limit at which we believe consultation should be reinitiated.

Section 9 of the Act does not address the incidental take of listed plant species. Consequently, this biological opinion does not include an incidental take statement, reasonable and prudent

measures, or terms and conditions for Ben Lomond spineflower, Ben Lomond wallflower, Monterey spineflower, robust spineflower, Santa Cruz cypress, Santa Cruz tarplant, Scott's Valley polygonum, Scott's Valley spineflower, and white-rayed pentachaeta. However, protection of listed plants is provided in that the Act requires a Federal permit for the removal or reduction to possession of endangered or threatened plants from Federal lands. Furthermore, it is unlawful for any person to remove, cut, dig up, or damage or destroy a listed plant species in knowing violation of any law or regulation of any state or in the course of any violation of a state criminal trespass law [section 9(a)(2)(B) of the Act].

This biological opinion provides an exemption from the prohibition against the taking of listed species, contained in section 9 of the Act, only for the activities described in the Description of the Proposed Action section of this biological opinion and only within the defined action area.

Incidental Take of the Mount Hermon June Beetle

The maximum amount of incidental take of Mount Hermon June beetles in the form of injury or mortality that may occur as a result of Program project activities is as follows: a cumulative total of 20 adults, juveniles, or larvae in any single calendar year; and a cumulative total of 200 adults, juveniles, or larvae over the 10-year life of the Program.

Incidental take of Mount Hermon June beetles will be difficult to detect because of their small body size; additionally, finding a dead or injured specimen is unlikely. Mount Hermon June beetles injured or killed during translocation efforts are likely to be observed. However, mortality from other sources, including the indirect effects of translocation, would be difficult to observe.

Incidental Take of the Ohlone Tiger Beetle and Zayante Band-winged Grasshopper

We do not expect any Ohlone tiger beetles to be injured or killed as a result of Program activities. However, if Ohlone tiger beetles occur in project areas, they may be taken through harassment. This could happen if they are disturbed by project activities and the disturbance reaches a level that significantly disrupts their normal behavioral patterns and is likely to result in injury.

We anticipate that few, if any, Zayante band-winged grasshoppers will be taken through injury or mortality during the implementation of Program activities. The maximum amount of incidental take of Zayante band-winged grasshoppers in the form of injury or mortality that may occur as a result of Program project activities is as follows: a cumulative total of 5 individuals in any single calendar year; and a cumulative total of 50 individuals over the 10-year life of the Program.

Incidental take of these species will be difficult to detect because of their small body sizes, and finding a dead or injured specimen is unlikely.

Incidental Take of the California Red-legged Frog and California Tiger Salamander

The maximum amount of incidental take of California red-legged frogs in the form of injury or mortality that may occur as a result of Program project activities is as follows: a cumulative total of 10 adults or juveniles in any single calendar year; and a cumulative total of 100 adults or juveniles over the 10-year life of the Program. The maximum amount of incidental take of California tiger salamanders in the form of injury or mortality that may occur as a result of Program project activities is as follows: a cumulative total of 5 individuals of each species in any single calendar year; and a cumulative total of 50 individuals of each species over the 10-year life of the Program.

All California red-legged frogs and California tiger salamanders found within the Program areas may be subject to take in the form of capture during relocation efforts. A subset of captured California red-legged frogs may experience a significant disruption of normal behavioral patterns to the point that reaches the level of harassment. California red-legged frogs may be taken only within the boundaries of individual project areas.

Incidental take of California red-legged frogs or California tiger salamanders will be difficult to detect because of their small body size; additionally, finding a dead or injured specimen is unlikely. California red-legged frogs or California tiger salamders injured or killed during translocation efforts are likely to be observed. However, mortality from other sources, including the indirect effects of translocation, would be difficult to observe.

Incidental Take of the Santa Cruz Long-toed Salamander and Marbled Murrelet

We do not expect any marbled murrelets or Santa Cruz long-toed salamanders to be injured or killed as a result of Program activities. However, if individuals of these two species occur in project areas, they may be taken through harassment. This could happen if they are disturbed by project activities and the disturbance reaches a level that significantly disrupts their normal behavioral patterns and is likely to result in injury. All Santa Cruz long-toed salamanders found within the Program areas may be subject to take in the form of capture during relocation efforts. Incidental take of the Santa Cruz long-toed salamander will be difficult to detect because of their small body sizes, and finding a dead or injured specimen is unlikely.

Only forms of take that are incidental to implementation of Program projects are exempted from the prohibitions described in section 9 of the Act. If the amount of incidental take within any geographic or temporal unit of measure described above is reached, the Corps, NRCS, and RCD have committed to cease project activities and the Corps will reinitiate formal consultation with the Service.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Mount Hermon June beetle, Ohlone tiger beetle, Zayante

band-winged grasshopper, tidewater goby, California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, and marbled murrelet during activities conducted under the Santa Cruz County Partners in Restoration Permit Coordination Program:

1. The Corps must ensure that the level of incidental take that occurs during project implementation is commensurate with the analysis contained herein.

2. Individuals must be authorized by the Service before they survey for, capture, and/or tidewater gobies, California red-legged frogs, California tiger salamanders, or Santa Cruz long-toed salamanders from the work areas.

3. The Corps must ensure implementation of additional protective measures designed to further reduce the level of take of federally listed species.

The Service's evaluation of the effects of the proposed action includes consideration of the measures developed by the Corps, NRCS, and SCCRCD and repeated in the Description of the Proposed Action portion of this biological opinion to reduce the adverse effects of Program activities on listed species. Any subsequent changes in the minimization measures proposed by the Corps, NRCS, or the SCCRCD may constitute a modification of the proposed action and may warrant reinitiation of formal consultation, as specified at 50 CFR 402.16. These reasonable and prudent measures are intended to supplement the protective measures that were proposed by the Corps, NRCS, and SCCRCD as part of the proposed action.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measure described in the previous section; the Corps must also comply with the reporting requirements described in the following two sections. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. If any Ohlone tiger beetles, Santa Cruz long-toed salamanders, or marbled murrelets are found dead or injured for any reason during the life of the Program, the Corps must contact our office immediately to reinitiate consultation. Program activities should cease until the reinitiated consultation is completed because the take exemption provided pursuant to section 7(o)(2) would have lapsed once the anticipated take level had been exceeded.

    b. If the following numbers of California red-legged frogs are found dead or injured during 10-year duration of the Program, the Corps must contact our office immediately to reinitiate consultation. Program activities should cease until the reinitiated consultation is completed because the take exemption provided pursuant to section 7(o)(2) would have lapsed once the anticipated take level had been exceeded.

Unit of Measure	Adults or Juveniles	Tadpoles
Cumulative Total Per Year	10	10 percent of those encountered
Cumulative Total over the Life of the Program	100	10 percent of those encountered

In addition, if any California red-legged frog egg masses are found injured or dead during Program activities, the Corps must contact the Service to determine whether formal consultation should be re-initiated.

c. If a total of 5 California tiger salamanders in any single year, or a cumulative total of 50 California tiger salamanders over the life of the Program, are found dead or injured, the Corps must contact our office immediately to reinitiate consultation. Program activities should cease until the reinitiated consultation is completed because the take exemption provided pursuant to section 7(o)(2) would have lapsed once the anticipated take level had been exceeded.

d. If a total of 4 tidewater gobies in any single year, or a cumulative total of 40 tidewater gobies over the life of the Program, are found dead or injured, the Corps must contact our office immediately to reinitiate consultation. Program activities should cease until the reinitiated consultation is completed because the take exemption provided pursuant to section 7(o)(2) would have lapsed once the anticipated take level had been exceeded.

e. If a cumulative total of 20 Mount Hermon June beetles of any life stage are found dead or injured in any single year, or if a total of 200 Mount Hermon June beetles of any life stage are found dead or injured during the life of the Program, the Corps must contact our office immediately to reinitiate consultation. Program activities should cease until the reinitiated consultation is completed because the take exemption provided pursuant to section 7(o)(2) would have lapsed once the anticipated take level had been exceeded.

f. If a cumulative total of 5 Zayante band-winged grasshoppers of any life stage are found dead or injured in any single year, or if a total of 50 Zayante band-winged grasshoppers of any life stage are found dead or injured during the life of the Program, the Corps must contact our office immediately to reinitiate consultation. Program activities should cease until the reinitiated consultation is completed because the take exemption provided pursuant to section 7(o)(2) would have lapsed once the anticipated take level had been exceeded.

2. The following terms and conditions implement reasonable and prudent measure 2: Surveying for, capturing, and handling listed species must be conducted only by Service-approved individuals. The following individuals are hereby authorized to conduct these activities. If the Corps wishes to use additional biologists, it must provide their qualifications to the Service at least 15 days before they are to begin work. Additional biologists must not capture or handle the listed species addressed in this biological opinion without written approval from the Service.

    a. Mark Allaback and David Laabs are authorized to conduct these activities for the San Francisco garter snake, California red-legged frog, California tiger salamander, and Santa Cruz long-toed salamander.

    b. Richard Arnold is authorized to conduct these activities for the Ohlone tiger beetle, Mount Hermon June beetle, and Zayante band-winged grasshopper.

    c. Jim Robbins is authorized to conduct these activities for the California red-legged frog and California tiger salamander.

    d. Gary Kittleson is authorized to conduct these activities for the California red-legged frog and the tidewater goby.

    e. Jodi McGraw is authorized to conduct these activities for the Mount Hermon June beetle and Zayante band-winged grasshopper.

    f. Bryan Mori is authorized to conduct these activities for the California red-legged frog, California tiger salamander, and Santa Cruz long-toed salamander. Mr. Mori is also authorized to conduct surveys for the marbled murrelet according to the inland survey protocol described by Evans Mack et al. (2003).

    g. Nick Lasher and Kelli Camara are authorized to conduct these activities for the California red-legged frog.

3. The following terms and conditions implements reasonable and prudent measure 3:

    a. Prior to the onset of activities that result in disturbance of potential habitat of listed species or individuals, a Service-approved individual will conduct a training session for all project-related personnel. At a minimum, the training will include: a description of the listed species likely to occur within the project area; a description of the species' habitat; the importance of the listed species and its habitat; the general measures that are being implemented to conserve the listed species as they relate to the project; and the boundaries within which the project may be accomplished. Brochures, books, and briefings may be used in the training session.

b. Whenever possible, only erosion control matting or blankets that consist of single-layered plastic mesh with a mesh size of 0.75 inch by 1.5 inches or larger, or matting or rolls of loosely woven jute and/or straw, will be used to prevent entanglement and possible mortality of listed species.

c. If a work site is to be temporarily dewatered by pumping, intakes will be completely screened with wire mesh not larger than 0.2 inch to prevent listed aquatic species from entering the pump system. Water will be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow will be removed in a manner that allows flow to resume with the least disturbance to the substrate.

d. Projects will be designed to avoid ground disturbance in coastal terrace prairie habitat, especially such areas with Watsonville loam soils.

e. If work must be conducted during the flight period of the Mount Hermon June beetle, tarps will be used to cover disturbed, exposed soils each evening to prevent adult male Mount Hermon June beetles from burrowing into these areas and being adversely affected by project activities the following day.

REPORTING REQUIREMENTS

For each year this biological opinion is in effect, the Corps/NRCS/SCCRCD must provide a written annual report to us by March 1. The report must contain information on the following: 1) the type of activities that occurred in the project area (e.g., construction activities, monitoring, etc.), 2) the location of these activities, 3) a description of the habitat in which these activities occurred, 4) the number of listed species affected, 5) steps taken to avoid or minimize effects, 6) the number of individuals of any federally listed species covered by this biological opinion captured and relocated, 7) universal transverse mercator (UTM) coordinates for any federally listed species encountered, 8) the locations from which federally listed species were moved and to which areas they were relocated, and 9) a record of observations of any other listed species observed during Program activities. The first report will be due March 1 following the first program activities conducted pursuant to this biological opinion.

DISPOSITION OF DEAD OR INJURED SPECIMENS

Upon locating any dead or injured marbled murrelets, California red-legged frogs, California tiger salamanders, Santa Cruz long-toed salamanders, tidewater gobies, Ohlone tiger beetles, Mount Hermon June beetles, or Zayante band-winged grasshoppers, initial notification must be made by telephone and writing to the Ventura Fish and Wildlife Office in Ventura, California, (2493 Portola Road, Suite B, Ventura, California 93003, (805) 644-1766) within 3 working days of the finding. The report must include the date, time, location of the carcass, a photograph, cause of death if known, and any other pertinent information.

The Corps, NRCS, and SCCRCD must take care in handling dead specimens to preserve biological material in the best possible state for later analysis. Should any injured listed species survive, the Corps, NRCS, or SCCRCD should contact us regarding their final disposition.

The Corps, NRCS, or SCCRCD must place the remains of marbled murrelets with the California Academy of Sciences Ornithology and Mammalogy Department (Contact: John Dumbacher, Chairman, California Academy of Sciences Ornithology and Mammalogy Department, 875 Howard Street, San Francisco, California, 94103 (415) 321-8369). Arrangements regarding proper disposition of potential museum specimens must be made with the California Academy of Sciences by the Corps, NRCS, or SCCRCD prior to conducting any project-related activities.

The Corps, NRCS, or SCCRCD must place the remains of California red-legged frogs, California tiger salamanders, and Santa Cruz long-toed salamanders with the California Academy of Sciences Herpetology Department (Contact: Jens Vindum, California Academy of Sciences Herpetology Department, 875 Howard Street, San Francisco, California, 94103 (415) 321-8289). Arrangements regarding proper disposition of potential museum specimens must be made with the California Academy of Sciences by the Corps, NRCS, or SCCRCD prior to conducting any project-related activities.

The Corps, NRCS, or SCCRCD must place the remains of tidewater gobies with the Department of Biology (OBEE), University of California at Los Angeles, 621 Young Drive South, Los Angeles, California, 90095-1606 (Attn: David K. Jacobs, Ph.D. (310) 206-7885). The Corps, NRCS, or SCCRCD must make arrangements with Dr. Jacobs regarding proper handling and disposition of potential museum specimens prior to conducting any project-related activities.

The Corps, NRCS, or SCCRCD must place the remains of Ohlone tiger beetles, Mount Hermon June beetles, and Zayante band-winged grasshoppers with the California Academy of Sciences Entomology Department (Contact: David Kavanaugh, California Academy of Sciences Entomology Department, 875 Howard Street, San Francisco, California, 94103 (415) 321-8310). Arrangements regarding proper disposition of potential museum specimens must be made with the California Academy of Sciences by the Corps, NRCS, or SCCRCD prior to conducting any project-related activities.

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. Service-approved biologists should permanently remove, from within the project areas, any individuals of exotic species, such as bullfrogs, crayfish, and centrarchid fishes, to the maximum extent possible. The service-approved biologists will have the

responsibility of ensuring that their activities are in compliance with the California Fish and Game Code.

2. The Corps, NRCS, and/or SCCRCD should monitor the effectiveness of the implementation of plant protection and habitat enhancement measures designed to minimize adverse effects to individuals and to benefit populations of listed plant species.

3. The Corps, NRCS, and/or SCCRCD should monitor and document the spread of invasive plant species and effectiveness of invasive plant control strategies in Santa Cruz County.

4. If a project involves excavation in the watershed of known or potential breeding habitat for the California red-legged frog, California tiger salamander, Santa Cruz long-toed salamander, or tidewater goby, the Corps, NRCS, and/or SCCRCD should evaluate, as an element of post-project monitoring, whether an increase in sedimentation occurs in the breeding habitat.

We request 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 and their habitats.

REINITIATION NOTICE

This concludes formal consultation on the Corps' proposed authorization of an RGP for the NRCS/SCCRCD Santa Cruz County Partners in Restoration Permit Coordination Program. 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. Additionally, as proposed in the Description of the Proposed Action section of this biological opinion, reinitiation of formal consultation should be requested within 10 years following the issuance of this biological opinion.

If you have any questions, please contact Heather Abbey of our staff at (805) 644-1766, extension 290.

Sincerely,

Diane K. Noda
Field Supervisor

Enclosures

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ENCLOSURE 1

COOPERATOR AGREEMENT

TERMS OF ASSISTANCE AND NOTIFICATION REGARDING
THE PROCEDURES FOR CONFORMANCE WITH MULTIPLE PERMITS
between the
UNITED STATES DEPARTMENT OF AGRICULTURE - NATURAL RESOURCES CONSERVATION SERVICE
and the
RESOURCE CONSERVATION DISTRICT OF SANTA CRUZ COUNTY
and the following Cooperator(s):

Property
Owner: _____
Address:_____
_____
Zip:_____
Operator:_____
Address:_____
_____
Zip:_____

Contractor:_____
Address:_____
_____
Zip:_____

Property Location:_____ _____ (the "Property")
(Assessor's Parcel Number, street address, or narrative description: see attached map)

USDA Tract #:_____ Photo No:_____ Quad Sheet:_____

Acres:_____ Major Land Use:_____
(Orchard, Row Crops, Range, Woodland, etc.)

This agreement is freely entered into by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) and the Santa Cruz County Resource Conservation District (SCCRCD) for the Santa Cruz Countywide Partners in Restoration Permit Coordination Program, referred to hereinafter as the "**Program**", and the "**Cooperator(s)**" identified above.

I. THE PROGRAM AGREES TO AUTHORIZE PROJECTS AND FURNISH INFORMATION, TECHNICAL and/or OTHER ASSISTANCE (as may be available) TO:

1. Help solve conservation problems;
2. Assist in the design, installation and monitoring of appropriate conservation practices,
3. Offer the Cooperator the coverage of multiple permits which provide for the design, installation and monitoring of specified conservation practices under the Program as issued by the public agencies including: Department of the Army, Corps of Engineers; United States Fish and Wildlife Service; National Marine Fisheries Service; California Coastal Commission; California Department of Fish and Game; Regional Water Quality Control Board; and County of Santa Cruz (collectively, the "Permitting Agencies").
4. Provide the Cooperator with information and support from qualified Program staff to answer questions regarding the procedures for the design, installation and monitoring of the conservation practices in terms of the specific protective measures to be followed to avoid or minimize the impacts of projects to natural resources and water quality.
5. Authorize participation of projects that are consistent with the parameters of the Program and to remove projects from the Program if the Cooperator or their agents (e.g. contractors, labor) do not carry out work consistent with the procedures for the design, installation and monitoring of the conservation practices covered by the permits as described under Section III.4 on the following page.

II. THE COOPERATOR(S) AGREES:

1. To fully conform with the procedures for the design, installation and monitoring of the conservation practices developed by the Program with the Permitting Agencies under their various permitting authorities. These procedures are documented in the project conditions, conservation plan, design and construction and maintenance specifications (collectively, the "Project") provided to the Cooperator by the NRCS and SCCRCD, which documents shall be dated and initialed by Cooperator, NRCS and SCCRCD prior to commencement of construction and shall be part of this Cooperator Agreement.
2. To allow the NRCS and SCCRCD to include information about the benefits of the project, including photographs, a mid-construction season (Oct. 1) project status report and an annual report provided to the Permitting Agencies.
3. To the best of Cooperator's knowledge, the Project is taking place on the Property.
4. Cooperator has provided the NRCS and SCCRCD with information about all existing easements and other restrictions on their property that could be affected by the proposed Project. If the landowner fails to provide this information to the NRCS and SCCRCD, and a conflict with the terms and conditions of any existing easements/restrictions occurs as a result of Project implementation, Cooperator will be responsible to rectify the situation consistent with the terms and conditions of the easement/restrictions.

III. IT IS AGREED THAT:

1. The Program is not obligated to determine the size and boundary lines of the Property, or any water rights connected to the Property,

2. Cooperator will obtain all necessary permits, if any, beyond the permits issued to NRCS and SCCRCD by the Permitting Agencies, and pay associated costs in order to comply with all laws and ordinances. The Conservation Plan implemented under this Agreement, as part of the Program provides the Cooperator with the authorizations described in the permits checked off below:

☐Master Permit issued by the County of Santa Cruz - complies with the Federal Coastal Zone Management Act, the Santa Cruz County Local Coastal Program (in conjunction with the California Coastal Commission), the California Environmental Quality Act, and the following County ordinances:

County Code Sections:

9.70 – Encroachment Permit Regulations
12.10 – Building Regulations
13.10 – Zoning Ordinance
13.20 – Coastal Zone Regulations
16.10 – Geologic Hazards Ordinance
16.20 – Grading Regulations
16.22 – Erosion Control Ordinance
16.24 – Water Quality Control Ordinance
16.30 – Riparian Corridor and Wetlands Protection Ordinance
16.32 – Sensitive Habitat Protection Ordinance
16.34 – Significant Trees Protection Ordinance
16.40 – Native American Cultural Sites Ordinance
16.44 – Paleontological Resource Protection Ordinance

☐Regional General Permit with the U.S. Army Corps of Engineers, San Francisco, CA - complies with Section 404 and Section 10 of the Clean Water Act.

☐Water Quality Certification issued by the Regional Water Quality Control Board, Region III, San Luis Obispo, CA - complies with Section 401 of the Clean Water Act.

☐Memorandum of Agreement with the California Department of Fish and Game, Yountville, CA - complies with Section 1602 of the Fish and Game Code when associated Streambed Alteration Agreement is issued by DFG.

☐Potential impacts on historic or archeological sites covered by the Programmatic Agreement (PA) between the Advisory Council on Historic Preservation, the National Council of State Historic Preservation Officers and NRCS, Washington, DC - complies with Section 106 of the National Historic Preservation Act.

☐Biological opinions and incidental take statements, issued by the United States Fish and Wildlife Service, Ventura, CA and/or the National Marine Fisheries Service, Santa Rosa, CA - complies with the Federal Endangered Species Act.

3. The Cooperator or their agents (e.g. contractors, labor) will perform work in compliance with the terms and conditions of the permits checked above, any additional permits required to be obtained by Cooperator, and the Project.

4. If the Cooperator or their agents (e.g. contractors, labor) do not carry out work consistent with the procedures for the design, installation and monitoring of the conservation practices covered by the permits with the public agencies indicated in #2 above, the Program shall

notify the Cooperator and work directly with them to resolve the problem. If the Cooperator still fails to conform, the Program shall notify the Cooperator that their activities are inconsistent with the procedures contained in permits and that the Cooperator's actions are no longer covered by the permits. The Program will revoke authorization for the project and will not reimburse contract funds to Cooperators who install conservation practices in a manner inconsistent with NRCS Project Plans and Specifications and the permits and approvals issued for the Program,. The Program shall have no further responsibility to enforce the conditions and shall not be held responsible as the permittee. The Cooperator shall be held directly liable for all violations and will have to individually obtain all necessary permits and/or rights, and to comply with all law and ordinances.

5. Cooperator agrees to indemnify, defend and hold harmless SCCRCD and the Permitting Agencies from and against any and all demands, claims, liabilities, losses, or causes of action (including, without limitation, negligence, active or passive), fines, penalties, and expenses (including all costs and attorney's fees) caused by, or arising out of, or in any way connected with the Project.

6. During the term of this Agreement, NRCS and SCCRCD shall have access over those portions of the Property as reasonably necessary to perform monitoring and any other actions described in the Project to be performed by them.

7. This Agreement shall bind and inure to the benefit of the respective heirs, personal representatives, assigns and successors in interest of Cooperator, who shall notify such parties of the existence of this Agreement and shall also notify NRCS and SCCRCD when the Property is being offered for sale or lease. All notices and other communications under this Agreement shall be in writing, addressed to the parties at the addresses set forth below, and delivered by personal service, or by Federal Express or other overnight delivery service, or by registered or certified mail, postage prepaid, return receipt requested:

Kelli Camara
Resource Conservation District of Santa Cruz County
820 Bay Ave, Suite 128
Capitola, CA 95010

Any such notice shall be deemed delivered as follows: (a) if personally delivered, the date of delivery to the address of the person to receive such notice; (b) if sent by Federal Express or other courier service, the date of delivery to the address of the person to receive such notice; (c) if mailed, three (3) calendar days after depositing same in the mail. Any notice sent by facsimile transmission must be confirmed by personally delivering or mailing a copy of the notice sent by facsimile transmission. Any party may change its address for notice by written notice given to the other at least five (5) calendar days before the effective date of such change in the manner provided in this Section.

8. This Agreement shall become effective on the date of the last signature and shall terminate in accordance with the terms of the Project.

9. This Agreement and any subsequent amendments may be executed in any number of counterparts, each of which shall be deemed to be an original, but all of which together shall constitute one and the same instrument.

10. Cooperator certifies that the following easements and/or restrictions on the property:

_____
_____

Owner(s) initials: _____

COOPERATOR(S):

Property Owner:_____ _____ Date

_____

Operator:_____ Date

_____

Contractor:_____ Date

_____ _____
Santa Cruz County Resource Conservation District Date

_____ _____
United States Department of Agriculture, Natural Resources Conservation Service Date

ENCLOSURE 2

Size and Ground Disturbance (By Volume) Limits for Conservation Practices Included Under the Santa Cruz Countywide Partners in Restoration Permit Coordination Program
(Projects included under the Program will not exceed any of the dimensions shown)

Conservation Practice	**Maximum Length (Feet)**	**Maximum Dimensions (Acres)**	**Maximum Volume (Cubic Yards)[1]**
1. Access Roads (Improvement) (560)	Average[2]: 1,000 over Max[3]: 10,000	Average: 0.8 Max: 4.5	Average: 750 Max: 7,500 (or 1,000 cu. yards in Coastal Zone Scenic Areas)
2. Planting (342, 612, 422, 391)	N/A	Average: 1 Max: 5	Average: 700 Max: 1,000
3. Stream Habitat Improvement and Management (395)	Max: 1 mile with multiple structures at multiple bank locations *Maximum area to be dewatered will not exceed 300 ft over the 1- mile maximum	n Max: 30 ft by 50 ft (across channel) for logjam modification n Max: 20 ft by 60 ft (across channel) for flashboard dam modification or removal n Max: 20 ft by 100 ft (across channel) for imensions for hardened crossing (ie. fords) removal	N/A
4. Stream Crossing (578)	Maximum area to be dewatered will not exceed 300 ft	n Max: 20 ft by 100 ft (across channel) for imensions for hardened crossing (ie. fords) replacement Max: 100 ft (across stream) with 20 ft wide deck[4]	N/A
5. Grade Stabilization Structure (410)	Average: 3 to 4 structures per 500	Average: 0.5 Max: 1.5	Max: 30 per structure; 300 total

[1] Volume of soil disturbed, based on practice installation and representing the volume of soil excavated and used as fill or removed from site, or soil imported as fill.
[2] Work performed over an average of 2 miles.
[3] Work performed over a maximum of 12 miles.
[4] The County of Santa Cruz prefers a 20 ft deck width for emergency vehicles but it's more likely that most bridges installed under the permit coordination program would not exceed 16 ft in width).

Conservation Practice	Maximum Length (Feet)	Maximum Dimensions (Acres)	Maximum Volume (Cubic Yards)[1]
(In non-fish bearing streams, primarily for gully repair)	feet Max: 10 structures per 1,000 feet		
6. Grassed Waterway (412)[5]	Average: 1,000 Max: 2,000	Average: 0.5 Max: 2	Average: 1,000 Max: 4,500 (or 1,000 cu. yards in Coastal Zone Scenic Areas)
7.Obstruction Removal (500)[6]	Max: 50	Max: 0.2	N/A
8. Restoration and Management of Rare and Declining Habitats (643)	Average: 500 Max: 1 mile	Average: .1 Max: 5	Average: 50 Max: 1,000
9. Sediment Basins (350) [with or without water control (638)][7]	N/A	Average: 0.1 Max: 1	Average: 400 Max: 4,000 (compacted embankment) (or 1,000 cu. yards in Coastal Zone Scenic Areas)
10. Stream bank Protection (580)	Vegetation Average: 200 Vegetation Max: 2,000 Rock Max: 300 contiguous rock protection and 500 of non-contiguous protection over	Average Vegetation: .1 Max Vegetation: 2.5 Rock protection: 0.1 acre	Average Vegetation: 500 Max Vegetation: 4,000 (or 1,000 cu. yards in Coastal Zone Scenic Areas)[8] Average Rock: 200 Max Rock: 800[9]

[5] Maximum flow rate is 150 cfs.

[6] Actual objects rarely exceed 10 ft x 15 ft. Access to an object may involve disturbance of up to 50 ft in length. It is difficult to estimate the total number of separate objects to be removed from a stream. Maximum disturbance per project is limited to 0.2 acre.

[7] Impoundment Volume: Average: 0.5 acre-foot; Max: 2 acre-feet. Impoundment Structure: Average: 6 ft embankment measured from the lowest point in the basin to the spillway at a 2:1 maximum slope; Max: 6 ft – 10 ft embankment measured from the lowest point in the basin to the spillway at a 2:1 maximum slope.

[8] For vegetation treatments, soil disturbance is assumed to be a maximum of 700 ft of 2,000 ft maximum reach. The average depth of soil grading (cut or fill) is 3 ft.

[9] Numbers provided for rock armoring refer to actual areas and volume of rock placed only. Total soil disturbance limits are same as for vegetative treatments since remainder of work area will be vegetated. Rock placed would be used at the toe of the bank in conjunction with bioengineering techniques. The maximum allowable rock allowed under the Program has been increased (Compared to allowable rock under the previous 5-year program) to account for a restoration focus of increasing stream complexity (i.e., j-hooks, root wads, rock weirs). RSP for bank protection is limited to approximately 300 cyd.

Conservation Practice	Maximum Length (Feet)	Maximum Dimensions (Acres)	Maximum Volume (Cubic Yards)[1]
	2,000 ft		
11. Stream Channel Stabilization (584)[10]	Average: 200 Max: 2,000	Average: .1 Max: 4.5[11]	Average: 200 Max: 7,500 (or 1,000 cu. yards in Coastal Zone Scenic Areas
12. Structure for Water Control (587)[12]	N/A	N/A	N/A
13. Underground Outlets (620)	Max: 50 (in riparian)	Max: 1,000 sq ft (in riparian)	Max: 10[13]
14. Wetland Management (657, 659, 356, 587, 644)	N/A	Max: 5	Max:1500
15. Upland Wildlife Habitat Management (645, 382, 614, 516)	Average: 50 Max: 200 (riparian)	Max: 4,000 sq ft (riparian)	Average: 15 Max: 50 (riparian)

Universal Restrictions on Projects Carried out Under the Permit Coordination Program:

1. The County and CACC approvals do not apply to projects conducted within CACC's retained coastal permitting jurisdiction (e.g., all State tidelands, including any lands lying below the mean high tide line, submerged lands, filled areas that previously were below the mean high tide line, coastal lagoons/estuaries, public trust lands, etc.). Any qualifying environmental enhancement projects in these areas, while encouraged, shall require separate CACC approval.

2. Per conditions developed in coordination with the Corps, total permanent (fill) impacts to waterways and wetlands may not exceed more than 0.5 acre and may not result in (permanent) fill of more than 0.25 acre of wetland.

3. Per Regional Board requirements, soil disturbance of one acre or greater may require a Regional Board stormwater permit. Contact the Regional Board on a case by case basis.

[10] Maximum flow rate is 400 cfs.
[11] The practice includes removal of accumulated sediment from up to 100 ft (across channel), if the channel has been widened due to scour associated with a dam, log jam or other barrier.
[12] Maximum flow rate is 80 cfs.
[13] Area of practice within riparian area includes a 50 ft length and a 20 ft wide work area for equipment. Volume of soil is based on a 2 ft wide trench over 50 ft with pipe buried to an average depth of 2 ft

ENCLOSURE 3

Plant species that shall not be Spread or Introduced as Part of the Santa Cruz Countywide Permit Coordination Program

Scientific Name	**Common Name**
Acacia baileyana	
Acacia melonoxylon	Blackwood acacia
Acacia longifolia	
Acacia dealbata	Silver wattle
Ageratina adenophora	Sticky Eupatorium
Ageratina adenophora	Mexican Eupatorium
Ailanthus altissima	Tree-of-heaven
Ammophila arenaria	European Beachgrass
Arundo donax	Giant Reed
Asparagus asparagoides	
Bromus rigidus	Rip gut grass
Calystegia sepium	Hedge Bindweed
Carduus pycnocephalus	Italian Thistle
Carpobrotus edulis	Iceplant
Centaurea solstitialis	Yellow Star Thistle
Cirsium vulgare	Bull Thistle
Conium maculatum	Poison Hemlock
Cortaderia jubata	Jubata Grass
Cortaderia selloana	Pampas grass
Cytisus scoparius	Scotch Broom
Cytisus striatus	Portuguese (Striatus) Broom
C. franchetti, C. pannosa, C. lacteal	Cotoneaster
Delaireia odorata	Cape Ivy
Ehrharta erecta	Veldt grass
Eucalyptus globulus	Eucalyptus
Erechtites glomerata	Australian fireweed
Erechtites mimima	Australian fireweed
Festuca arundinacea	tall fescue
Genista monspessulana	French broom
Hedera sp.	Algerian Ivy
Hedera helix	English Ivy
Holcus lanatus	velvet grass
Hordeum geniculatum	Mediterranean barley
Hordeum leporinum	Famer’s foxtail
Leptospermum sp.	Australian tea tree
Lolium multiflorum	Italian rye grass
Lolium perenne	perennial rye grass
Marrubium vulagare	Horehound
Medicago hispida	bur clover
Melilotus albus	white sweet clover

Mesembryanthemum edule	hottentot fig
Myosatis latifolia	Forget-me-not
Oxalis per-caprae	Bermuda buttercup
Pennisetum clandestinum	kikuyu grass
Phalaris spp.	Harding grass
Robinia psuedoacacia	Black Locust
Rubus procerus	Himalaya Berry
Salsola kali tenuifolia	Russian thistle
Senecio mikanoides	German ivy
Senecio vulgaris	common groudsel
Silybum marianum	milk thistle
Sonchus oleraceus	common sow thistle
Spartium junceum	Spanish Broom
Tamarix ramosissima	salt cedar, tamarisk
Tradescantia sp.	Wandering Jew
Tropaeolum majus	Garden Nasturtium
Ulex europaea	Gorse
Vinca major	Periwinkle
Xanthium spinosum	spiney clotbur

ENCLOSURE 4

Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander
October 2003

The Service and CDFG have received numerous requests for guidance in planning for the protection of the California tiger salamander (CTS) at the sites of proposed and existing land use activities. This document provides interim guidance for two procedures to accurately assess the likelihood of CTS presence in the vicinity of a project site, including: (1) an assessment of CTS locality records and potential CTS habitat in and around the project area; and (2) focused field surveys of breeding pools and their associated uplands to determine whether CTS are likely to be present.

Because CTS use aquatic and upland habitats during their life cycle, they may be present in either or both habitats on a given property. For sites with suitable breeding habitat, two consecutive seasons of negative larval surveys and a negative upland drift fence study in the intervening fall/winter are recommended to support a negative finding. For sites with no suitable aquatic breeding habitat, but where suitable upland habitat exists, two consecutive seasons of negative upland drift fence studies are recommended to support a negative finding.

If the following Guidance is followed completely, the results of these site assessments and field surveys will be considered valid by the Service and CDFG.
Results of the site assessments and field surveys should be reported to the appropriate Service's Field Office, if appropriate the Service's Regional Office in Portland, Oregon pursuant to the terms and conditions of the permittee's section 10(a)(1)(A) recovery permit, and to the CDFG and other agencies or offices as required. Details regarding the recommended content and/or format of reports are provided throughout the remainder of this document.

Surveyors must obtain permission of the landowner before implementing any surveys or research on the CTS. **In locations where the CTS is federally listed surveyors should obtain a Recovery Permit for this species pursuant to section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended, prior to implementing the guidance.** For surveys that may ultimately be used in support of a negative finding, it is recommended that surveyors consult with Service biologists on their study design before beginning work. If surveyors are working in areas with other federally listed species that are likely to be captured incidentally during CTS surveys, surveyors should also possess a valid 10(a)(1)(A) permit for these species (e.g., California red-legged frog, vernal pool tadpole shrimp, *etc*.). **For all locations, the surveyor should hold an active Scientific Collecting Permit from the CDFG that specifically names CTS surveys as an authorized activity. Authorization Number 9, without explicit permission for handling CTS, is not adequate for CTS surveys.**

Site Assessment for the California tiger salamander

Available information about CTS and their habitats in the vicinity of the project should be used to determine the likelihood that CTS may occur there and if field surveys are appropriate. The project proponent should compile and submit to the Service and the CDFG the following information:

Element 1. Is the project site within the range of the CTS?

The surveyor should review the attached maps or referenced weblink to determine if the project site is within the range of the CTS. For Sonoma County, refer to the attached county map. For Santa Barbara County, refer to http://ventura.fws.gov/Images/CTS_Range.jpg. For Monterey, San Benito, and San Luis Obispo counties, contact the Ventura Fish and Wildlife Office at the address provided below. For all other areas, refer to the attached map of California.

Element 2. What are the known localities of CTS within the project site and within 3.1 miles (5.0 kilometers) (km) of the project boundaries? This is to place the project site in a regional perspective.

The surveyor should consult the California Natural Diversity Data Base (CNDDB) maintained by the CDFG to determine known localities of the CTS. The Sacramento or Ventura Fish and Wildlife Offices should be contacted for localities within their respective jurisdictions. Other information sources on local occurrences of CTS should be consulted. These sources may include, but are not limited to, biological consultants, local residents, amateur herpetologists, resources managers and biologists from municipal, state, and Federal agencies, environmental groups, and herpetologists at museums and universities. The surveyor should note in their report all known CTS localities within the project site and within 3.1 miles of the project boundaries; if there are no localities within 3.1 miles, the nearest locality should be noted.

Element 3. What are the habitats within the project site and within 1.24 miles (2 km) of the project boundaries? This distance is based on the observed mobility of the species.

Describe the upland and aquatic habitats within the project site and within 1.24 miles of the project boundaries. Characteristics of the site that should be recorded include acreage, elevation, topography, plant communities, presence and types of water bodies, fossorial mammal species and their burrows, current land use, a description of adjacent lands, and an assessment of potential barriers to CTS movement. Use of aerial photographs is necessary to characterize potential breeding habitats that are not part of the project site under consideration. The aquatic habitats should be mapped and characterized (*e.g.*, natural vernal pools, stockponds, drainage ditches, creeks, types of vegetation, surface area, depth, approximate drying date). Suitable upland habitat, including locations of underground refugia, for CTS should be mapped as well, with a focus on areas where small mammal burrows are located or are most dense.

Reporting and interpretation of the site assessment
Site assessments should include, but are not limited to, the following information:
(1) photographs of the project site(s); (2) survey dates and times; names of evaluator(s); (3) a description of the site assessment methods used; (4) a list of CTS localities, as requested above; and (5) a map of the site(s) showing habitat as requested above. Maps should be of similar nature to a U.S. Geological Survey (USGS) 7.5-minute (1:24,000) topographic maps -or- Geographic Information System (GIS) data depicting the site(s) and the area within 5 kilometers (3.2 miles) of its boundaries. The report should be provided to the appropriate Service field office and CDFG regional office prior to initiating field surveys.

After completing items 1-3 of the site assessment (as above), send a report to the appropriate Service field office and CDFG regional office. Based on the information provided from the site assessment, the Service and CDFG will provide recommendations as to the appropriateness of field surveys. **Surveys should not be initiated until recommended by the Service and CDFG.**

Interim Presence/Negative Finding Survey Guidance for the California Tiger Salamander

Biological field surveys should be conducted for all sites with potential CTS habitat. Due to its unique life history, the CTS can be difficult to detect depending on weather and time of year. Aquatic sampling for larvae during spring months can be the most effective way to determine if CTS are present in a given area. However, especially if environmental conditions are unfavorable, CTS may not breed successfully in a given year. After metamorphosis CTS spend most of each year on land, emerging from refugia only occasionally, usually on rainy nights. CTS have been observed on land 1.24 miles from any potential breeding pool.

At sites that contain both upland habitat and potential breeding habitat (*i.e.*, pools that contain standing water continuously for at least 10 weeks, extending into April), aquatic sampling during two breeding seasons and a drift fence study in the intervening winter should be conducted to support a negative finding. At sites that contain appropriate upland habitat only, but where there is a known or potential breeding site accessible within 1.24 miles, a two-year drift fence study should be conducted.

In years with little rainfall, upland emergence may be reduced and CTS may not breed. Field surveys conducted in years with at least 70% of average rainfall between September 1 and April 1, at the nearest National Oceanic and Atmospheric Administration climate station are most reliable. Data from survey seasons not meeting this criterion will also be considered; surveyors should provide strong justification that their data are reliable including but not limited to local climate (*e.g.*, daily rainfall totals, pond filling date, pond drying date) and biological survey data (*e.g.*, other species captured during each sampling interval).

Aquatic larval sampling

1. Aquatic larval surveys of potential breeding pools should be repeated three times each season. Surveys should be conducted once each in March, April, and May, with at least

10 days between surveys. **If pools are likely to dry prior to the completion of three surveys, the sampling schedule should be shifted accordingly.**

2. Captured CTS should remain in nets for the minimum amount of time necessary, but no longer than 5 minutes. During this time, larvae should not be kept out of water for more than 30 seconds. Photographs should document a representative sample of captured CTS.

3. Disruption to the pond's bottom should be minimized. Shallow areas where young larvae may occur should be traversed in the most direct and least disturbing manner possible.

4. Sampling should cease once presence has been determined to minimize disturbance of pool flora and fauna. If CTS are detected at a pond, subsequent visits to that pond are not necessary.

5. Ponds should be initially sampled using D-shaped or similar, long-handled dipnets with 1/8th inch (3.2mm) or finer mesh. If CTS larvae are not captured in the first 50 dipnet sweeps, covering representative portions of the pond, seines should be used.

6. <u>If dipnetting has been unsuccessful</u>, seines should be used to sample 100% of the surface area of ponds smaller than 1 acre and at least 30% of the surface area of larger pools, including a representative sample from different water depths and vegetated and non-vegetated areas. One eighth inch (3.2 mm) or finer mesh minnow seines with weights along the bottom and floats along the top edge should be used, with dowling or PVC pipe attached to the end of the seine so the bottom edge can be dragged along the bottom of the pool. Whenever possible, the seine should be pulled from one edge of the pond to the other.

7. Use of minnow traps will be considered on a case-by-case basis. Minnow trapping for CTS larvae should only be conducted in habitats that are too deep to adequately survey with dipnets and seines, or in which dense vegetation impedes normal dipnetting/seining activities. **In these cases the surveyor should submit to the Service a written minnow trap sampling design based on the requirements detailed below.** No minnow trapping should be conducted in ponds known to support state or federally threatened or endangered animals (*e.g.,* California red-legged frogs (*Rana aurora draytonii*)). In areas where California red-legged frogs may occur, minnow trapping should be preceded by negative surveys following the Service guidelines for this species. To conduct minnow trap sampling in pools known to contain California red-legged frogs, surveyors must possess a valid Recovery Permit for this species pursuant to section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended.

   Minnow trapping should be conducted in the following manner:

   a. Minnow traps should be monitored for three three-day intervals between March 1 and May 15 (for a total of nine days of trapping per site). Trapping intervals

should be separated by at least ten days. Minnow trap surveys should immediately cease if CTS presence is determined.

b. Minnow trapping should be avoided during warm periods when air temperatures reach 80 degrees Fahrenheit or when water temperatures reach 70 degrees Fahrenheit or warmer, to prevent the possibility of mortality due to reduced oxygen availability.

c. Minnow traps should be deployed overnight and checked frequently enough to ensure that larvae are not killed or injured. Traps should be checked at least once per day.

d. A minimum of four traps should be placed in each pond. For larger ponds, traps should be distributed along the shoreline with no more than 75 ft (23 m) between traps. Each trap should be clearly marked with the name, telephone number, and State and Federal permit number of the surveyor. Traps should be anchored to stakes set near the shoreline. Steel braided fishing line or heavy cord works well for this purpose; galvanized wire and stainless steel wire should not be used because these wires may kink and break. If livestock are present, we recommend that the surveyor devise a method to anchor the trap in a manner to prevent entanglement of livestock. Brightly colored flagging should be affixed to each anchor point. For extra security, a float attached to each trap can aid in detection. If a minnow trap is lost, every effort should be made to recover it to avoid the possibility of leaving behind a trap that can kill a variety of species over time.

e. Traps should be deployed to the deepest parts of ponds and in shoreline areas with aquatic vegetation growth.

9. Data regarding the type and quality of each pool sampled should be recorded. At a minimum, these data should include the date and time, location, type of water body (*e.g.*, vernal pool, seasonal wetland, artificial impoundment, etc.), dimension and depth of pond, water temperature, turbidity, presence of aquatic vegetation (submergent and emergent), and dominant invertebrates and all vertebrates observed. Photographs of pools and adjacent upland areas are helpful and copies should be included in the final report.

10. Surveyors should follow guidance below for disinfecting equipment and clothing after surveying a pond and before entering a new pond, unless the two ponds are hydrologically connected to one another. These recommendations are adapted from the Declining Amphibian Population Task Force's Code which can be found in their entirety at: http://www.mpm.edu/collect/vertzo/herp/daptf/fcode.html.

a. All dirt and debris, including mud, snails, plant material (including fruits and seeds), and algae, should be removed from nets, traps, boots, vehicle tires and all other surfaces that have come into contact with water. Cleaned items should be rinsed with clean water before leaving each study site.

b. Boots, nets, traps, *etc*., should then be scrubbed with either a 70 % ethanol solution, a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water), QUAT 128 (quaternary ammonium, use 1:60 dilution), or a 6% sodium hypochlorite 3 solution and rinsed clean with water between study sites. Cleaning equipment in the immediate vicinity of a pond or wetland should be avoided. Care should be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

c. When working at sites with known or suspected disease problems, disposable gloves should be worn and changed between handling each animal.

d. 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.

Upland Habitat Survey Methods

A drift fence study conducted during fall and winter is the primary method used to study CTS in upland habitats. To support a negative finding, an upland drift fence study should be included. Although less intrusive methods (see below) may also be used to determine presence of the CTS, these methods are less reliable and thus cannot be used to support a negative finding.

Because CTS have been observed to make breeding migrations of at least 0.6 miles (1 km), the project proponent or the Service may assume presence of CTS if a known breeding pond lies within 1 km and no significant barriers exist. Examples of significant physical barriers include high-density residential or urban development and Interstate Highways, while features such as golf courses, disked fields, and most paved roads are not considered barriers.

For sites with at least one accessible potential breeding pool, we recommend that a one-year drift fence study be conducted during the winter between two consecutive seasons of aquatic larval surveys (if presence of CTS was not established during the first season of aquatic sampling). We recommend that a two year drift fence study be conducted if: 1) a site has suitable upland habitat and a potential breeding pool lies within 1.2 miles (2 km); 2) on-site ponds cannot be adequately sampled using aquatic methods (*e.g*., deep impoundments with known presence of California red-legged frogs); or 3) if non-native predators or poor water quality may preclude detection of CTS during larval sampling (*i.e*., due to mortality of the larvae).

1. We recommend that a proposal to conduct a drift fence study be submitted in writing to the Service and the CDFG. The results of studies not approved by the Service and CDFG may not be accepted in support of a negative finding. The proposal should include an aerial photograph of the study site indicating all potential on- and off-site breeding locations identified in the site assessment and an overlay with the proposed drift fence study design clearly delineated. We recommend that drift fence study designs incorporate the following:

a. **For sites with at least one suitable breeding pond** (*i.e.*, ponds that contain standing water for at least 10 continuous weeks in most years), the ponds should be surrounded by drift fences installed 10 - 50 ft from the high water line. Sections of drift fence should be spaced regularly around the pond, focusing on areas where salamanders are most likely to be captured. We recommend that each section of fence be at least 30 ft (9.2 m) long, and that the total distance between fence sections be no greater than the total length of installed fence (i.e., >50% of the circumference fenced). There should be no more than 33 ft (10 m) between pitfall traps, and drift fences should be constructed such that during periods when traps are closed, openings at least every 66 ft (20 m) allow animal passage.

b. **For all sites**, we also recommend upland drift fences. Unless a strong rationale can be presented, drift fence equaling at least 90% of the site perimeter should be installed. The exact placement of fences should be selected to maximize the probability of capturing CTS (*e.g.*, in grassland areas with high densities of mammal burrows; along site boundaries closest to identified potential breeding pools; with pitfalls situated away from areas where flooding is likely). Pitfalls should be spaced less than 33 ft apart. To the extent possible drift fences and pitfalls should be placed to minimize the number of flooded buckets. Each section of fence should be a minimum of 30 ft (9.2 m) long, unless topography, property lines, or other circumstances dictate. Upland drift fences should be constructed such that during periods when traps are closed, openings at least every 66 ft (20 m) allow animal passage.

2. Arrays should be approved and constructed by 15 October. Beginning on or before October 15, pitfall buckets should be opened before sunset if there was any rain during the day or if at 2 PM rain is forecast for the remainder of the day or subsequent night with 70% or greater probability (based on the nearest National Weather Service forecast - available at http://www.wrh.noaa.gov/Sacramento/). Traps should be open each night and checked each morning until no rain has fallen within the preceding 24 hours. Nights of high relative humidity (greater than 75% relative humidity) should be considered equivalent to rain events once onsite or nearby seasonal wetlands have become inundated with standing water, regardless of its depth, surface area, or duration. The above guidance should be followed until 20 nights of surveying under the proper conditions has been conducted. After 20 nights of surveying is completed, and until March 15, pitfall buckets should be opened before sunset if there was any rain during the day, or if at 2 PM rain is forecast for the remainder of the day or subsequent night with 70% or greater probability. Traps will be checked the next morning, and unless it is still raining or more rain is forecast, the traps can be closed until the next rain event.

3. Drift fences should be constructed from a material that is durable, weather resistant, and **appropriate for the area in which it will be installed; proposals should describe the materials to be used**. Examples include aluminum flashing, silt fencing, untreated wood particle board, shade cloth, window screen, Vexar plastic mesh, *etc*. Hardware cloth may be useful for short segments of fence that experience heavy overland water flow. Drift

fences should be buried at least 3 inches (8 cm) underground and extend at least 1 ft (31 cm) above the ground. All drift fences require regular inspections and maintenance, especially after each significant storm event. If drift fences are installed incorrectly and/or have insufficient maintenance this may call into question the reliability of the data. Unless special authorization is received from the Service and CDFG to maintain drift fences through non-sampling months, drift fencing should be disassembled by April 1.

4. Pitfall traps should not be placed in a manner that will disturb or destroy rodent burrows or other refugia that could be used by CTS.

5. Excessive pitfall flooding may invalidate a study. To avoid flooding traps should be placed preferentially in slightly elevated locations where flooding is less likely. Pitfalls in locations likely to flood should be free of holes. If ground saturation forces a pitfall out of the soil it can be weighted down with cement, gravel or other suitable materials.

6. All pitfall traps should have a rigid lid that closes securely. When not in use, traps should be closed in a manner that precludes entry by CTS and other animals.

7. Pitfall traps should be cylindrical, non-galvanized, metal or plastic containers. They should be at least 2-gallons in size and 8 in (20 cm) deep.

8. Each pitfall trap should contain noncellulose sponges or other nontoxic absorbent material which should be kept moist at all times.

9. Each pitfall trap should have a rigid cover with legs one to two inches high to provide shade and shed water during extreme rain events.

10. When in use, pitfall traps should be checked as often as necessary, but at a minimum one time a day, with one of these checks occurring between one hour before sunrise and noon. Whenever possible, traps should be opened just before dark and checked and closed the following morning.

11. When not in use, the drift fence and pitfall traps should be inspected weekly to ensure the system has not been disturbed by vandals, wildlife, fallen trees, wind, *etc.* Repairs to fences should be completed prior to the next night of sampling.

12. Pitfall traps should be placed as far as possible from ant nests. If an ant nest develops within 10 feet of an existing pitfall trap, the pitfall trap should be moved, removed from the field, or closed.

13. Captured CTS should be released as near as possible to the point of capture, in a manner that maximizes their survival. CTS should be released into the mouth of a small mammal burrow or other suitable refugia. CTS should be watched after release to be sure that they are in a safe location and are not susceptible to increased predation risk.

14. Once a CTS is captured, all traps and drift fences should be emptied and removed within 24 hours, and holes in the ground which contain traps should be filled in.

15. In addition, to minimize mortality of small mammals that may become trapped during surveys, each pitfall trap should also incorporate either jute twine, as described in Karraker (2001; http://www.fs.fed.us/psw/rsl/projects/wild/karraker/karraker4.pdf), a rodent safe-house as described in Padgett-Flohr and Jennings (2001), or other material as approved by the Service and CDFG.

16. Each pitfall trap should be marked with the name, telephone number, and CDFG permit number.

Other methods

Other methods, such as visual egg surveys, night driving, nocturnal surveys, fiber optic scoping and cover-boards, may be used to determine presence of the CTS, but these techniques may not be accepted in support of a negative finding. Deviations from this guidance may be approved on a case-by-case basis if a strong rationale can be presented.

Reporting

If one or more CTS are captured or detected a representative sample of the embryo(s), larva(e), or transformed salamander(s) should be photographed. The Service and the CDFG should be contacted by telephone within 3 working days if CTS are captured. If any mortality of California tiger salamander occurs, specimens should be collected, preserved by freezing, and the Service and the CDFG contacted by telephone within 1 work day.

For each survey location, a final report detailing the survey results should be submitted to the Service and the CDFG within one month of the last site visit. The written report should include, but is not be limited to, the following information: names of surveyors and copies of permits and authorizations, a description and map at the appropriate resolution of the type and quality of upland and aquatic habitats and land uses at the site; a map indicating the location of water bodies sampled for larvae; a map indicating the location of drift fences and pitfalls. The survey report also should include survey methods used, the dates and times of surveys, rainfall totals by date, nightly minimum temperatures, number and length of dipnet sweeps made, number of passes with seine, total estimated area seined, records of upland and aquatic animals captured, and pond water temperature, turbidity, and maximum depth at each aquatic sampling. If CTS are detected on the site, the report should include a map indicating the precise location of all CTS observations and captures, the number of CTS egg masses, larvae, sub-adults and adults observed, and photographic verification of CTS from the site. Site photographs may also be helpful in interpreting survey results. For the CDFG, survey reports should also include CNDDB field locality forms. Locality information should be in the form of UTM or latitude/longitude (degree, minute, second) coordinates.

In the case of a negative finding including a season with <70% of average rainfall, additional information (*e.g.*, pond filling/drying dates, quantity and timing of rainfall during each sampling interval, temperatures) supplied by the surveyor, may assist the Service and the CDFG in their decision whether or not to accept the data.

Contact Information:

U.S. Fish and Wildlife Service

For an application or guidance on how to obtain a Federal permit or for reporting, please contact:

For areas within the Great Valley hydrobasin:

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
Attn: Permit Coordinator
2800 Cottage Way, W-2605
Sacramento, California 95825
(916) 414-6547

For hydrobasins south of and including Santa Cruz County:

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Attn: Permit Coordinator
2493 Portola Road, Suite B
Ventura, California 93003
(805) 644-1766

http://endangered.fws.gov/permits/

Please refer to http://ventura.fws.gov/VFWO_area.htm for a map showing U.S. Fish and Wildlife Office jurisdictions.

California Department of Fish and Game

For CDFG reporting or questions regarding land use activity guidance, a map of regional offices and telephone numbers is available at http://www.dfg.ca.gov/regions/regions.html

For State of California Scientific Collecting permit applications and information, please contact:

California Department of Fish and Game
License and Revenue Branch
3211 S Street
Sacramento, California 95816
(916) 227-2271

For additional State permit information, please refer to:

http://www.dfg.ca.gov/licensing/pdffiles/fg1547.pdf (How to Obtain a Scientific Collecting Permit)

http://www.dfg.ca.gov/hcpb/ceqacesa/rsrchpermit/mou/whenneedmou.shtml (When is the MOU Required?)

http://www.dfg.ca.gov/licensing/pdffiles/fg1476.pdf (Scientific Collecting Regulations)

http://www.dfg.ca.gov/licensing/pdffiles/fg1379e.pdf (Scientific Collecting Permit Attachment)

ENCLOSURE 5

The Declining Amphibian Populations Task Force Fieldwork Code of Practice

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 work site.

2. Boots, nets, traps, and other types of equipment used in the aquatic environment should then be scrubbed with 70 percent ethanol solution and rinsed clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond. wetland, or riparian area.

3. In remote locations, clean all equipment with 70 percent ethanol or a bleach solution, and rinse with sterile water upon return to the lab or "base camp" Elsewhere, when washing machine facilities are available, remove nets from poles and wash in a protective mesh laundry bag with bleach on the “delicates” cycle.

4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolated 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 them as directed above and store separately at the end of each field day.

5. When amphibians are collected, ensure that animals from different sites are kept separately and take great care to avoid indirect contact (e.g., via handling, reuse of containers) between them or with other captive animals. Isolation from unsterilized plants or soils which have been taken from other sites is also essential. Always use disinfected and 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 and fluids 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.

The Fieldwork Code of Practice has been produced by the Declining Amphibian Populations Task Force with valuable assistance from Begona Arano, Andrew Cunningham, Tom Langton, Jamie Reaser, and Stan Sessions.

For further information on this Code, or on the Declining Amphibian Populations Task Force, contact John Wilkinson, Biology Department, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.
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