Appendix J USFWS Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
81420-2008-F-1791-2

MAY 27 2010

Mr. James Richards
California Department of Transportation
Environmental Planning and Engineering
111 Grand Avenue
Oakland, California 94623-0660

Subject: Biological Opinion for the Proposed Jepson Parkway Project, Solano County, California (District 4-SOL-0-STA)

Dear Mr. Richards:

This letter is in response to your March 4, 2009, request for formal consultation on the proposed Jepson Parkway Project (proposed project) in Solano County, California. You determined that the proposed project is likely to adversely affect the federally-listed as threatened vernal pool fairy shrimp (*Branchinecta lynchi),* endangered vernal pool tadpole shrimp (*Lepidurus packardi*) (collectively vernal pool crustaceans), endangered Contra Costa goldfields (*Lasthenia conjugens*) (goldfields), threatened California tiger salamander (*Ambystoma californiense*) (salamander), threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle), and critical habitat for the vernal pool crustaceans and goldfields. Your request was also for concurrence that the proposed project may affect but is not likely to adversely affect the federally-listed as threatened Delta green ground beetle (*Elaphrus viridis*), endangered Conservancy fairy shrimp (*Branchinecta conservatio*), endangered Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*), endangered soft bird's-beak (*Cordylanthus mollis* ssp. *mollis*), threatened San Joaquin Valley orcutt grass (*Orcuttia inaequalis*), endangered California clapper rail (*Rallus longirostris obsoletus*), threatened California red-legged frog (*Rana draytonii*), endangered salt-marsh harvest mouse (*Reithrodontomys raviventris*), and threatened giant garter snake (*Thamnophis gigas*). The U.S. Fish and Wildlife Service (Service) received your request on March 5, 2009. The proposed project is located in the cities of Vacaville, Fairfield, Suisun City, and unincorporated areas of Solano County.

TAKE PRIDE IN AMERICA

Based upon the information provided, the Service concurs that the proposed action will adversely affect vernal pool crustaceans, goldfields, salamander, beetle, and critical habitat for vernal pool crustaceans and goldfields. Based on the fact that habitat assessments revealed no suitable habitat for these species, the Service concurs that the proposed action is not likely to adversely affect delta green ground beetle, Conservancy fairy shrimp, Suisun thistle, soft bird's-beak, salt-marsh harvest mouse, and the California clapper rail. In addition, botanical surveys, which were conducted in various years from 1999-2008, inside the Biological Study Area (BSA) in accordance with the Service's "Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants" (September 23, 1996 version) (Plant Guidelines), detected no listed plants. The BSA is defined as the area within the project boundary and surrounding areas within 250 feet of the edge of project disturbance.

The Service concurs that the proposed action is not likely to adversely affect the California red-legged frog based on the fact that a habitat assessment revealed no suitable habitat for this species. This habitat assessment was performed pursuant to the Service's "Revised Guidance on Site Assessments and Field Surveys for the California red-legged frog" (August 2005). Additionally, the only known records for the California red-legged frog are from the tri-city/county open space area, roughly defined by Interstate Highways 80, 680 and 780 between Vallejo, Cordelia, and Benicia, and the hills north of I-80 (identified as the Jameson Canyon-Lower Napa River Core Recovery Area) and in the Stebbins Cold Canyon Preserve in the northwest corner of Solano County. The closest known record is within 8 miles of the BSA. The BSA is outside of the known range of the giant garter snake, with the closest known occurrence of the giant garter snake over 10 miles to the east of the BSA. Therefore, the Service concurs that the proposed action is not likely to adversely affect the giant garter snake.

The Service concurs that the proposed action is not likely to adversely affect the San Joaquin Valley orcutt grass. The Service has made this determination based on botanical surveys done to the Plant Guidelines conducted in various years from 1999-2008, and habitat assessments in the BSA. This species primarily occurs in a 36-mile long strip in Fresno, Merced and Madera counties, on the east side of the San Joaquin Valley, with one disjunct population on the Muzzy Ranch just east of Travis Air Force Base. The Muzzy Ranch population is the only known population for this species outside the eastern half of the San Joaquin Valley.

This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) and represents the Service's biological opinion on the effects of the proposed project on vernal pool crustaceans, goldfields, salamander, and the beetle, and critical habitat for vernal pool crustaceans and goldfields.

This biological opinion is based on information provided in the following: (1) the October 2005 *Biological Assessment-Jepson Parkway Project*; (2) the February 2006 *Natural Environment Study Jepson Parkway Project*; (3) the may 2008, *Draft Environmental Impact Report / Environmental Impact Statement (EIR/EIS) on the Jepson Parkway Project* (4) the March 2009, *Biological Assessment for the Jepson Parkway Project*; (5) the July 10, 2009, revised conceptual

mitigation plan; (6) electronic mail correspondence (e-mail) and telephone conversations between representatives of the Service, PBS&J, Solano Transportation Authority (STA), and California Department of Transportation (Caltrans), on the proposed action; (7) references cited in this biological opinion; and (8) other information available to the Service.

CONSULTATION HISTORY

April 12, 2006: The Service received a request for formal consultation from the Federal Highway Administration (FHWA) on the proposed project and the attached October 2005 *Biological Assessment-Jepson Parkway Project*, and the February 2006 *Natural Environment Study Jepson Parkway Project* (NES).

May 10, 2006: The Service sent a request to FHWA for additional information on the proposed project.

September 28, 2007: The Service received the biological section for the administrative draft EIR/EIS from PBS&J.

October 1, 2007: The Service received exhibits from the NES from PBS&J.

October 4, 2007: The Service met with representatives of PBS&J to discuss past communication on the proposed project.

October 10, 2007: The Service met with STA, and representatives of PBS&J to discuss existing project data based on previous studies, and identify data gaps.

October 23, 2007: The Service received a letter from Caltrans withdrawing formal consultation on the proposed project because a preferred alternative had not been designated.

November 5, 2007: The Service received a packet of environmental documents form PBS&J on the proposed project.

February 12, 2008: The Service received minutes from a multi agency meeting that was held on January 10, 2008 to discuss the proposed project. The Service was not in attendance at this meeting, due to schedule conflicts.

May 29, 2008: The Service received the updated Biological section to review from the Draft EIR/EIS from PBS&J.

June 4, 2008: The Service received the *Draft EIR/EIS on the Jepson Parkway Project.*

June 5, 2008:	The Service met with representatives of PBS&J to discuss information to be included in the Biological Assessment.
August 5, 2008:	The Service sent a letter commenting on the Draft EIR/EIS.
September 12, 2008:	The Service received a set of draft effects maps for the proposed project.
September 26, 2008:	The Service met with representatives of PBS&J to go over direct and indirect effects to vernal pools and discuss the conceptual mitigation plan.
November 20, 2008:	The Service met with representatives from California Department of Fish and Game (CDFG), National Marine Fisheries Service (NMFS), STA, and PBS&J to discuss the proposed project.
March 5, 2009:	The Service received the request for formal consultation on the proposed project and the attached March 2009 *Biological Assessment for the Jepson Parkway Project* from Caltrans.
April 2, 2009:	The Service sent an e-mail asking for additional information on the proposed project.
April 30, 2009:	The Service met with representatives of Caltrans and PBS&J to discuss the additional information needed by the Service.
July 10, 2009:	The Service received a formal response to the request for additional information which included a revised conceptual mitigation plan.
August 10, 2009:	The Service sent an e-mail to PBS&J asking for some additional information on the conceptual mitigation proposal implementation timeframe.
August 18, 2009:	The Service received an e-mail from PBS&J clarifying the implementation timeframe.
September 8, 2009:	The Service sent an e-mail to PBS&J discussing the conceptual mitigation plan as it relates to goldfield conservation.
October 10, 2009:	The Service and representative's from PBS&J had a conference call to discuss the conceptual mitigation plan as it relates to goldfields.
November 25, 2009:	The Service sent an e-mail to PBS&J requesting some pools to be added to the impact analysis for goldfields.

BIOLOGICAL OPINION

Description of the Proposed Action

Project Purpose and Need

The proposed project is located in Township 6N, Range 1W, Sections (12, 13, 24, 25, and 35); Township 5N, Range 1W, Sections (2, 3, 9, 10, 11, 15, 16, 17, 20, 21, 28, and 29); Elmira USGS 7.5 minute Quadrangle; Township 5N, Range 1W, Sections (28, 29, 32 and 33); Denverton USGS 7.5 minute Quadrangle. The proposed project is designed to address existing and future traffic congestion, improve safety, and facilitate the use of alternative modes of transportation. The proposed project will meet the following specific purposes:

- Provide an integrated and continuous route for local north-south trips between Vacaville, Fairfield, Suisun City, and unincorporated areas of central Solano County as an alternative to using Interstate 80 (I-80).

- Provide local traffic a safe, convenient route between Vacaville, Fairfield, Suisun City, and unincorporated areas of central Solano County using existing roadways when feasible.

- Enhance multimodal transportation options for local trips in central Solano County, including providing a safe, convenient bicycle and pedestrian path and options for transit use in the area.

Caltrans is the National Environmental Policy Act (NEPA) lead agency and STA is the California Environmental Quality Act (CEQA) lead for the project. STA, in partnership with Solano County and the cities of Suisun City, Fairfield, and Vacaville is responsible for overall project funding, completion of the mitigation requirements as set forth in the Final EIR/EIS and project permits, right-of-way acquisition and construction administration for the proposed project. Funding for the proposed project will be provided by a combination of state, federal and local funds, which Caltrans will provide oversight for.

Project Alignment and Facilities

The proposed project will be constructed along local roadways in the cities of Vacaville, Fairfield, and Suisun City, as well as in unincorporated Solano County, California. The proposed project is designed to provide a four-lane divided arterial for the entire length of the corridor and includes improvements to (from north to south) Leisure Town Road, Vanden Road, Cement Hill Road, and Walters Road. The proposed project includes the widening of existing roadways; construction of a northern extension of Walters Road between Cement Hill Road and the intersection of Air Base Parkway; a grade separation (overpass) of the Union Pacific Railroad (UPRR) mainline tracks as part of the Walters Road Extension; improvements at the Leisure

Town Road crossings of Alamo Creek and New Alamo Creek; a new crossing of McCoy Creek; bicycle and pedestrian paths; landscaping; and utilities relocation.

The alignment for the proposed project begins in Vacaville on Leisure Town Road at Orange Drive. It extends south along Leisure Town Road to the intersection of Leisure Town Road and Vanden Road in unincorporated Solano County. The alignment then extends southwest along Vanden Road to the intersection of Cement Hill Road/Vanden Road and Peabody Road in Fairfield. From here, the alignment continues west along Cement Hill Road to the intersection of Cement Hill Road and the north end of the Walters Road Extension, extends south along the Walters Road Extension to the intersection of Walters Road and Air Base Parkway, and then continues south along Walters Road in Fairfield and Suisun City to the Walters Road/State Route (SR) 12 intersection.

The proposed project is supported by the City of Fairfield (City) because it will provide an additional north/south crossing of the UPRR mainline tracks in eastern Fairfield. The proposed Walters Road Extension is approximately one mile southwest of the Peabody Road crossing. The City desires an additional crossing of the UPRR mainline tracks, as provided by the proposed project because:

- The additional crossing will provide an alternative crossing in the event the main entrance to Travis Air Force Base (AFB) is closed for security reasons and the closure backs up traffic into the adjacent Air Base Parkway/Peabody Road intersection; and

- The additional crossing and the Walters Road extension alignment will provide a valuable transportation network improvement. This will provide important redundant connections that will ease future congestion on the already heavily traveled Air Base Parkway and Peabody Road.

Leisure Town Road

Under the proposed project, Leisure Town Road will be widened to four lanes from Orange Drive south to the New Ulatis Creek Bridge, a distance of approximately 1.3 miles. The road will be widened to the east to retain the westerly right-of-way line of Leisure Town Road. This portion of the roadway will consist of curb and gutter, an eight-foot outside shoulder, and two 12-foot lanes in each direction (for a total of four lanes) separated by a 16-foot-wide median. Left-turn lanes will be provided at all local street intersections by reducing the 16-foot-wide median width. A 10-foot-wide sidewalk will be constructed on both the east and west sides of Leisure Town Road, except for the east side of Leisure Town Road between Sequoia Drive and Maple Road. Because of constrained right-of-way, sidewalks in these segments will not be separated from the roadway by a landscaped area.

The median will be raised and landscaped, except near Poplar Road, where the median will be paved and striped to allow dual left-turn lanes. The right-of-way width for this section of Leisure Town Road will be approximately 100 feet.

South from the New Ulatis Creek Bridge to Alamo Drive, a distance of approximately two miles, Leisure Town Road will continue to be widened to four lanes under the proposed project. The roadway will continue to be widened to the east to retain the westerly right-of-way line. This portion of the roadway will consist of curb and gutter, an eight-foot outside shoulder, two 12-foot lanes in each direction (for a total of four lanes) separated by a 16-foot-wide raised, and landscaped median. Left-turn lanes will be provided at all local street intersections by reducing the 16-foot-wide median width.

A 10-foot-wide landscaped area will be provided on the east side of Leisure Town Road in this segment. On the west side, the existing southbound lane and shoulder will be removed and reconstructed as a part of a linear park to buffer existing residential uses. The 35- to 55-foot-wide linear park will consist of landscaping and a 10-foot-wide meandering bicycle and pedestrian path that will link to the existing Alamo Creek bicycle path just south of the intersection of Leisure Town and Elmira Roads. The bicycle and pedestrian path will be separated from the roadway by at least five feet and from the right-of-way line by at least two feet. The right-of-way width for this section of Leisure Town Road will be 125 feet to 145 feet.

Roadway improvements in this segment will include the widening of approximately 300 feet of Elmira Road east of Leisure Town Road to conform to the reconfigured Leisure Town Road/Elmira Road intersection.

From the signalized intersection at Alamo Drive southwest to the New Alamo Creek the roadway widening will be to the east. From New Alamo Creek southwest to the Vanden Road intersection, a distance of approximately 1.7 miles, Leisure Town Road will be widened to the west approximately 85 feet to retain the existing southeasterly right-of-way. The alignment shifts to the east 650 feet south of Alamo Drive to align with the existing westerly right-of-way north of Alamo Drive. This portion of the segment will consist of curb and gutter, an eight-foot outside shoulder, a 12-foot outside lane, and a 12-foot inside lane in each direction (for a total of four lanes) separated by a 16-foot-wide raised, landscaped median. A 10-foot-wide landscaped area will be provided on the southeasterly side of Leisure Town Road, and a minimum 55-foot-wide linear park will be provided on the northwesterly side. The linear park will consist of a 10-foot-wide meandering bicycle and pedestrian path and 45 feet of landscaped area. The bicycle and pedestrian path will be separated from the roadway by at least five feet and from the back of the right-of-way line by at least two feet. The right-of-way width for this section of Leisure Town Road will be 145 feet.

Leisure Town Road crosses Horse Creek, Old Ulatis Creek, New Ulatis Creek, Alamo Creek, and New Alamo Creek. Existing bridges crossing Horse Creek, Old Ulatis Creek, and New Ulatis Creek have recently been upgraded and will not need additional work to accommodate

implementation of the proposed project. However, the roadway crossings of Alamo Creek and New Alamo Creek will be widened as part of the proposed project. The 3-span bridge over New Alamo Creek will be widened approximately 50 feet. The existing wall type piers will be widened to the west. These piers are on the edge of the creek bank.

Construction during the dry season will require minor dewatering within the excavation for the pier footings and small coffer dams will be around the excavation area. Best Management Practices (BMP'S) will be used for handling the dewatering operations and the intermittent flow of the creek will not be disturbed during construction. The existing box culvert at Alamo Creek will either be extended or replaced with large culverts. All waterways with seasonal or perennial flows will be completely spanned with bridges or extensions of existing culverts. No waterways will have new culverts.

Vanden Road

From the intersection of Leisure Town Road and Vanden Road, the alignment of the proposed project continues southwest on Vanden Road to the intersection of Peabody Road. Under the proposed project, Vanden Road between Leisure Town Road and the beginning of the Vanden Road realignment portion (to the old railroad grade approximately one half mile northeast of the Peabody Road intersection) will be widened to the west of the existing roadway right-of-way to include a combination 10-foot-wide bicycle and pedestrian path and landscaped strip. At the signalized intersection of Vanden and Leisure Town Roads, the improvements will be extended 500 feet north of the intersection to conform to the existing two-lane Vanden Road section. This portion of Vanden Road will consist of an eight-foot outside shoulder, two 12-foot lanes (for a total of four lanes), and a two-foot-wide inside shoulder in each direction separated by a 16-foot-wide landscaped median. No outside curb and gutter or median curb will be constructed except within approximately 400 feet of the Vanden Road/Leisure Town Road and Vanden Road/Canon Road intersections, and within approximately 2,500 feet of intersection of Cement Hill Road/Vanden Road and Peabody Road on each side. The median will be paved adjacent to the residential units south of Leisure Town Road to provide left-turn access to and from Vanden Road. A 20-foot-wide landscaped area will be provided on the southeasterly side of Vanden Road, and a minimum 32-foot-wide area will be provided on the northwesterly side, consisting of a 10-foot-wide meandering bicycle and pedestrian path and landscaped area. The bicycle and pedestrian path will be separated from the roadway by at least 15 feet and from the back of the right-of-way line by at least two feet. The right-of-way width for this section of Vanden Road will be 136 feet.

The intersection of Vanden and Canon Roads will be improved to accommodate turn lanes, northbound acceleration and deceleration lanes, and the bicycle and pedestrian path connection. A traffic signal will also be installed at this intersection. The new traffic signal will be interconnected with the railroad crossing arms. Minor improvements at the railroad crossing on Cannon Road will be completed. The west approach of the intersection of Vanden Road and

Leisure Town Road will be constructed to allow for a connection to the future Foxboro Parkway1 (opposite Leisure Town Road). Vanden Road will be raised near Union Creek and a new series of replacement concrete box culverts or a short bridge will be constructed to remove the roadway from the floodplain. Culverts along Vanden Road will be upsized within the surrounding constraints as much as possible to facilitate wildlife movement. All of the replacement culverts will be as large or larger than existing culverts. Urban landscaping within this segment will be implemented from the intersection of Peabody Road and Cement Hill Road/Vanden Road to approximately 3,000 feet north along Peabody Road. Rural landscaping will be implemented in the remainder of the segment.

Cement Hill Road

The proposed project alignment turns west onto Cement Hill Road at the intersection of Cement Hill Road/Vanden Road and Peabody Road. Cement Hill Road will be widened from the existing two lanes to four lanes from 600 feet west of its intersection with Peabody Road west to the proposed intersection with the Walters Road Extension, a distance of approximately 0.75 mile. Under the proposed project, the widening will be accomplished by widening Cement Hill Road to the south approximately 34 feet and retaining the existing right-of-way on the north side. This portion of Cement Hill Road will consist of an eight-foot outside shoulder, a 12-foot outside lane, and a 14-foot inside lane in each direction (for a total of four lanes) separated by a 16-foot-wide raised, landscaped median. A 6.5-foot-wide sidewalk will be constructed adjacent to the back of the curb on the north side of Cement Hill Road, with a 3.5-foot landscaped strip between the sidewalk and the right-of-way line. A 10-foot-wide concrete bicycle and pedestrian path will be constructed on the south side of Cement Hill Road, separated from the face of curb by a 5-foot landscaped strip. An additional 5-foot-wide landscaped strip will be located between the bicycle and pedestrian path and the southerly right-of-way line. Driveways will be provided for all existing properties on the north side of Cement Hill Road. Access from north-side businesses or unsignalized local roads to eastbound Cement Hill Road will be restricted to right-turn movements only. The right-of-way width on this portion of Cement Hill Road will be 114 feet.

Walters Road Extension

From the intersection of Cement Hill Road/Walters Road a new roadway alignment will be constructed to the south tying into the existing intersection of Huntington Drive and Walters Road, just north of Air Base Parkway. From Cement Hill Road the alignment will curve to the west along a natural ridge line before spanning the man-made Strassberger Detention Pond with a new 1250-foot long multiple span bridge. The alignment continues south crossing a tributary of McCoy Creek with a 140-foot single span bridge. The alignment then curves back to the east and rises to clear the Union Pacific Railroad with a 160-foot single span bridge. The alignment then

1 The City of Vacaville General Plan calls for the extension of Foxboro Parkway between Nut Tree Road and Vanden Road (Vacaville General Plan Policy 2.3-I13). The extension is intended to support development of the South Vanden Area as defined in the General Plan, and would occur independent of the Jepson Parkway Project, subject to its own separate environmental evaluation.

heads directly south and ties into the intersection of Air Base Parkway/Walters Road at the existing grade. The intersection of Huntington Drive/Walters Road will be raised two to four feet. The new roadway will be four lanes (two lanes in each direction) with a raised median. The raised median has been narrowed to two feet wide for the entire length of the Walters Road extension. The proposed four-lane Walters Road Extension will consist of a curb and gutter, a 5-foot outside shoulder, a 12-foot outside lane, and a 14-foot inside lane in each direction separated by a two-foot-wide raised median. A 10-foot-wide bicycle and pedestrian sidewalk will be constructed on the east side of Walters Road. The northerly 1,600 feet of sidewalk on the east side of Walters Road will be separated from the curb by a 5-foot-wide landscaped strip on either side and the bicycle and pedestrian sidewalk. The right-of-way width in this section of Walters Road will generally be approximately 72 feet, except at the northerly limits, where Walters Road will be widened an additional 10 feet to the east to accommodate the two 5-foot-wide landscaped strips.

Existing Walters Road

From Air Base Parkway south to East Tabor Avenue, a distance of approximately 2,300 feet, Walters Road will be widened approximately 40 feet to the east. The existing Walters Road (four-lane undivided roadway and right-of-way) will be retained as a part of the new Walters Road. The new roadway will consist of curb and gutter, a 5-foot outside shoulder, a 12-foot outside lane, and a 14-foot inside lane in each direction separated by a raised, landscaped median that will vary in width from five to 16 feet. Northbound left-turn lanes will be provided at the mobile home park entrance, Walters Court, and Air Base Parkway (double left-turn lane). A 10-foot-wide bicycle and pedestrian concrete sidewalk will be constructed immediately behind the back of curb on the east side. The right-of-way width along Walters Road will generally be 97 feet, including the existing right-of-way width, except at the northerly limits by Air Base Parkway, where Walters Road will be widened to the east to accommodate a right-turn lane and the second left-turn lane.

Most of Walters Road in this segment has been widened under previously-approved projects. In this segment, Walters Road consists of a 5-foot outside shoulder and two 12-foot lanes in each direction separated by a minimum 6.5-foot-wide raised, landscaped median. Improvements along the east side of Walters Road included a 5-foot-wide landscaped strip separating the roadway from a 10-foot-wide paved bicycle and pedestrian path. A soundwall was built between the bicycle path and the approved Petersen Ranch development east of Walters Road, with a one-foot separation from the bicycle path.

Between Tabor Avenue and SR 12, the existing Walters Road has been improved to a four-lane roadway, including soundwalls, a 10-foot-wide sidewalk on the east side of Walters Road from Bella Vista Drive to Petersen Road, and traffic signals at the intersections of Walters Road at Tabor Avenue, Petersen Drive, and SR 12. Under the proposed project, some improvements to Walters Road between Bella Vista Drive and SR 12 are proposed, including: restriping Walters Road at SR 12 for an additional left-turn lane; constructing a median along Walters Road from

Petersen Road north approximately 600 feet; and installing signal-interconnect cable from Bella Vista Drive to SR 12.

Proposed Landscaping

In urban areas of the proposed project alignment, landscaping on both sides of the roadway and a landscaped median will be provided wherever feasible. Trees will be planted in the center median, with an understory of low shrubs, native grasses, and groundcover or decomposed granite. At no time will exotic (non-native) invasive plants, such as Pampas Grass (*Cortaderia selloana*), Eucalyptus (*Eucalyptus sp.*), Tamarisk (*Tamarix sp.*), or Giant Reed (*Arundo donax*) be used as part of any plantings along the corridor. Trees in the center median will be planted at regularly spaced intervals 30 to 50 feet. Where left-turn lanes are provided, the median will be too narrow for tree plantings. Vines will be planted at regular intervals along the soundwall.

Within its jurisdiction, the City of Vacaville has committed to consult further with its citizens regarding the specific density and design of the landscaping within the linear park. It is anticipated that the landscaped buffer within the City of Vacaville will be more dense and lush than in other portions of the proposed project alignment to buffer existing residential neighborhoods from the effects of the traffic on the roadway. The landscaped buffers will be funded by development proposed for this area.

In rural areas of the alignment, native trees will be planted on both sides of the roadway at irregular intervals (300 to 500 feet) in clusters, with at least five trees per cluster and native grasses as understory. Trees will also be used to mark intersections and drainages. In drainage areas, trees will be more densely planted to mimic what might occur naturally. New trees will be planted to augment existing vegetation. The median will be planted with native grasses and shrubs.

In industrial areas of the alignment, trees will be planted in the median and spaced approximately 30 feet apart, with an understory of low shrubs, grasses, and decomposed granite. The landscaped strips will be planted with native shrubs and groundcover.

Proposed Utility Improvements

Major drainages in the alignment of the proposed project will be crossed using concrete box culverts or pipe culverts. The existing 5-foot by 10-foot box culvert for Alamo Creek will be extended or replaced with a series of 60-inch culverts underneath the widened Leisure Town Road and Elmira Road. New Alamo Creek will be spanned by widening the existing bridge to the west. Vanden Road will be raised near Union Creek and a new series of concrete box culverts or a short bridge will be constructed. McCoy Creek and the existing man-made detention basin will be spanned with bridges on the Walters Road Extension.

Irrigation facilities will be maintained and extended or reconstructed as required. A storm drain system will be constructed to collect and convey drainage along Leisure Town Road where necessary, connecting to Vacaville's existing storm drain lines where possible. The existing joint pole line (Pacific Gas & Electric Company [PG&E], telephone, and cable) will be relocated in areas where it is within the project right-of-way. Conduit for future fiber-optic communication cable will be installed along the length of the proposed project alignment.

Project Phasing

The proposed project will be implemented in three phases. Funding is currently being provided by segment with funds programmed to complete improvements to the narrow, rural Vanden Road segment (Phase 1) connecting Vacaville and Fairfield; followed by two additional phases to construct the urban segments in Vacaville (Phase 2) and the urban segments in Fairfield (Phase 3). Detailed information on each Phase is included below:

Phase 1: Will include widening Vanden Road from 500-feet east of the Vanden Road/Cement Hill Road/Peabody Road intersection to the Vanden Road/Leisure Town Road intersection. The length of this segment is 2.8 miles, and includes a new bridge crossing at Union Creek. It is anticipated that this phase will take two years to complete.

Phase 2: Will include widening Leisure Town Road from the northern limits of Phase 1 (Vanden/Leisure Town Road intersection) to the south side of the Leisure Town Road/Orange Drive intersection. The length of this segment is 5.0 miles, and includes widening the New Alamo Creek Bridge, an extension of the existing Alamo Creek box culvert, and connection to a pipe storm drain system. It is anticipated that this phase will take three years to complete.

Phase 3: Will include widening Walters Road from Tabor Avenue to Huntington Drive; constructing the Walters Road extension from Huntington Drive to Cement Hill Road; and widening Cement Hill Road from the Walters Road extension through the Vanden Road/Peabody Road/Cement Hill Road intersection to connect with the southern limits of Phase 1. The length of Phase 3 is 2.6 miles, and includes a new railroad overhead crossing of the UPRR, and separate north/south bridges spanning a tributary of McCoy Creek, the Strassberger Detention Pond, and wetland resources, some containing habitat for goldfields north and south of the detention pond. It is anticipated that this phase will take three years to complete.

Phase 1 is anticipated to begin construction in 2010. Phase 2 is expected to begin upon the completion of Phase 1. It is anticipated that Phases 2 and 3 will have some overlap in construction schedules. Based upon the expected length of time to complete each Phase's construction, final completion of the proposed project is expected to be sometime between 2015 and 2018.

Road Construction

The majority of this proposed project involves widening existing narrow roadways to wider arterial sections. In many instances the existing roadway is currently two lanes and will be widened to four lanes with a raised divided median and sufficient topsoil to adequately cover all proposed sideslopes. The topography throughout the corridor is relatively flat and level so the cut and fills for the proposed roadway are small. Fill slopes on Leisure Town Road will be less than five feet, on Vanden Road there will be fill heights between three and six feet in height.

Because of this widening, construction staging will include constructing the first half of the widening while keeping traffic on existing pavement and then switching traffic to the newly constructed section while widening the other side. No detour alignments are anticipated. Culverts and storm drain systems will be constructed as part of the roadway construction. Bridges and bridge widenings will be staged in the same manner as the main roadways (one direction or side at a time), with the exception of the Walters Road extension, which will have bridges built to full width all at once.

During construction, standard highway BMPs will be utilized to minimize sediment transfer, water quality contamination and other construction related effects. Generally BMPs that are anticipated to be utilized include silt fence, inlet protection, and temporary fence around all Environmentally Sensitive Areas (ES) that are to be avoided. On the Walters Road extension the existing man-made Strassberger Detention Pond will be drained so that a temporary access into the pond area can be built to construct the bridge footings and columns. Draining the water during the dry season and constructing a flow channel to a cofferdam will not alter the surrounding natural resources or the hydrology/hydraulics. It is anticipated that this detention pond will be affected for approximately three months during construction. Upon completion this pond will be allowed to fill up to its normal capacity. No effects on federally-lised species are anticipated to occur during the draining of this pond, as it does not represent habitat for any federally-listed plant or wildlife species.

Clearing and Grading

Existing vegetation, trees and topsoil will be cleared from within the construction limits. The existing topsoil will be stockpiled within each phase and applied to finished sideslopes. It is anticipated that there will be sufficient topsoil to adequately cover all proposed sideslope. On the Walters Road extension there will be fill slopes above five feet on the approaches to the three structures. On the Walters Road extension the fill between the UPRR and the McCoy Creek tributary will be constructed with walls retaining the fill on both sides. Throughout the corridor, grading for the project will be relatively minor and appropriate best management practices will be installed to control erosion and construction area runoff.

Bridges and Culverts

Leisure Town Road

As previously mentioned, the Horse Creek, Ulatis Creek, New Ulatis Creek crossings will not require any additional work. The bridges for these creeks have previously been widened to accommodate the proposed cross section width. The existing Alamo Creek box culvert will be extended to the east and north to discharge into the existing channel alignment north of Elmira Road. The existing New Alamo Creek bridge will be widened to the west approximately 50 feet. Storm water runoff will be collected within the roadway curb and gutter and drop inlets and conveyed into storm drainage systems that discharge into the above mentioned creeks. These storm drainage systems will include detention basins along the east side of Leisure Town Road adjacent to the creeks. South of New Alamo Creek the proposed storm drain systems will discharge into the recently constructed South Vanden Area detention basin.

Vanden Road

Along Vanden Road the roadway will be raised and a new two span bridge will be constructed at the Union Creek crossing. With the added width of the proposed roadway, approximately 300 feet of Union Creek will need to be realigned. Currently the creek makes a series of ninety degree bends as it approaches Vanden Road. Existing offsite runoff that crosses under Vanden Road will continue to cross Vanden Road in the same location through improved culvert crossings. Roadway storm water runoff will be collected in roadside ditches and conveyed to cross culvert locations. Biofiltration strips will be implemented in the roadside ditches.

Cement Hill Road

The McCoy Creek crossing at Cement Hill Road will not require any additional work. Storm water runoff will be collected within the roadway curb and gutter and drop inlets and conveyed into storm drainage systems that discharge into biofiltration swales on the south side of the road before reaching existing runoff locations.

Walters Road Extension

The Walters Road extension will span the man-made Strassberger Detention Pond, which receives the McCoy Creek. This bridge span will allow the existing hydrology on the north and south sides of the detention pond to remain intact. An additional bridge will span a tributary of McCoy Creek south of the Strassberger detention pond. Storm water runoff will be collected within the roadway curb and gutter and drop inlets and conveyed into storm drainage systems that discharge into biofiltration swales on the sides of the road before reaching existing runoff locations. These systems will provide similar surface water runoff to the surrounding areas. Biofiltration swales will be constructed within the road construction effect area.

Walters Road

On Walters Road from Huntington Drive to Tabor Avenue the existing storm drainage systems will be modified and expanded to handle the additional lanes. Existing runoff on the east side currently is conveyed through a roadside ditch that is then piped under the road to the west side at two locations, and will continue to be conveyed this way after completion of the proposed project.

Staging Areas and Access Roads

Each construction phase will have separate staging areas. Phase 1 and Phase 2 will utilize adjacent farmland for staging areas to avoid sensitive areas. Because of the relative lack of listed species habitat and natural resources on these adjacent farmland areas, phase specific staging areas have not been identified and it will be up to the contractor to negotiate and secure parcels for staging and small material storage. Implementation of best management practices, construction specifications, and conservation measures mentioned in this biological opinion will ensure no additional effects to listed species or natural resources. Phase 3 work will utilize existing paved surfaces within the Strassberger property south of Cement Hill Road and west of the proposed Walters Road extension. These paved areas have a direct connection to the man-made detention pond that the Walters Road extension will span. Additional minor staging areas within the proposed right–of-way for existing Walters Road and Cement Hill Road will be used and the aforementioned best management practices, construction specifications, and conservation measures implemented to ensure no additional effects to listed species or natural resources

Because the majority of the construction on this project is widening existing roadways, access roads are not required. The only access roads required for constructing this project are along the north edge of the UPRR. In order to construct the Union Pacific Overhead Structure and the bridge crossing of the McCoy Creek tributary an existing farm access road on the property currently owned by Edenbridge Corporation will be utilized to access this area from Air Base Parkway. The remaining portions of the Walters Road extension will be accessed through the man-made Strassberger Detention Pond or via the proposed right-of-way.

Materials Delivery

The project site is close to many material suppliers and because of the urban nature and close proximity to these material sources, major stockpiles will not be required. Staging areas will be utilized to store small amounts of construction materials. Major items such as roadway fill, aggregate base course, asphalt and concrete will be delivered from the material supplier directly to the final location on the project. Bridge girders also will be delivered directly to the project site.

Post-Construction Activities

Areas outside of the proposed right-of-way that will be disturbed during construction (temporary easement, staging areas, and access roads) will be restored after construction is complete. This will include removing all construction materials, including temporary surfacing materials, regrading as necessary to restore the land to pre-construction conditions and seeding and mulching with an approved native seed mixture. Additionally, a plant establishment period will be required from the contractor to ensure planting and seeding is successfully implemented.

Biological Study Area

The BSA is defined as the area within the project boundary and surrounding areas within 250 feet of the edge of project disturbance (described below) from the intersection of Orange Drive and Leisure Town Road in the City of Vacaville, south to the intersection of Leisure Town and Vanden Road, then along Vanden Road across Peabody Road at which point Vanden Road becomes Cement Hill Road, then west along Cement Hill Road to the Walters Road extension area, and finally, south to the connection with existing Walters Road at its intersection with Huntington Drive. From Huntington Drive the BSA continues along Walters Road south to its terminus at SR 12. The BSA also includes all associated access roads, construction footprints, and staging areas.

Land uses in the BSA

Land uses in the BSA include commercial, recreational (golf course), residential, industrial, and agricultural (crop lands and grazing lands). Commercial, residential, and recreational land uses occur along the northern portion of the BSA from the intersection of Leisure Town Road and Orange Drive, south to the intersection of Leisure Town Road and Fry Road. Agricultural and grazing lands dominate the land uses from Frye Road south to the intersection of Leisure Town Road and Vanden Road, and along Vanden Road to just east of its intersection with Peabody Road/Cement Hill Road. Commercial/industrial land uses are present in the vicinity of the Peabody Road/Cement Hill Road/Vanden Road intersection. Lands along Cement Hill Road and the Walters Road extension consist primarily of undeveloped and grazing land. South of the UPRR tracks is a combination of industrial, residential and undeveloped land along existing Walters Road to the project terminus at SR 12. The majority of the corridor is in an area of the County with slopes of less than 15 percent; there are no outstanding topographic features. Properties adjacent to the alignment are owned by public and private entities, including homeowners, business owners, the Cities of Vacaville, Fairfield, Suisun City, and Solano County.

Habitats in the BSA

Annual Grassland

Non-native annual grassland occurs throughout the BSA and is the most prevalent community type in terms of total acreage. Cattle graze on much of the annual grassland along Leisure Town Road, Vanden Road, and on the grassland in the Walters Road Extension area. Plant species commonly observed in this habitat in the BSA include annual bluegrass (*Poa annua*), Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), soft chess (*Bromus hordeaceus*), medusa-head (*Taeniantherum caput-medusae*), rattail fescue (*Vulpia myuros*), foxtail barley (*Hordeum murinum var. leporinum*), Italian ryegrass (*Lolium multiflorum*), bristly ox-tongue (*Picris echioides*), black mustard (*Brassica nigra*), cut-leaf geranium (*Geranium dissectum*), English plantain (*Plantago lanceolata*), purple star-thistle (*Centaurea calcitrapa*), yellow star-thistle (*Centaurea solstitialis*), little hop clover (*Trifolium dubium*), rose clover (*Trifolium hirtum*), broad-leaved pepperweed (*Lepidium latifolium*), field bindweed (*Convolvulus arvensis*), and red-stem filaree (*Erodium cicutarium*). Native plant species observed included miniature lupine (*Lupinus bicolor*), western blue-eyed grass (*Sisyrinchium bellum*), annual fireweed (*Epilobium brachycarpum*), common bedstraw (*Galium aparine*), turkey mullein (*Croton setigerus*), red maids (*Calandrinia ciliata*), pitgland tarweed (*Holocarpha virgata*), Great Valley gumplant (*Grindelia camporum var. camporum*), blue dicks (*Dichlostemma capitatum*), purple needlegrass (*Nasella pulchra*), and blue wild-rye (*Elymus glaucus*).

Agricultural Lands

Agricultural land includes both cultivated cropland and irrigated pasture land. Actively cultivated agricultural land supporting alfalfa or grain crops occupies most of the study area east of Leisure Town Road. The natural vegetation here typically is minimal and weedy, usually occurring only on the fringes of agricultural fields, where it is subject to frequent disturbance. Irrigated pasture land occurs west of Leisure Town Road near its intersection with Vanden Road and in smaller areas near residences along Leisure Town Road.

Developed/Landscaped Areas

Developed/landscaped areas include paved areas and buildings within the urbanized portions of the study area, as well as the associated landscaped vegetation. Parks are included in this community type because they comprise similar species and physical structures as landscaping. Landscape vegetation is usually located in areas that are disturbed by human activity and therefore provides relatively low-quality wildlife habitat.

Ruderal Areas

Ruderal (weedy) vegetation occurs at the edges of the pavement along existing roads within the BSA and in some undeveloped parcels, and typically consists of short-lived non-native annual

and biennial herbaceous plant species that persist in areas that undergo nearly continuous disturbance regimes (e.g., spraying, mowing, plowing). Because ruderal areas typically are disturbed on a regular basis by human activity, they provide low-quality habitat for wildlife. Assemblages of ruderal vegetation were frequently encountered by Jones and Stokes and PBS&J biologists during plant guideline surveys within fallow fields, open roadsides, and unmaintained lots. Plant species observed included bristly ox-tongue, yellow star-thistle, annual fireweed (*Epilobium* sp.), black mustard (*Brassica nigra*), rose clover, vetch (*Vicia sativa*), rip-gut brome, wild oat, California bur-clover (*Medicago polymorpha*), common groundsel (*Senecio vulgaris*), wild radish (*Raphanus sativus*), sweet fennel (*Foeniculum vulgare*), horseweed (*Conyza canadensis*), chicory (*Cichorium intybus*), and Italian thistle (*Carduus pycnocephalus*).

Riparian Woodland

Riparian woodland is located along the banks of Alamo Creek at the Leisure Town Road crossing and along a drainage between Leisure Town Road and Green Tree Golf Course. At the Alamo Creek crossing of Leisure Town Road, the riparian woodland supports valley oak (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), Fremont's cottonwood (*Populus fremontii*), blue elderberry (*Sambucus mexicana*), and California wild rose (*Rosa californica*). Understory species include Himalayan blackberry (*Rubus discolor*) and sedge (*Cyperus eragrostis*). Willows are the dominant riparian trees along the drainage by the golf course. Riparian woodland is limited in the study area and present in small areas isolated by development and roads. Riparian woodland vegetation provides a variety of important ecological functions and values for wildlife.

Wetlands and Other Waters of the U.S.

There were 45.87 acres of wetlands and other waters of the U.S. delineated in the BSA. Of these wetlands and other waters of the U.S., 5.37 acres will be affected from construction related activities. This includes 2.94 acres of wetlands and 2.43 acres of other waters.

Vernal Pool

This habitat type is found in shallow depressions in open grassland areas within the BSA, particularly along the Walters Road extension, and along existing Walters Road, near its intersection with Air Base Parkway. Vernal pools are depressional features of varying size, and are characterized as having a layer of claypan or hardpan below the surface that inhibits percolation of precipitation during the rainy season. This results in prolonged inundation and saturation regimes that allow a unique assemblage of native plants and animals (many of them restricted to this habitat type) to complete their life cycles before the vernal pools dry out completely at the beginning of the dry season. There are a number of annual herbs and grasses that are considered either "indicator species" or strongly associated with this habitat type. Plant species observed include Great Valley button-celery (*Eryngium castrense*), spikeweed (*Centromadia* sp.), common spikerush (*Eleocharis macrostachya*), bractless hedge-hyssop

(*Gratiola ebracteata*), short woollyheads (*Psilocarphus brevissimus*), goldfields (*Lasthenia* spp.), stalked popcornflower (*Plagiobothrys stipitatus* var. *micranthus*), white-tip clover (*Trifolium variegatum*), and white navarretia (*Navarretia leucocephala*).

Seasonal Swale (mapped as seasonal wetlands)

Seasonal swales are found primarily in the large grazed parcel between Cement Hill Road and along the UPRR tracks along Vanden Road. Swales are low-gradient features in between hill slopes that convey sheet flows from surrounding uplands during the rainy season, and generally do not exhibit pronounced scouring. Soils in this portion of the project area are often alkaline, have poor vegetative coverage and are largely restricted to halophytic (i.e., salt tolerant) species. Plant species observed included Mediterranean barley, salt grass (*Distichlis spicata*), Baltic rush (*Juncus balticus*), saltbush (*Atriplex* sp.), alkali heath (*Frankenia salina*), flat-face calicoflower (*Downingia pulchella*), alkali goldfields (*Lasthenia platycarpha*), forked peppergrass (*Lepidium oxycarpum*), dwarf peppergrass (*Lepidium latipes* var. *latipes*), pickleweed (*Salicornia virginica*), alkali mallow (*Malvella leprosa*), and sticky sandspurrey (*Spergularia macrotheca* var. *longistyla*).

Seasonal Wetland

Seasonal wetlands are not common in the project area; these are generally shallow (i.e., do not pond water for prolonged periods) and were found either along the toe of the UPRR tracks, or within roadside and drainage ditches. Plant species observed included Italian ryegrass, common spikerush, curly dock (*Rumex crispus*), cocklebur (*Xanthium strumarium*), and tall flatsedge (*Cyperus eragrostis*).

Freshwater Emergent Marsh (includes perennial and seasonal freshwater marsh)

Freshwater emergent marsh habitat occurs within deep concave ditches along various roadways throughout the project area, along the shoreline of the Strassberger Detention Basin, and along an intermittent drainage feature located between Cement Hill Road and the UPRR tracks. This habitat type exhibits inundation and/or saturation regimes for prolonged periods, and often contains extensive stands of robust hydrophytic species. Dominant plant species observed included broad-leaved cattail (*Typha latifolia*) and tule (*Schoenoplectus* spp.). Less frequent associates included tall flatsedge, common spikerush, water speedwell (*Veronica anagallis-aquatica*), seep monkeyflower (*Mimulus guttatus*), clustered dock (*Rumex conglomeratus*), and hairy willow-herb (*Epilobium ciliatum*).

Creeks

Creeks that cross the BSA include Horse Creek, Alamo Creek, New Alamo Creek, Ulatis Creek, New Ulatis Creek, McCoy Creek, and Union Creek. Horse Creek, Alamo Creek, New Alamo creeks, and New Ulatis Creek are all tributaries to Ulatis Creek, which flows into Cache Slough

and eventually the Sacramento River. McCoy Creek and Union Creek are tributaries to Suisun Slough.

Conservation and Minimization Measures

According to the Biological Assessment and additional information provided to the Service, Caltrans and STA propose that this action will be designed and constructed in the following ways that will minimize effects on federally-listed species. These measures must be implemented. These measures are:

General

1. To minimize the adverse effects from loss of habitat and all vernal pool crustaceans inhabiting 4.69 acres (0.97 direct and 3.72 indirect) from the proposed project on vernal pool crustaceans, STA proposes to protect a combined total of 24.92 acres of aquatic vernal pool crustacean habitat (of the 24.92 acres, 22.60 will be preserved and 2.32 will be created). This combined habitat compensation can be achieved by: 1) purchase of compensation credits at an existing Service-approved bank or banks, as appropriate for the species, 2) or purchase and preservation of a Service-approved parcel and establishment of a conservation easement, development of a management plan, and provision of a perpetual endowment sufficient to cover management and maintenance of protected lands for the benefit and recovery of vernal pool crustaceans, or 3) a combination of these two approaches. 2.64 acres of the preservation will occur prior to groundbreaking on Phase 1. The remainder of the preservation (19.96 acres) will occur prior to groundbreaking on Phase 3. The 2.32 acres of creation will be done on approximately 10 acres of land for both goldfields and vernal pool crustaceans which STA will acquire prior to groundbreaking on Phase 1. The creation of all pools will occur prior to groundbreaking of Phase 3.

2. To minimize the impact of the adverse effects on goldfields from the loss of habitat and all goldfields inhabiting 3.02 acres (0.57 acre direct and 2.45 acres indirect) from the proposed project, STA proposes to protect a combined total of 30.6 acres of goldfield habitat (of the 30.6 acres, 28.62 will be preserved and 1.98 will be created). This combined habitat compensation can be achieved by: 1) purchase of compensation credits at an existing Service-approved bank or banks, as appropriate for the species, 2) or purchase and preservation of a Service-approved parcel and establishment of a conservation easement, development of a management plan, and provision of a perpetual endowment sufficient to cover management and maintenance of protected lands for the benefit and recovery of goldfields, or 3) a combination of these two approaches. STA has proposed to provide preservation for goldfields at the beginning of each Phase even though the impacts to goldfields will not occur until Phase 3. This was proposed to ensure adequate credits will be available at Service-approved goldfields banks. STA has proposed to enter into an agreement with Goldfields Mitigation Bank to hold credits for

future purchase. Prior to the groundbreaking of each Phase, STA will purchase 9.54 acres of goldfield preservation. The 1.98 acres of creation will be done on approximately 10 acres of land for both goldfields and vernal pool crustaceans which STA will acquire prior to groundbreaking on Phase 1. The creation of all pools will occur prior to groundbreaking of Phase 3.

3. To minimize the impact of the adverse effects on salamanders from the loss of habitat and all individual salamanders inhabiting 22.7 acres of upland habitat from the proposed project, STA has proposed to protect in perpetuity a total of 68.1 acres of upland salamander habitat. This upland habitat preservation compensation can be achieved by: 1) purchase of compensation credits at an existing Service/CDFG-approved bank or banks, as appropriate for the species, 2) or purchase and preservation of a Service/CDFG approved parcel and establishment of a conservation easement, development of a management plan, and provision of a perpetual endowment sufficient to cover management and maintenance of protected lands for the benefit and recovery of the salamander, or 3) a combination of these two approaches. The compensation for the salamander will occur in full 18 calendar months following the date of initial project groundbreaking on Phase 1. If this upland habitat preservation compensation is achieved either in whole or in part through the purchase of a Service/CDFG approved parcel, then the following conditions shall apply. Acquisition of land shall either be through conservation easement or fee title. The conservation easement shall name the Service/CDFG as third-party beneficiaries and shall be held by an entity qualified to hold conservation easements subject to Service/CDFG approval. An endowment, based on a management plan and a PAR or PAR-equivalent analysis, to manage the land and monitor the conservation easement shall be held by a Service/CDFG approved entity in an amount approved by the Service /CDFG. The management plan shall be developed and approved by the Service/CDFG prior to or concurrent to the acquisition of land and shall include, but is not limited to: a description of existing habitats and planned habitat creation, restoration and/or enhancement; restoration and/or enhancement success criteria; and adaptive management strategies to be implemented if success criteria are not met or to incorporate new scientific data. Prior to impacts on CTS habitat, STA shall provide, and have approved by CDFG, a Funding Assurance Letter (FAL) stating that sufficient funds to mitigate impacts have been budgeted into the Jepson Parkway Project. The FAL shall be signed by the District Deputy Director of Project Management and the District Deputy Director of Environmental Planning and Engineering and approved by CDFG's Offices of the General Council. The FAL provides evidence that STA has allocated sufficient funding to implement the proposed mitigation, monitoring, and reporting requirements including habitat conservation credits or land acquisition costs, costs of managing the mitigation lands, and an endowment.

4. To minimize the impact of the adverse effects on beetles from the loss of habitat and all individual beetles inhabiting 4 elderberry shrubs (*Sambucus* sp.) with 16 stems, 1 inch or greater in diameter at ground level, within 100 feet from the proposed project

activities, STA proposes to transplant the 4 elderberry shrubs and purchase beetle habitat credits equivalent to 70 elderberry seedlings and 124 associated natives. Minimization ratios are listed and explained in Table 9 of the BA. This habitat preservation compensation can be achieved by: 1) purchase of compensation credits at an existing Service-approved bank or banks, as appropriate for the species, 2) or purchase and preservation of a Service-approved parcel and establishment of a conservation easement, development of a management plan, and provision of a perpetual endowment sufficient to cover management and maintenance of protected lands for the benefit and recovery of the beetle, or 3) a combination of these two approaches. The compensation for the beetle will occur in full prior to groundbreaking on Phase 2 of the proposed project.

Vernal Pool Crustaceans/Contra Costa Goldfields

1. Effects have been minimized by modifying the roadway alignment, shifting the centerline, and/or widening primarily to one or the other side; narrowing inside shoulder widths, and added bridge structures to avoid direct effects to wetlands. An additional 670 feet of bridge has been incorporated to span habitat to reduce effects to wetlands/vernal pools containing or potentially containing vernal pool crustaceans and goldfields.

2. Salvage topsoil with vernal pool crustacean cysts for use in suitable enhanced, restored, and/or created pools, if such enhancement, restoration, or creation is approved by the Service.

3. Construction will occur in the dry season to minimize sedimentation and contamination transport in to listed species habitat, unless otherwise authorized by the Service.

4. Prior to construction activities on the site, a protective fence shall be installed a minimum of one foot (or greater, if feasible) from the edge of all vernal pool crustacean and goldfields habitat indirectly affected, but to be avoided in the immediate vicinity of the proposed construction areas. Prior to initiation of construction activities, a qualified biologist shall inspect the protective fencing to ensure that all wetland features have been appropriately protected. No encroachment into fenced areas shall be permitted during construction and the fence shall remain in place until all construction activities have been completed.

5. In areas where complete avoidance, buffer areas, or equally effective protective measures to reduce the effects of surface disturbance and compaction are not feasible, the following measures shall be implemented:

    - Prior to allowing any vehicles or heavy equipment into Walters Road extension Area, STA or their agent shall install wooden mats in all areas where vehicles will encroach upon vernal pool crustacean habitat. The wooden mats will help

distribute the weight of vehicles and equipment and will prevent substantial disturbance of soil in these areas.

- Wooden mats shall only remain in the habitat areas as long as necessary for the construction work in the area. As soon as the work is completed, all fabric, wooden mats and any other construction related materials shall be removed from the site.

6. STA shall conduct Worker Environmental Awareness Program (WEAP) training for construction crews (primarily crew and construction foreman) before construction activities begin. The WEAP shall include a brief review of the special-status species and other sensitive resources that could occur in the proposed project site (including species life history and habitat preferences) and their legal status. The program shall also cover all mitigation measures, environmental permits and proposed project plans, such as the Stormwater Pollution Prevention Plan (SWPPP), best management practices (BMPs), erosion control and sediment plan, and any other required plans. During WEAP training, construction personnel shall be informed of the importance of avoiding ground-disturbing activities outside of the designated work area. The designated environmental inspector shall be responsible for ensuring that construction personnel adhere to the guidelines and restrictions.
   WEAP training sessions shall be conducted as needed for new personnel brought onto the job during the construction period.

7. A biological monitor will be onsite to monitor construction activities that occur within 250 feet of a wetland, to ensure compliance with all conservation measures and applicable resource agency permits. More than one monitor may be required depending on the distance between construction activities and the proximity to wetland resources.

8. Salvage of goldfield seeds, or topsoil with seeds for use in suitable enhanced, restored, and/or created goldfields pools, if such enhancement, restoration, or creation is approved by the Service.

California Tiger Salamander

Due to the presence of a UPRR right-of-way adjacent to the BSA along Vanden Road, there is no opportunity to modify the proposed project alignment to lessen the effect on upland habitat for the salamander.

1. A biological monitor will be on site to monitor construction activities that occur along salamander upland habitat to minimize the number of individual salamanders taken during the road widening and improvement along Vanden and Leisure Town Road.

2. All construction activities (including grading) within salamander upland habitat will be restricted to the dry season (May 1 to October 15).

3. Ground-disturbing activities will be minimized in salamander upland habitat and protective fencing will be installed along the perimeter of the construction work area.

Valley Elderberry Longhorn Beetle

1. Effects on elderberry shrubs shall be avoided during all phases of the proposed project where feasible. Complete avoidance is accomplished through establishment and maintenance of a minimum buffer zone of 100 feet from the drip lines of any elderberry shrub. Firebreaks shall not be allowed within these buffer zones, and any areas temporarily disturbed within this buffer zone during construction shall be restored immediately following construction.

2. For those shrubs that will not be directly removed by the project, any ground disturbing activities within 100 feet of elderberry shrubs with stems measuring one inch or greater in diameter at ground level shall conform to the following avoidance measures:

    - STA shall provide a minimum setback of at least 20 feet from the drip line of each elderberry shrub. The setbacks shall be fenced and flagged to prevent equipment and materials encroachment into the setback zone. Fire fuel breaks (disked land) may not be included within the 100 foot setback.

    - Signs will be erected every five feet along the edge of the setback zone with the following information, "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." This signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction (Service 1999).

    - Construction contractors shall be instructed about the status of the beetle, the need to protect its elderberry host plant, the need to avoid damaging the elderberry shrubs and the possible penalties for not complying with these requirements.

    - No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or the 3 remaining shrubs shall be used within 100 feet of any elderberry shrub with one or more stems measuring one inch or greater in diameter at ground level.
    - Mowing of grasses/ground cover shall only occur from July through April to reduce fire hazard. No mowing shall occur within 50 feet of elderberry shrub stems on the 3 remaining shrubs. Mowing must be done in a manner that avoids

damaging shrubs (e.g., avoid stripping away bark through careless use of mowing/trimming equipment).

- Trimming of elderberry stems less than one inch in diameter may occur between September 1 and March 14. The recommended period for trimming is between November through the first two weeks in February when the plants are dormant and after they have lost their leaves.

3. For the cases where damage to, or removal of elderberry shrubs or their stems measuring one inch or greater (removal or trimming) will be unavoidable (i.e., shrubs within 20 feet of disturbance), these effects shall be compensated for. Compensation shall include salvaging and planting the affected elderberry shrubs and planting additional elderberry shrubs and associated native riparian plants according to the ratios specified in the biological assessment. Compensation plantings shall occur at a Service-approved compensation site (such as a conservation bank) to be preserved as beetle habitat in perpetuity.

4. Monitor. A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry shrubs to ensure that the shrubs identified to be removed in this biological opinion, are in fact the ones removed. If shrubs other than those identified in this opinion are removed or disturbed, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or modification to its habitat to the Service and to the CDFG, and Caltrans shall reinitiate this formal consultation with the Service to address the additional effects.

5. Timing. Transplant elderberry plants when the plants are dormant, from approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.

6. Plant Additional Seedlings or Cuttings. Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 9 of the BA. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area.

7. Plant Associated Native Species. Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry shrubs at the project site

or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the conservation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the conservation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the conservation area. Only stock from local sources should be used.

Action Area

The action area is defined in 50 CFR § 402.02 as, "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the proposed project, this includes all BSA areas subject to the direct effects and indirect effects (250 feet from the edge of construction) associated with construction of widening of existing roadways; construction of a northern extension of Walters Road between Cement Hill Road and the intersection of Air Base Parkway; a grade separation (overpass) of the UPRR mainline tracks as part of the Walters Road Extension; improvements at the Leisure Town Road crossings of Alamo Creek and New Alamo Creek; a new crossing of McCoy Creek; bicycle and pedestrian paths; landscaping; and utilities relocation

Analytical Framework for the Jeopardy and Adverse Modification Analysis

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the vernal pool crustaceans, goldfields, salamanders, and beetles range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of vernal pool crustaceans, goldfields, salamanders, and beetles in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the vernal pool crustaceans, goldfields, salamanders, and beetles; (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 vernal pool crustaceans, goldfields, salamanders, and beetles; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the vernal pool crustaceans, goldfields, salamanders, and beetles.

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 vernal pool crustaceans, goldfields, salamanders, and beetles current status, 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 the vernal pool crustaceans, goldfields, salamanders, and beetles 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 vernal pool crustaceans, goldfields, salamanders, and beetles and the role of the action area in the survival and recovery of the vernal pool crustaceans, goldfields, salamanders, and beetles 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 CFR 402.02. Instead, we have relied upon the statutory provisions of the ESA 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 rangewide condition of designated critical habitat for the vernal pool crustaceans and goldfields in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat at the provincial and range-wide scale; (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 or interdependent activities on the PCEs and how that will influence the recovery role of 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 vernal pool crustaceans and goldfields critical habitat are evaluated in the context of the range-wide condition of the critical habitat at the provincial and range-wide scales, 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 the vernal pool crustaceans and goldfields.

The analysis in this Biological Opinion places an emphasis on using the intended range-wide recovery function of vernal pool crustaceans and goldfields critical habitat 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 Environmental Baseline

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp (fairy shrimp) was listed as threatened on September 19, 1994 (Service 1994). Simovich *et al.* (1992) and Ericksen and Belk (1999) provide further details about the life history and ecology of this species. The fairy shrimp has a delicate elongate body, large stalked compound eyes, no carapace, and 11 pairs of swimming legs. It swims or glides gracefully upside down by means of complex beating movements of the legs that pass in a wave-like anterior to posterior direction. Fairy shrimp feed on algae, bacteria, protozoa, rotifers, and bits of detritus. The females carry the eggs in an oval or elongate ventral brood sac. The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. The "resting" or "summer" eggs are capable of withstanding heat, cold, and prolonged desiccation. When the pools fill in the same or subsequent seasons, some, but not all, of the eggs may hatch. The egg bank in the soil may consist of eggs from several years of breeding (Donald 1983). The eggs hatch when the vernal pools fill with rainwater. The early stages of the vernal pool fairy shrimp develop rapidly into adults. These non-dormant populations often disappear early in the season long before the vernal pools dry up.

The fairy shrimp inhabits vernal pools with clear to tea-colored water, most commonly in grass or mud-bottomed swales, or basalt flow depression pools in unplowed grasslands. The fairy shrimp has been collected from early December to early May. It can mature quickly, allowing populations to persist in short-lived shallow pools (Simovich *et al.* 1992). Fairy shrimps occupy a variety of different vernal pool habitats, from small, clear, sandstone rock pools to large, turbid, alkaline, grassland valley floor pools (Eng *et al.* 1990; Helm 1998;). The pool types where the species has been found include Northern Hardpan, Northern Claypan, Northern Volcanic Mud Flow, and Northern Basalt Flow vernal pools formed on a variety of geologic formations and soil types. Although fairy shrimp have been collected from large vernal pools, including one exceeding 25 acres in area (Eriksen and Belk 1999), it is most frequently found in pools measuring fewer than 0.05 acre in area (Helm 1998; Gallagher 1996). The fairy shrimp occurs at elevations from 33 feet to 4,003 feet (Eng *et al.* 1990), and is typically found in pools with low to moderate amounts of salinity or total dissolved solids (Keeley 1984; Syrdahl 1993). Vernal pools are mostly rain fed, resulting in low nutrient levels and dramatic daily fluctuations in pH, dissolved oxygen, and carbon dioxide (Keeley and Zedler 1998). Although there are many observations of the environmental conditions where fairy shrimp have been found, there have been no experimental studies investigating the specific habitat requirements of this species.

The hydrology that maintains the pattern of inundation and drying characteristic of vernal pool habitats is complex. Vernal pool habitats form in depressions above an impervious soil layer (duripan) or rock substrate. After winter rains begin, this impervious layer prevents the downward percolation of water and creates a perched water table causing the depression (or pool) to fill. Due to local topography and geology, the depressions are generally part of an undulating landscape, where soil mounds are interspersed with basins, swales, and drainages (Nikiforoff

1941; Holland and Jain 1988). These features form an interconnected hydrological unit known as a vernal pool complex. Although vernal pool hydrology is driven by the input of precipitation, water input to vernal pool basins also occurs from surface and subsurface flow from the swale and upland portions of the complex (Zedler 1987, Hanes *et al.* 1990, Hanes and Stromberg 1998). Surface flow through the swale portion of the complex allows vernal pool species to move directly from one vernal pool to another. Upland areas are a critical component of vernal pool hydrology because they directly influence the rate of vernal pool filling, the length of the inundation period, and the rate of vernal pool drying (Zedler 1987; Hanes and Stromberg 1998).

The fairy shrimp has evolved unique physical adaptations to survive in vernal pools. Vernal pool environments are characterized by a short inundation phase during the winter, a drying phase during the spring, and a dry phase during the summer (Holland and Jain 1988). The timing and duration of these phases can vary significantly from year to year, and in some years vernal pools may not inundate at all. In order to take advantage of the short inundation phase, vernal pool crustaceans have evolved short reproduction times and high reproductive rates. Fairy shrimps generally hatch within a few days after their habitats fill with water, and can start reproducing within a few weeks (Eng *et al.* 1990; Helm 1998; Eriksen and Belk 1999). Fairy shrimps can complete their entire life cycle in a single season, and some species may complete several life cycles. Fairy shrimps can also produce numerous offspring when environmental conditions are favorable. Some species may produce thousands of cysts during their life spans.

To survive the prolonged heat and dessication of the vernal pool dry phase, vernal pool crustaceans have developed a dormant stage. After vernal pool crustacean eggs are fertilized in the female's brood sac, the embryos develop a thick, usually multi-layered shell. When embryonic development reaches a late stage, further maturation stops, metabolism is drastically slowed, and the egg, now referred to as a cyst, enters a dormant state called diapause. The cyst is then either dropped to the pool bottom or remains in the brood sac until the female dies and sinks. Once the cyst is desiccated, it can withstand temperatures near boiling (Carlisle 1968), fire (Wells *et al.* 1997), freezing, and anoxic conditions without damage to the embryo. The cyst wall cannot be affected by digestive enzymes, and can be transported in the digestive tracts of animals without harm (Horne 1967). Most fairy shrimp cysts can remain viable in the soil for a decade or longer (Belk 1998).

Although the exact signals that cause fairy shrimp cysts to hatch are unknown, factors such as soil moisture, temperature, light, oxygen, and osmotic pressure may trigger the embryo's emergence from the cyst (Brendonck 1990). Because the cyst contains a well-developed embryo, the animal can quickly develop into a fully mature adult. This allows fairy shrimps to reproduce before the vernal pool enters the dry phase, sometimes within only a few weeks (Helm 1998, Eriksen and Belk 1999). In some species, cysts may hatch immediately without going through a dormant stage, if they are deposited while the vernal pool still contains water. These cysts are referred to as quiescent, and allow the vernal pool crustacean to produce multiple generations in a single wet season as long as their habitat remains inundated.

Another important adaptation of vernal pool crustaceans to the unpredictable conditions of vernal pools is the fact that not all of the dormant cysts hatch in every season. Hathaway and Simovich (1996) found that only 6 percent of endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*) cysts hatched after initial hydration, and only 0.18 percent of Riverside fairy shrimp cysts hatched. The cysts that don't hatch remain dormant and viable in the soil. These cysts may hatch in a subsequent year, and form a cyst bank much like the seed bank of annual plants. The cyst bank may be comprised of cysts from several years of breeding, and large cyst banks of viable resting eggs in the soil of vernal pools containing fairy shrimp have been well documented (Belk 1998). Based on a review of other studies (e.g. Belk 1977; Gallagher 1996, Brendonck 1990), Hathaway and Simovich (1996) concluded that species inhabiting more unpredictable environments, such as smaller or shorter lived pools, are more likely to have a smaller percent of their cysts hatch after their vernal pool habitats fill with water. This strategy reduces the probability of complete reproductive failure if a vernal pool dries up prematurely. This kind of "bet-hedging strategy" has been suggested as a mechanism by which rare species may persist in unpredictable environments (Chesson and Huntly 1989; Ellner and Hairston 1994).

Upland areas associated with vernal pools are also an important source of nutrients to vernal pool organisms (Wetzel 1975). Vernal pool habitats derive most of their nutrients from detritus which is washed into the pool from adjacent uplands, and these nutrients provide the foundation for vernal pool aquatic communities' food chain. Detritus is a primary food source for the vernal pool crustaceans (Eriksen and Belk 1999).

Fairy shrimp generally will not hatch until water temperatures drop to below 50°F (Gallagher 1996; Helm 1998). This species is capable of hatching multiple times within a single wet season if conditions are appropriate. Helm (1998) observed 6 separate hatches of fairy shrimp within a single wet season, and Gallagher (1996) observed 3 separate hatches in vernal pools in Butte County. Helm (1998) observed fairy shrimp living for as long as 147 days. The species can reproduce in as few as 18 days at optimal conditions of 68°F and can complete its life cycle in as little as 9 weeks (Gallagher 1996; Helm 1998). However, maturation and reproduction rates of fairy shrimp are controlled by water temperature and can vary greatly (Eriksen and Brown 1980; Helm 1998). Helm (1998) observed that fairy shrimp did not reach maturity until 41 days at water temperatures of 59°F. Fairy shrimp has been collected at water temperatures as low as 40°F (Eriksen and Belk 1999), however, the species has not been found in water temperatures above about 73°F (Helm 1998; Eriksen and Belk 1999).

The fairy shrimp is known from 32 populations extending from Stillwater Plain in Shasta County through most of the length of the Central Valley to Pixley in Tulare County, and along the central coast range from northern Solano County to Pinnacles in San Benito County (Eng et al. 1990; Fugate 1992; Sugnet and Associates 1993) and a disjunct population on the Agate Desert in Oregon. Five additional, disjunct populations exist: one near Soda Lake in San Luis Obispo County; one in the mountain grasslands of northern Santa Barbara County; one on the Santa Rosa Plateau in Riverside County, one near Rancho California in Riverside County and one on the

Agate Desert near Medford, Oregon. Three of these isolated populations each contain only a single pool known to be occupied by the fairy shrimp. The genetic characteristics of these species, as well as ecological conditions, such as watershed continuity, indicate that populations of these animals are defined by pool complexes rather than by individual vernal pools (Fugate 1992). Therefore, the most accurate indication of the distribution and abundance of these species is the number of inhabited vernal pool complexes.

The primary historic dispersal method for the fairy shrimp likely was large scale flooding resulting from winter and spring rains which allowed the animals to colonize different individual vernal pools and other vernal pool complexes. This dispersal currently is non-functional due to the construction of dams, levees, and other flood control measures, and widespread urbanization within significant portions of the range of this species. Waterfowl and shorebirds likely are now the primary dispersal agents for vernal pool crustaceans (Brusca in. litt.; 1992; Simovich in. litt., 1992). The eggs of vernal pool crustaceans are either ingested (Krapu 1974; Swanson 1974; Driver 1981; Ahl 1991) and/or adhere to the legs and feathers where they are transported to new habitats.

Vernal pool crustaceans are often dispersed from one pool to another through surface swales that connect one vernal pool to another. These dispersal events allow for genetic exchange between pools and create a population of animals that extends beyond the boundaries of a single pool. Instead, populations of vernal pool crustaceans are defined by the entire vernal pool complex in which they occur (Simovich *et al.* 1992, King 1996). These dispersal events also allow vernal pool crustaceans to move into pools with a range of sizes and depths. In dry years, animals may only emerge in the largest and deepest pools. In wet years, animals may be present in all pools, or in only the smallest pools. The movement of vernal pool crustaceans into vernal pools of different sizes and depths allows these species to survive the environmental variability that is characteristic of their habitats.

Vernal pool crustaceans are an important food source for a number of aquatic and terrestrial species. Aquatic predators include insects such as backswimmers (Woodward and Kiesecker 1994), predaceous diving beetles and their larvae, and dragonflies and damselfly larvae. Vernal pool tadpole shrimp are another significant predator of fairy shrimp. Vernal pools provide important habitat for resident and migratory birds, particularly waterfowl and shorebirds. Birds are particularly attracted to the pools because they offer foraging habitat at a time of year when resources are limited (Silveira 1998), and vernal pools help link aquatic resources in the California portion of the Pacific Flyway. Vernal pool crustaceans provide important proteins and calcium vital to the energetic needs of migratory bird migration and reproduction (Proctor *et al.* 1967; Silveira 1998). Vernal pool crustaceans are a major food source for a number of terrestrial vertebrate predators including water fowl, wading birds, toads, frogs, and salamanders (Proctor *et al.* 1967; Krapu 1974; Swanson 1974; Morin 1987; Simovich *et al.* 1991; Silveira 1998). Vernal pool crustaceans depend on the absence of water during the summer months to discourage aquatic predator species such as bullfrogs, garter snakes, and fish (Eriksen and Belk 1999).

The fairy shrimp is imperiled by a variety of human-caused activities, primarily urban development, water supply/flood control projects, and land conversion for agricultural use. Habitat loss occurs from direct destruction and modification of pools due to filling, grading, discing, leveling, and other activities, as well as modification of surrounding uplands which alters vernal pool watersheds. Other activities which adversely affect these species include off-road vehicle use, certain mosquito abatement measures, and pesticide/herbicide use. The main threat to listed vernal pool crustaceans is the loss of habitat associated with human activities, including urban/suburban development, water supply/flood control development, and conversion of natural lands to intensively farmed agricultural uses. According to the 1997 National Resources Inventory, released by the Natural Resources Conservation Service (2000), California ranked sixth in the nation in number of acres of private land developed between 1992 and 1997, at nearly 695,000 acres. Habitat loss occurs from direct destruction and modification of pools due to filling, grading, discing, leveling, and other activities, as well as modification of surrounding uplands which alters vernal pool watersheds. Other activities which adversely affect these species include off-road vehicle use, certain mosquito abatement measures, and pesticide/herbicide use, alterations of vernal pool hydrology, fertilizer and pesticide contamination, activity, invasions of aggressive non-native plants, gravel mining, and contaminated stormwater runoff. State and local laws and regulations do not protect listed vernal pool crustaceans, while other laws and regulations, including the Clean Water Act, have not effectively maintained habitat necessary to conserve and recover these species. Although developmental pressures continue, only a small fraction of vernal pool habitat is protected from the threat of destruction.

A substantial amount of vernal pool habitat has been converted for human uses in spite of Federal regulations implemented to protect wetlands. Current rapid urbanization and agricultural conversion throughout the ranges of these two species continue to pose the most severe threats to the continued existence of the vernal pool tadpole shrimp and vernal pool fairy shrimp.

In addition to direct habitat loss, the vernal pool habitat for the fairy shrimp is also highly fragmented throughout their ranges due to the nature of vernal pool landscapes and the conversion of natural habitat by human activities. Such fragmentation results in small, isolated populations of fairy shrimp which may be more susceptible to extinction due to random demographic, genetic, and environmental events. Should an extirpation event occur in a population that has been fragmented, the opportunities for recolonization would be greatly reduced due to physical (geographical) isolation from other (source) populations.

The proposed project is located within the Solano-Colusa vernal pool region, which was designated based largely on presence of endemic vernal pool species identified in the Service's Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Recovery Plan) (Service 2005a). The fairy shrimp has been adversely affected by development and modification of the vernal pool and grassland habitat within the Solano-Colusa vernal pool region and known to be present in much of the undeveloped areas surrounding the proposed project. Excessive impacts to one or more of the vernal pool regions could jeopardize the long-term survival and

recovery of the vernal pool crustaceans by increasing the vulnerability of the remaining vernal pool regions to catastrophic events (Service 2005a).

The global average temperature has risen by approximately 0.6°C during the 20th Century (IFPC 2001, 2007; Adger *et al* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IFPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils sensitive species, and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction.

The CDFG's California Natural Diversity Database includes multiple reported fairy shrimp observations within the action area (CDFG 2010). A small portion of the action area is within the Jepson Prairie Core area described in the Recovery Plan. According to the Recovery Plan (Service 2005a), these core areas were established based on the understanding that these support viable populations of vernal pool species and/or will contribute to the connectivity of habitat and, thus, the increase of dispersal opportunities between populations. The preservation and enhancement of each core area is important to maintain and possibly expand the distribution of vernal pool species range-wide (Service 2005a).

Guideline-level dry-season (in accordance with the Service's "Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods" (April 19, 1996 version) [Shrimp Guidelines]) surveys for vernal pool crustaceans were conducted by Vollmar Consulting, Natural Resource Specialists, in vernal pools along Air Base Parkway and adjacent to the proposed Walters Road Extension on September 13, 2000, and November 2000-April 2001). A habitat assessment for vernal pool crustaceans was conducted by Vollmar Consulting, Natural Resource Specialists in May February and November of 2005. In addition, guideline level vernal pool crustacean surveys were conducted in portions of the study area in 2000. These surveys detected fairy shrimp in 22 locations within or adjacent to the BSA. This species is also known to occur in pools in and adjacent to Travis Air Force Base, and in the Jepson Prairie Preserve east of Travis AFB. Presence is inferred elsewhere in the BSA where suitable habitat occurs.

The Service has determined that the fairy shrimp occurs within action area because of the presence of extant occurrences, appropriate wetland habitat within the action area, known nearby occurrences within the range of the vernal pool crustaceans, uninterrupted connectivity between occupied habitat and the action area, and the biology and ecology of the animal.

Vernal Pool Tadpole Shrimp

The vernal pool tadpole shrimp (tadpole shrimp) was listed as endangered on September 19, 1994 (Service 1994). Simovich *et al.* (1992) provide further details about the life history and ecology of these animals. The species has dorsal compound eyes, a large shield-like carapace that covers most of the body, and a pair of long cercopods at the end of the last abdominal segment (Linder 1952; Longhurst 1955; Pennak 1989). It is primarily a benthic animal that swims with its legs down. Tadpole shrimp climb or scramble over objects, as well as move along or in bottom sediments. Their diet consists of organic detritus and living organisms, such as fairy shrimp and other invertebrates (Pennak 1989).

The tadpole shrimp occurs in a wide variety of vernal pool habitats including vernal pools, clay flats, ephemeral stock ponds, roadside ditches, and road ruts (Helm 1998). They have been found in pools with water temperatures ranging from 50°F to 84°F and pH ranging from 6.2 to 8.5 (Syrdahl 1993, King 1996). However, vernal pools exhibit daily and seasonal fluctuations in pH, temperature, dissolved oxygen, and other water chemistry characteristics (Syrdahl 1993, Scholnick 1995).

The life history of the tadpole shrimp is linked to the phenology of its vernal pool habitat. After winter rainwater fills the pools, the populations are reestablished from diapaused eggs which lie dormant in the dry pool sediments (Lanway 1974; Ahl 1991). Ahl (1991) found that eggs in one pool hatched within three weeks of inundation and sexual maturation was reached in another three to four weeks. The eggs are sticky and readily adhere to plant matter and sediment particles (Simovich et al. 1992). A portion of the eggs hatch immediately and the rest enter diapause and remain in the soil to hatch during later rainy seasons (Ahl 1991). The tadpole shrimp matures slowly and is a long-lived species (Ahl 1991). Adults are often present and reproductive until the pools dry up in the spring (Ahl 1991; Simovich *et al.* 1992).

Tadpole shrimp have relatively high reproductive rates. Ahl (1991) found that fecundity increases with body size. Large females, greater than 0.8 inch carapace length, could deposit as many as 6 clutches, averaging 32 to 61 eggs per clutch, in a single wet season. Tadpole shrimp sex ratios can vary (Ahl 1991). After winter rains fill their vernal pool habitats, dormant vernal pool tadpole shrimp cysts may hatch in as little as 4 days (Ahl 1991).

Additional cysts produced by adult tadpole shrimp during the wet season may hatch without going through a dormant period (Ahl 1991). Tadpole shrimp emerge from their cysts as metanaupliu, a larval stage which lasts for 1.5 to 2 hours. They then molt into a larval form resembling the adult.

Helm (1998) found that tadpole shrimp took a minimum of 25 days to mature and the mean age at first reproduction was 54 days. Other researchers have observed tadpole shrimp generally take between 3 and 4 weeks to mature (Ahl 1991; King 1996). Ahl (1991) found that reproduction did not begin until individuals were larger than 0.39 inch carapace length. Variation in growth

and maturation rates may be a result of differences in water temperature, which strongly influences the growth rates of aquatic invertebrates. King (1996) studied genetic variation among vernal pool tadpole shrimp populations at 20 different sites in the Central Valley. She found that 96 percent of the genetic variation measured was due to differences between sites. This result corresponds with the findings of other researchers that vernal pool crustaceans have low rates of gene flow between separated sites. The low rate of exchange between vernal pool tadpole shrimp populations is probably a result of the spatial isolation of their habitats and their reliance on passive dispersal mechanisms. However, King (1996) also estimated that gene flow between pools within the same vernal pool complex was much higher, and concluded that vernal pool crustacean populations should be defined by vernal pool complex, not by the boundaries of an individual vernal pool.

Based on genetic differences, King (1996) separated tadpole shrimp populations into two distinct groups. One group was comprised of animals inhabiting the floor of the Central Valley, near the Sacramento and San Joaquin Rivers. The other group contained tadpole shrimp from sites along the eastern margin of the Central Valley. King (1996) concluded that these two groups may have diverged because cyst dispersal by overland flooding historically connected populations on the Central Valley floor, while populations on the eastern margin of the valley were not periodically connected by large scale flooding, and were therefore historically more isolated. When dispersal of these foothill populations occurred, it was probably through different mechanisms such as migratory birds.

The tadpole shrimp is known from 19 populations in the Central Valley, ranging from east of Redding in Shasta County south to Fresno County, and from a single vernal pool complex located on the San Francisco Bay National Wildlife Refuge in Alameda County. The species inhabits vernal pools containing clear to highly turbid water, ranging in size from 54 square feet in the Mather Air Force Base area of Sacramento County, to the 93-acre Olcott Lake at Jepson Prairie in Solano County. Vernal pools at Jepson Prairie and Vina Plains (Tehama County) have a neutral pH, and very low conductivity, total dissolved solids, and alkalinity (Barclay and Knight 1984; Eng et al. 1990). These pools are located most commonly in grass-bottomed swales of grasslands in old alluvial soils underlain by hardpan or in mud-bottomed claypan pools containing highly turbid water.

The main threat to the tadpole shrimp is the loss of habitat associated with human activities, including urban/suburban development, water supply/flood control development, and conversion of natural lands to intensively farmed agricultural uses. Habitat loss occurs from direct destruction and modification of pools due to filling, grading, discing, leveling, and other activities, as well as modification of surrounding uplands which alters vernal pool watersheds. Other activities which adversely affect the species include off-road vehicle use, certain mosquito abatement measures, and pesticide/herbicide use, alterations of vernal pool hydrology, fertilizer and pesticide contamination, invasions of aggressive non-native plants, gravel mining, and contaminated stormwater runoff. State and local laws and regulations do not protect the tadpole shrimp, while other laws and regulations, including the Clean Water Act, have not effectively

maintained habitat necessary to conserve and recover these species. Although developmental pressures continue, only a small fraction of vernal pool habitat is protected from the threat of destruction.

In addition to direct habitat loss, the vernal pool habitat for the tadpole shrimp is also highly fragmented throughout their ranges due to the nature of vernal pool landscapes and the conversion of natural habitat by human activities. Such fragmentation results in small, isolated populations of tadpole shrimp which may be more susceptible to extinction due to random demographic, genetic, and environmental events. Should an extirpation event occur in a population that has been fragmented, the opportunities for recolonization would be reduced due to physical (geographical) isolation from other (source) populations.

The proposed project is located within the Solano-Colusa vernal pool region, which was designated based largely on presence of endemic vernal pool species identified in the Recovery Plan (Service 2005a). The tadpole shrimp has been adversely affected by development and modification of the vernal pool and grassland habitat within the Solano-Colusa vernal pool region and known to be present in much of the undeveloped areas surrounding, and within the BSA. Excessive impacts to one or more of the vernal pool regions could jeopardize the long-term survival and recovery of the vernal pool crustaceans by increasing the vulnerability of the remaining vernal pool regions to catastrophic events (Service 2005).

The global average temperature has risen by approximately 0.6°C during the 20th Century (IFPC 2001, 2007; Adger *et al* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IFPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils sensitive species, and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction.

The CNDDB includes multiple reported vernal pool tadpole shrimp observations within the BSA (CNDDB 2010). The action area is within the known tadpole shrimp range and there are no significant artificial, hydrological, or landscape barriers between these occupied areas and the action area. Areas within and adjacent to the action area have been assigned various designations relative to the ecological value of associated vernal pool habitat. A portion of the action area is within the Jepson Prairie Core area described in the Recovery Plan (Service 2005).

Guideline-level dry-season (Shrimp Guidelines) surveys for vernal pool crustaceans were conducted by Vollmar Consulting, Natural Resource Specialists, in vernal pools along Air Base Parkway and adjacent to the proposed Walters Road Extension on September 13, 2000, and November 2000-April 2001). A habitat assessment for vernal pool crustaceans was conducted by

Vollmar Consulting, Natural Resource Specialists in May, February, and November of 2005. In addition, guideline level vernal pool crustacean surveys were conducted in portions of the study area in 2000. Although these surveys did not detect tadpole shrimp in the BSA, there are three prior known occurrences of tadpole shrimp within the BSA. This species is also known to occur in pools in south of SR 12 and east of Travis AFB. Presence is inferred elsewhere in the BSA where suitable habitat occurs.

The Service has determined that the tadpole shrimp occurs within action area because of the presence extant occurrences, appropriate wetland habitat within the action area, known nearby occurrences of vernal pool crustaceans, uninterrupted connectivity between occupied habitat and the action area, and the biology and ecology of the animal.

Contra Costa Goldfields

The Service listed Contra Costa goldfields as an endangered species in 1997 (Service 1997). This species does not currently have any State listing status. The California Native Plant Society has considered Contra Costa goldfields rare and endangered since the organization's first list was published (Powell 1974); Contra Costa goldfields are currently on List 1B.

Greene (1888) first described Contra Costa goldfields, naming this species *Lasthenia conjugens.* The type locality is Antioch, in Contra Costa County (Greene 1888). Hall (1914) later synomized Contra Costa goldfields under the common species Fremont's goldfields, which at that time was called *Baeria fremontii.* Ferris (1958) proposed the name *Baeria fremontii* var. *conjugens* to recognize the distinctiveness of Contra Costa goldfields. Finally, Ornduff (1966) restored Greene's original name and rank, returning this species to the genus *Lasthenia.* The two closest relatives of Contra Costa goldfields are *L. burkei* (Burke's goldfields) and *L. fremontii* (Fremont's goldfields).

The stems of Contra Costa goldfields are 4 to 12 inches tall, somewhat fleshy, and usually branched. The leaves are opposite and narrow; the lower leaves are entire, but stem leaves have one or two pairs of narrow lobes. The daisy-like flower heads are solitary. Both the disk and ray flowers are golden-yellow, and the ligules are 0.20 to 0.39 inch long. Each head has numerous disk flowers and 6 to 13 ray flowers. The club-shaped achenes are no more than 0.06 inch long and are shiny, olive-green, hairless, and lack a pappus (Greene 1888, Ornduff 1993b). Contra Costa goldfields has a diploid chromosome number of 12 (Ornduff 1966; Ornduff 1993b). Whereas all other species of *Lasthenia* have either completely free phyllaries or phyllaries fused more than two-thirds of their length, Contra Costa goldfields has phyllaries fused from one-quarter to one-half their length. The free phyllaries and presence of a pappus distinguish both *L. burkei* and *L. fremontii* from Contra Costa goldfields (Ornduff 1969; Ornduff 1979; Ornduff 1993b). *Blennosperma* species can be differentiated from Contra Costa goldfields by the alternate leaves, clustered (as opposed to solitary) flower heads, and paler yellow ligules of the former (Ornduff 1993a,b).

Contra Costa goldfields occurred historically in seven vernal pool regions: Central Coast, Lake-Napa, Livermore, Mendocino, Santa Barbara, Santa Rosa, and Solano-Colusa (Keeler-Wolf *et al.* 1998). In addition, several historical occurrences in Contra Costa County are outside of the defined vernal pool regions (Keeler-Wolf *et al.* 1998, (CNDDB 2010). Many collection sites from the late 19th and early 20th centuries are difficult to pinpoint because locality information on specimen labels often was vague. Ornduff (1966) reported collections from 13 sites in Alameda, Contra Costa, Mendocino, Napa, Santa Barbara, Santa Clara, and Solano Counties. Although he cited three specimens each from Contra Costa (including the type) and Santa Barbara Counties, Ornduff (1966, 1979) noted that the species was most common in Solano County. One additional site in Alameda County was documented in 1959 by G. Thomas Robbins, who collected a specimen (# 3963, housed at the Jepson Herbarium) on the "shore of San Francisco Bay" south of Russell.

Of the 32 occurrences of Contra Costa goldfields recorded between 1884 and 2010 that are currently (through 2010) catalogued in the CNDDB (2010), 20 are likely extant. However, there is uncertainty due in part to the difficulty of relocating sites based on early vague site descriptions and also because this species may reappear on a site after several years, even if it is absent during a given survey. Contra Costa goldfields presumably remains in all of the vernal pool regions where it occurred historically, except for the Santa Barbara, Livermore, and Mendocino Vernal Pool Regions. However, by far the greatest concentration of this species is in the Solano-Colusa Vernal Pool Region; where 10 occurrences that are presumed extant, plus 1 that may be extirpated. Five occurrences are extant in the Central Coast Vernal Pool Region, including three at the former Fort Ord in Monterey County, one at San Francisco Bay National Wildlife Refuge, and one near Fremont, both in Alameda County (CNDDB 2010).

Germination, growth, reproduction, and demography are likely to be similar to *Lasthenia burkei*, a close relative that has been studied more intensively. As a vernal pool annual plant, seeds of Contra Costa goldfields would be expected to germinate in response to autumn rains, with the plants maturing in a single growing season, setting seed, and dying back during the summer. However, detailed research on the life cycle has not been conducted. Laboratory germination tests on the related species *L. burkei* (Rancho Santa Ana Botanical Garden unpublished data), indicated that germination occurs rapidly in a single flush (peak germination date the same as first germination date), with relatively high germination rates (49 to 100 percent). *Lasthenia burkei* plants that establish in autumn under natural conditions may tolerate prolonged submergence but do not begin rapid stem growth until vernal pools and swales drain down during late winter or early spring (Ornduff 1969, Patterson *et al.* 1994).

Contra Costa goldfields flowers from March through June (Ornduff 1966, Ornduff 1979, Skinner *and Pavlik 1994*). The flowers are self-incompatible (Crawford and Ornduff 1989). Although Contra Costa goldfields has not been the subject of pollinator studies, observations suggest that the same insects visit all outcrossed species of *Lasthenia*, rather than concentrating on any particular species (Thorp 1976). Insect visitors to flowers of *Lasthenia* belong to five orders: Coleoptera, Diptera, Hemiptera , Hymenoptera, and Lepidoptera (Thorp and Leong 1998). Most

of these insects are generalist pollinators. All of the specialist pollinators of *Lasthenia* are solitary bees of the family Andrenidae; these pollinators include *Andrena submoesta, A. puthua, A.baeriae, A. duboisi, A. lativentris*, and two or three undescribed species (Thorp and Leong 1998). The extent to which pollination of Contra Costa goldfields depends on host-specific bees or more generalist pollinators is currently unknown.

Seed dispersal mechanisms in Contra Costa goldfields are unknown. However, the lack of a pappus or even hairs on the achenes makes wind dispersal unlikely (Ornduff 1976). Seed longevity, survival rates, fecundity, and other demographic parameters have not been investigated. However, as with other vernal pool annuals, population sizes have been observed to vary by up to four orders of magnitude from year to year (CNDDB 2010). Thus, this species most likely forms a persistent soil seed bank. Seeds of the related species *L. burkei* have been stored artificially for many years with little loss of viability (C. Patterson, pers. comm.). However, the maximum duration of viable seed in the soil is not known.

Contra Costa goldfields typically grows in vernal pools, swales, moist flats, and depressions within a grassland matrix (CNDDB 2010). However, several historical collections were from populations growing in the saline-alkaline transition zone between vernal pools and tidal marshes on the eastern margin of the San Francisco Bay (P. Baye 2000). The herbarium sheet for one of the San Francisco Bay specimens notes that the species also grew in evaporating ponds used to concentrate salt (P. Baye 2000). The vernal pool types from which this species has been reported are Northern Basalt Flow, Northern Claypan, and Northern Volcanic Ashflow (Sawyer and Keeler-Wolf 1995). The landforms and geologic formations for sites where Contra Costa goldfields occur have not yet been determined. Most occurrences of Contra Costa goldfields are at elevations of 6 to 200 feet, but the recently discovered Monterey County occurrences are at 400 feet and one Napa County occurrence is at 1,460 feet elevation (CNNB 2010). The soil types have not yet been identified for most *Contra Costa goldfields* localities. However, soil series from which it is known are: Aiken, Antioch, Concepcion, Conejo, Crispin, Haire, Linne, Los Robles, Rincon, Solano, and San Ysidro, plus the Arnold-Santa Ynez, Hambright-rock outcrop, and Los Osos complexes. Soil textures, where known, are clays or loams. At least in Solano County and on the shores of San Francisco Bay, Contra Costa goldfields grow in alkaline or saline-alkaline sites (P. Baye 2000, CNDDB 2010).

Many plant species grow in association with Contra Costa goldfields in various parts of its range, but no comprehensive survey of associates has been undertaken. The two most commonly reported associates are *Lolium multiflorum* (Italian ryegrass) and *Plagiobothrys* spp. (popcorn flower). Other plant species that occur at several Contra Costa goldfields sites include *Cotula coronipifolia* (brass buttons), *Downingia pulchella* (valley downingia), *Eryngium aristulatum* (California eryngo), *Lasthenia glaberrima* (smooth goldfields), *Myosurus minimus* (common mousetail), and *Pleuropogon californicus* (California semaphore grass).

The largest concentration of goldfields in Solano County is within the City of Fairfield's sphere of influence and subject to relatively intense development pressure under the City's general plan.

Numerous construction projects, including residential development, landfill expansion, and drainage channels, are proposed and pose specific threats (Service 1997). Threats due to conversions to vineyards are also continuing. The largest Napa County occurrence of this plant, at Suscol Ridge (CNDDB 2010), is imminently threatened by vineyard conversion; the site is already under a 25-year lease to a winery (P. Baye 2000). Competition from non-native plants, particularly *Lolium multiflorum* (Italian ryegrass), threatens at least seven occurrences of Contra Costa goldfields, several of which are also targeted for development (CNDDB 2010). Non-native grasses such as *Lolium multiflorum* not only shade out short statured plants like Contra Costa goldfields, but can also negatively impact vernal pool hydrology by decreasing inundation periods in pools (Marty 2004). In addition, encroachment by non-native plants often follows surface-disturbing activities, such as discing, grading, filling, ditch construction, and off-road vehicle use, which can alter hydrology and microhabitat conditions (Service 2005a). Management strategies including grazing, mowing, and burning are vital to controlling these weed species. The CNDDB (2010) also cites inappropriate livestock grazing practices as a threat to seven occurrences of Contra Costa goldfields. However, the removal of livestock grazing from at least one site in Contra Costa County has caused significant population declines in this species (J. Marty, pers. comm. 2004). Therefore, the complete elimination of grazing, as well as overgrazing, may have adverse impacts to the Contra Costa goldfields.

Five occurrences of Contra Costa goldfields are on public lands: three at Fort Ord, and one each at San Francisco Bay National Wildlife Refuge and Travis Air Force Base. These lands are administered by the U.S. Bureau of Land Management, the Service, and the U.S. Air Force, respectively. All of the Fort Ord occurrences are on land within the Habitat Management Plan Habitat Reserve lands and will be conserved and managed in perpetuity (W. Collins *in litt.* 2005; U.S. Army Corps of Engineers 1997). The population at Travis Air Force Base, including over 20 acres of adjacent restored vernal pools, is protected as a special ecological preserve, with protective measures and appropriate management for the species provided in the Travis Air Force Base Land Management Plan.

Seasonal managed cattle grazing has been returned to two conservation sites supporting Contra Costa goldfields: 1) the Warm Springs Seasonal Wetland Unit of the Don Edwards San Francisco Bay National Wildlife Refuge in Alameda County, and 2) the State Route 4 Preserve managed by the Muir Heritage Land Trust in Contra Costa County. The Contra Costa goldfields population at the Warm Springs Unit has declined during the last 10 years due to many factors including competition by non-native plant species. During this time period, grazing, which occurred intermittently at the Warm Springs Unit since the 1800s, has been excluded by the Refuge until a management plan could be developed. The decline in the Contra Costa goldfields population at the Warm Springs Unit cannot be attributed to a single factor, but most likely results from the complex interaction of several variables including current and historical land uses, the abiotic environment, and annual climatic variation. The increasing dominance of non-native grasses, however, coincides with the suspension of livestock grazing, suggesting that the lack of a disturbance regime may be a primary factor in the degradation of habitat for Contra Costa goldfields at this site (Service 2005a). The population of Contra Costa goldfields at the State

Route 4 Preserve, which was protected as part of compensation for the construction of the State Route 4 Gap Closure Project, has also declined in recent years. The decline may be due to a number of causes, including below normal precipitation and competition with non-native species (Pardieck 2003). The site had been grazed heavily for many years resulting in stream channel erosion. Grazing was suspended in 2000 and the numbers of plants dropped sharply in 2001 and continued to decline the following year. Controlled grazing has been reintroduced to control the amount of seed and thatch produced by non-native plants.

The conversion of land to agricultural use and urban development which has become more pronounced over the past 60 years has artificially isolated populations of goldfields from each other, resulting in 5 distinct populations in the area. While these populations are fragments of a previously larger population, they are nevertheless sizeable individually at least in terms of total numbers of plants, ranging in size from 100,000 plants to over 30 million (LSA 2009). These five primary populations are demarcated based on soil type and watershed association. A description of each primary population follows:

- **Northeast Fairfield.** Several sub-populations, separated from each other by existing roads and developments for the most part, exist in northeast Fairfield. These sub-populations are located within the watersheds of McCoy and western Union Creek. The total population is typically in excess of at least 8-10 million individuals annually given weather conditions and grazing regimes (LSA 2009).
- **Potrero Hills Flats.** Two sub-populations exist in this area. One large sub-population occurs at the base of the Potrero Hills at the lower end of the watershed of Union Creek. A second, small sub-population exists to the east in the flats north of Hwy 12, within the lower Denverton Creek watershed.
- **Cordelia Road.** One small, remnant sub-population exists near Cordelia Road in the flats south of a rock quarry, southwest of Fairfield at the lower end of the watershed of Dan Wilson Creek.
- **Lower Ledgewood Creek.** A small sub-population occurring in the lower reaches of the watershed of Ledgewood Creek, southwest of Fairfield.
- **Vanden Road.** A small sub-population has been historically reported as occurring in low areas along the railroad tracks that parallel Vanden Road, north of Travis Air Force Base in the upper region of the watershed of Union Creek. This population appears to be extinct, but other undocumented sub-populations may be present in suitable vernal pool habitats east of Vanden Road, but have not yet been surveyed (LSA 2009).

The proposed project is located within the Solano-Colusa vernal pool region, which was designated based largely on presence of endemic vernal pool species identified in the Recovery Plan (Service 2005a). Goldfields have been adversely affected by development and modification of the vernal pool and grassland habitat within the Solano-Colusa vernal pool region and known to be present in much of the undeveloped areas surrounding the base. Excessive impacts to one or more of the vernal pool regions could jeopardize the long-term survival and recovery of the goldfields by increasing the vulnerability of the remaining vernal pool regions to catastrophic

events (Service 2005a). The action area is within a small portion of the Jepson Prairie Core area described in the Recovery Plan (Service 2005a).

Guideline-level surveys for goldfields have been conducted within the BSA in the bloom time of years 1999, 2000, 2002, 2005, and 2007. Goldfields were detected in the Walters Road extension area, along the south side of Airbase Parkway between Peabody Road and Walters Road, and along the east side of Walters Road, south of Airbase Parkway. Therefore, the Service has determined that Contra Costa goldfields do occur within the action area because of the biology and ecology of the plant, the presence of known and suitable habitat in the action area, as well as on the site.

California Tiger Salamander

On May 23, 2003, the Service proposed to list the Central California Distinct Population Segment (DPS) of the California tiger salamander as threatened. At that time we also proposed reclassification of the Santa Barbara County DPS and Sonoma County DPS from endangered to threatened (68 FR 28647). In the same notice we also proposed a special rule under section 4(d) of the Act to exempt take for routine ranching operations for the Central California DPS and, if reclassified to threatened, for the Santa Barbara and Sonoma County DPSs (68 FR 28668). On August 4, 2004, after determining that the listed the Central California population of the California DPS of the California tiger salamander was threatened (69 FR 4721211), we determined that the Santa Barbara and Sonoma County populations were threatened as well, and reclassified the California tiger salamander as threatened throughout its range (69 FR 47212), removing the Santa Barbara and Sonoma County populations as separately listed DPSs (69 FR 47241). In this notice we also finalized the special rule to exempt take for routine ranching operations for the California tiger salamander throughout its range (69 FR 47248). On August 18, 2005, as a result of litigation of the August 4, 2004 final rule on the reclassification of the California tiger salamander DPSs (*Center for Biological Diversity et al.* v. *United States Fish and Wildlife Service et al.*, C 04-04324 WHA [N.D. Cal. 2005]), the District Court of Northern California sustained the portion of the 2004 rule pertaining to listing the Central California tiger salamander as threatened with a special rule, vacated the 2004 rule with regard to the Santa Barbara and Sonoma DPSs, and reinstated their prior listing as endangered. The List of Endangered and Threatened Wildlife in part 17, subchapter B of Chapter I, title 50 of the Code of Federal Regulations has not been amended to reflect the vacatures contained in this order, and continues to show the rangewide reclassification of the California tiger salamander (salamander[s]) as a threatened species with a special rule.

The salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Recorded adult measurements have been as much as 8.2 inches long (Petranka 1998; Stebbins 2003). Salamanders exhibit sexual dimorphism (differences in body appearance based on gender) with males tending to be larger than females. The coloration of the adults generally consists of random white or yellowish markings against a black body. The markings tend to be more concentrated on the lateral sides of the body; whereas other salamander species tend to have brighter yellow spotting that is heaviest on the dorsal surface.

The salamander has an obligate biphasic life cycle (Shaffer *et al.* 2004). Although the larvae develop in the vernal pools and ponds in which they were born, the species is otherwise terrestrial and spend most of their post-metamorphic lives in widely dispersed underground retreats (Shaffer *et al.* 2004; Trenham *et al.* 2001). Because they spend most of their lives underground, the animals rarely are encountered even in areas where salamanders are abundant. Subadult and adult salamanders typically spend the dry summer and fall months in the burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a). Although ground squirrels have been known to eat these amphibians, the relationship with their burrowing hosts is primarily commensal (an association that benefits one member while the other is not affected) (Loredo *et al.* 1996; Semonsen 1998).

Salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Burrows often harbor camel crickets (*Stenelopomatus* species) and other invertebrates that provide likely prey for the amphibians. Underground refugia also provide protection from the sun and wind associated with the dry California climate that can cause excessive drying of amphibian skin. Although salamanders are members of a family of "burrowing" salamanders, they are not known to create their own burrows. This may be due to the hardness of soils in the California ecosystems in which they are found. Salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia for the species. Burrows are short lived without continued small mammal activity and typically collapse within approximately 18 months (Loredo *et al.* 1996).

Upland burrows inhabited by salamanders have often been referred to as aestivation sites. However, "aestivation" implies a state of inactivity, while most evidence suggests that the animals remain active in their underground dwellings. One study has found that salamanders move, feed, and remain active in their burrows (Van Hattem 2004). Because the adults arrive at breeding ponds in good condition and are heavier when entering the pond than when leaving, researchers have long inferred that they are feeding while underground. A number of direct observations have confirmed this (Trenham 2001; Van Hattem 2004). Thus, "upland habitat" is a more accurate description of the terrestrial areas used by salamanders.

Salamanders typically emerge from their underground refugia at night during the fall or winter rainy season (November-May) to migrate to their breeding ponds (Stebbins 1985, 1989; Shaffer

et al. 1993; Trenham *et al.* 2000). The breeding period is closely associated with the rainfall patterns in any given year with less adults migrating and breeding in drought years (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Male salamander are typically first to arrive and generally remain in the ponds longer than females. Results from a 7-year study in Monterey County suggested that males remained in the breeding ponds for an average of 44.7 days while females remained for an average of only 11.8 days (Trenham *et al.* 2000). Historically, breeding ponds were likely limited to vernal pools, but now include livestock stockponds. Ideal breeding ponds are typically fishless, free of non-native predators, and seasonal or semi-permanent (Barry and Shaffer 1994; Petranka 1998).

While in the ponds, adult salamanders mate and then the females lay their eggs in the water (Twitty 1941; Shaffer *et al.* 1993; Petranka 1998). Egg laying typically reaches a peak in January (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). Eggs are often attached to objects, such as rocks and boards in ponds with no or limited vegetation (Jennings and Hayes 1994). Clutch sizes from a Monterey County study had an averaged of 814 eggs (Trenham *et al.* 2000). Seasonal pools may not exhibit sufficient depth, persistence, or other necessary parameters for adult breeding during times of drought (Barry and Shaffer 1994). After breeding and egg laying is complete, adults leave the pool and return to their upland refugia (Loredo *et al.* 1996; Trenham 1998a). Adult salamanders often continue to emerge nightly for approximately the next two weeks to feed amongst their upland habitat (Shaffer *et al.* 1993).

Salamander larvae typically hatch within 10 to 24 days after eggs are laid (Storer 1925). The larvae are totally aquatic and range in length from approximately 0.45 to 0.56 inches (Petranka 1998). They have yellowish gray bodies, broad fat heads, large, feathery external gills, and broad dorsal fins that extend well up their back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the tadpoles of Pacific treefrogs (*Pseudacris regilla*), western spadefoot toads (*Spea hammondii*), and California red-legged frogs (*Rana aurora draytonii*) (J. Anderson 1968; P. Anderson 1968). Salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, they often rest on the bottom in shallow water but are also found throughout the water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The salamander larval stage is typically completed in 3 to 6 months with most metamorphs entering upland habitat during the summer (Petranka 1998). In order to be successful, the aquatic phase of this species' life history must correspond with the persistence of its seasonal aquatic habitat. Most seasonal ponds and pools dry up completely during the summer. The peak emergence of these metamorphs is typically between mid-June and mid-July (Loredo and Van Vuren 1996; Trenham *et al.* 2000). 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). Larval development and metamorphosis can vary and is often site-dependent. Larvae collected near Stockton in the Central Valley during April varied between 1.88 to 2.32 inches in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left breeding pools 60 to 94 days after eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. Longer ponding duration typically results in larger larvae and metamorphosed juveniles that are more likely to survive and reproduce (Pechmann *et al.* 1989; Semlitsch *et al.* 1988; Morey 1998; Trenham 1998b). Larvae will perish if a breeding pond dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann *et al.* (1989) found a strong positive correlation between ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, Feaver (1971) found that only 11 of 30 sampled pools supported larval salamanders, and 5 of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only 6 (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988; Scott 1994; Morey 1998).

Following metamorphosis, juvenile salamanders leave their pools and move to upland habitat. This emigration can occur in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo *et al.* 1996). Wet conditions are more favorable for upland travel but summer rain events seldom occur as metamorphosis is completed and ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under dry conditions, juveniles may be limited to seeking upland refugia in close proximity to their aquatic larval pool. These individuals often wait until the next winter's rains to move further into more suitable upland refugia. Juveniles remain active in their upland habitat, emerging from underground refugia during rainfall events to disperse or forage (Trenham and Shaffer 2005). Depending on location and other development factors, metamorphs will not return as adults to aquatic breeding habitat for 2 to 5 years (Loredo and Van Vuren 1996; Trenham *et al.* 2000).

Lifetime reproductive success for the salamander is low. Results from one study suggest that the average female bred 1.4 times over their lifespan and produced 8.5 young per reproductive effort that survived to metamorphosis (Trenham *et al.* 2000). This resulted in the output of roughly 11 metamorphic offspring over a breeding female's lifetime. The primary reason for low reproductive success may be that this relatively short-lived species requires two or more years to become sexually mature (Shaffer *et al.* 1993). Some individuals may not breed until they are four to six years old. While salamanders may survive for more than ten years, many breed only once, and in one study, less than 5 percent of marked juveniles survived to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events as well human-caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated pools can quickly extirpate a population.

Dispersal and migration movements made by salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the

movement of salamanders to and from a pond from the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live continuously for several years. At a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal/ birth pond to breed, while 20 percent dispersed to other ponds (Trenham *et al.* 2001). After breeding, adult salamanders return to upland habitats, where they may live for one or more years before attempting to breed again (Trenham *et al.* 2000).

Salamanders are known to travel long distances between breeding ponds and their upland refugia. Generally it is difficult to establish the maximum distances traveled by any species, but salamanders in Santa Barbara County have been recorded dispersing up to 1.3 miles from their breeding ponds (Sweet 1998). As a result of a 5-year capture and relocation study in Contra Costa County, Orlaf (2007) estimated that captured California tiger salamanders were traveling a minimum of 0.5 mile to the nearest breeding pond and that some individuals were likely traveling more than 1.3 miles to and from breeding ponds. Tiger salamanders are also known to travel between breeding ponds. One study found that 20 to 25 percent of the individuals captured at one pond were recaptured later at other ponds approximately 1,900 and 2,200 feet away (Trenham *et al.* 2001). In addition to traveling long distances during juvenile dispersal and adult migration, salamanders may reside in burrows far from their associated breeding ponds.

Although previously cited information indicates that salamanders can travel long distances, they typically remain close to their associated breeding ponds. A trapping study conducted in Solano County during the winter of 2002/2003 suggested that juveniles dispersed and used upland habitats further from breeding ponds than adults (Trenham and Shaffer 2005). More juvenile salamanders were captured at traps placed at 328, 656, and 1,312 feet from a breeding pond than at 164 feet. Approximately 20 percent of the captured juveniles were found at least 1,312 feet from the nearest breeding pond. The associated distribution curve suggested that 95 percent of juvenile salamanders were within 2,099 feet of the pond, with the remaining 5 percent being found at even greater distances. Preliminary results from the 2003-04 trapping efforts at the same study site detected juvenile salamanders at even further distances, with a large proportion of the captures at 2,297 feet from the breeding pond (Trenham *et al.*, unpublished data). Surprisingly, most juveniles captured, even those at 2,100 feet, were still moving away from ponds. In Santa Barbara County, juvenile salamanders have been trapped approximately 1,200 feet away while dispersing from their natal pond (Science Applications International Corporation, unpublished data). These data show that many salamanders travel far while still in the juvenile stage. Post-breeding movements away from breeding ponds by adults appear to be much smaller. During post-breeding emigration from aquatic habitat, radio-equipped adult salamanders were tracked to burrows between 62 to 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult salamanders exiting the ponds with depleted physical reserves, or drier weather conditions typically associated with the post-breeding upland migration period.

Salamanders are also known to use several successive burrows at increasing distances from an associated breeding pond. Although previously cited studies provide information regarding linear movement from breeding ponds, upland habitat features appear to have some influence on movement. Trenham (2001) found that radio-tracked adults were more abundant in grasslands with scattered large oaks (*Quercus* species), than in more densely wooded areas

Documented or potential salamander predators include coyotes (*Canis latrans*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), egrets (*Egretta* species), great blue herons (*Ardea herodias*), crows (*Corvus brachyrhynchos*), ravens (*Corvus corax*), garter snakes (*Thamnophis* species), bullfrogs (*Rana catesbeiana*), California red-legged frogs (*Rana aurora draytonii*), mosquito fish (*Gambusia affinis*), and crayfish (*Procrambus* species).

The salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern salamander (*Ambystoma tigrinum*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); and predation by introduced species. Salamander populations are likely threatened by multiple factors but continued habitat fragmentation and colonization of non-native salamanders may represent the most significant current threats. Habitat isolation and fragmentation within many watersheds have precluded dispersal between sub-populations and jeopardized the viability of metapopulations (broadly defined as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or "rescuing" extinct habitat patches). Other threats include predation and competition from introduced exotic species; possible commercial over-utilization; diseases; various chemical contaminants; road kill; and certain mosquito and rodent control operations. Currently, these various primary and secondary threats are largely not being offset by existing Federal, State, or local regulatory mechanisms. The salamander is also prone to chance environmental or demographic events.

The global average temperature has risen by approximately 0.6°C during the 20th Century (IFPC 2001, 2007; Adger *et al* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IFPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils sensitive species, and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat.

The proposed project is located within the Solano-Colusa vernal pool region, which was designated based largely on presence of endemic vernal pool species identified in the Recovery Plan (Service 2005a). Salamanders have been adversely affected by development and

modification of the vernal pool and grassland habitat within the Solano-Colusa vernal pool region and known to be present in much of the undeveloped areas surrounding the BSA. Excessive impacts to one or more of the vernal pool regions could jeopardize the long-term survival and recovery of the salamander by increasing the vulnerability of the remaining vernal pool regions to catastrophic events.

The salamander is known to be present in much of the undeveloped areas to the south and east of the proposed project site. The CNDDB includes three reported salamander observation adjacent to the proposed project site to the east, within 1 mile (CNDDB 2010). Areas within and adjacent to the action area have been assigned various designations relative to the ecological value of associated vernal pool habitat. The action area is within the Jepson Prairie Core area described in the Service's Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service 2005). The California tiger salamander Central Valley Region, Designated Critical Habitat Unit 2 is located east of the action area, in Jepson Prairie. No protocol surveys were conducted for salamanders specifically for the proposed project, however the entire BSA was evaluated for its potential to support both aquatic and upland habitat. Results from these habitat assessments determined that the BSA did not contain any suitable aquatic habitat for salamanders but that it did contain suitable upland habitat.

The Service has determined that the salamander is reasonably certain to occur within the action area because of the presence of appropriate upland habitat within the action area, the presence of potential breeding ponds adjacent to the action area, known adjacent occurrences within the dispersal range of the salamander, connectivity between occupied habitat and the action area, and the biology and ecology of the animal, especially the ability of the adults to move considerable distances between their breeding ponds and upland habitat.

Valley Elderberry Longhorn Beetle

The beetle was listed as a threatened species under the Act on August 8, 1980 (45 **FR** 52803). Critical habitat for the species was designated and published in 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. The first area designated as critical habitat for this species is along the lower American River at River Bend (Goethe) and Ancil Hoffman parks (American River Parkway Zone) and the second area is at the Sacramento Zone, an area about a half mile from the American River downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to *The Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984). These critical habitat areas and essential habitat areas within the American River parkway and Putah Creek support large numbers of mature elderberry shrubs with extensive evidence of use by the beetle.

The elderberry shrub (*Sambucus* sp.) is the sole host plant for the beetle. Elderberries are locally common components of the remaining riparian forest and savannah landscapes, and to a lesser

extent the mixed chaparral-foothill woodlands, of the Central Valley. The occupancy rates of the beetle are reduced in non-riparian habitats (e.g., Talley *et al.* in press), indicating that riparian elderberry habitat an important habitat type for the beetle.

Use of elderberry shrubs by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva emerging just prior to the pupal stage. Observations of elderberry shrubs along the Cosumnes River and in the Folsom Lake area indicate that larval beetles can be found in elderberry stems with no apparent exit holes; the larvae either succumb prior to constructing an exit hole or not developed sufficiently to construct one. Larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level and can occur living stems. *The Valley Elderberry Longhorn Beetle Recovery Plan* (Service 1984) and Barr (1991) further describe the beetle's life history.

The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge *et al.* 2001). It has been observed feeding upon both blue and red elderberry (Service 1984, Barr 1991) with stems greater than or equal to one inch in diameter (Barr 1991). Sightings of the beetle are rare and in most circumstances, evidence of the beetle is derived from the observation of the exit holes left when adults emerge from elderberry stems. The beetle tends to occur in areas with higher elderberry densities, but has lower exit hole densities than a closely related species, the California elderberry longhorn beetle. (Collinge *et al.* 2001).

When the beetle was listed in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the *Valley Elderberry Longhorn Beetle Recovery Plan* was prepared in 1984, additional occupied localities had been found along the American River and Putah Creek. As of 2010, the California Range wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDB 2010). The California Natural Diversity Database (CNDDB) contained 190 occurrences for this species in 44 drainages throughout the Central Valley. However, the number of records should be viewed with caution as a record does not necessarily indicate a unique population. In many cases, there are multiple records within close proximity to one another within the same watershed or river. For example, 24 records are known within two miles of the American River (CNDDB 2010).

The beetle is considered a poor disperser based on the spatial distribution of occupied shrubs (Barr 1991; Collinge *et al.* 2001). Huxel and Hastings (1999) used computer simulations of colonization and extinction patterns based on differing dispersal distances, and found that the short dispersal simulations best matched the 1997 census data in terms of site occupancy. This suggests that dispersal and colonization are limited to nearby sites. At spatial scales greater than 6.2 miles, such as across drainages, beetle occupancy appears to be strongly influenced by regional extinction and colonization processes, and colonization is constrained by limited dispersal (Collinge *et al.* 2001; Huxel and Hastings 1999). Except for one occasion, drainages examined by Barr that were occupied in 1991, remained occupied in 1997 (Collinge *et al.* 2001;

Huxel and Hastings 1999). The one exception was Stoney Creek, which was occupied in 1991, but not in 1997. All drainages found by Barr (1991) to be unoccupied in 1991, were also unoccupied in 1997. Collinge *et al.* (2001) further found that while the proportions of occupancy were similar, the number of sites examined containing elderberry and the density of elderberry at sites had decreased since Barr (1991), resulting in fewer occupied sites and groups. Studies suggest that the beetle is unable to re-colonize drainages where the species has been extirpated, because of its limited dispersal ability (Barr 1991; Collinge *et al.* 2001). This data suggests that drainages unoccupied by the beetle remain unoccupied.

The beetle continues to be threatened by habitat loss and fragmentation, predation by the non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Huxel *et al.* 2001; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock.

Habitat destruction is one of the most significant threats to the beetle. Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Huxel *et al.* 2001; Katibah 1984; Roberts *et al.* 1977; Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages, such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984).

A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). The clearing of riparian forests for fuel and construction made this land available for agriculture (Thompson 1961). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984).

In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well and urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectric power, flood control, navigation, and recreation (Frayer *et al.* 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to 800,000 acres of riparian forest as of approximately 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Huxel *et al* 2001; Katibah 1984). Another source estimates that of approximately 5,000,000 acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer *et al.* 1989).

Based on a CDFG riparian vegetation distribution map, by 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent as of 1979 (Katibah 1984). More extreme figures were given by Frayer *et al.* (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939).

An more recent analysis, completed by The Central Valley Historic Mapping Project, observed similar decreases in the amount of riparian habitat (Geographic Information Center 2003). Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96 percent in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84 percent in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80 percent in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley.

Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig (1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation. Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge *et al.* (2001) consistently found beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species.

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species' potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998). Small, isolated subpopulations are susceptible to extirpation from random demographic,

environmental, and/or genetic events (Shaffer 1981; Lande 1988; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors. When a sub-population becomes extinct, habitat fragmentation reduces the chance of recolonization from any remaining populations. The effect of habitat fragmentation likely is exacerbated by the poor dispersal abilities of the beetle (Collinge *et al* 2001; Talley 2005).

Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species (Huxel *et al.* 2001; Huxel 2000) and pesticide contamination (Barr 1991). Several edge effect-related factors may be related to the decline of the beetle.

The invasive Argentine ant (*Linepithema humile*) is a potential threat to the beetle (Huxel 2000). This ant is both an aggressive competitor and predator on native fauna that is spreading throughout riparian habitats in California and displacing assemblages of native arthropods (Ward 1987; Human and Gordon 1997; Holway 1998). The Argentine ant requires moisture and it may thrive in riparian or irrigated areas. A negative association between the presence of the ant and beetle exit holes was observed along Putah Creek in 1997 (Huxel 2000). This aggressive ant could interfere with adult mating or feeding behavior, or prey on eggs and larvae (e.g., Way *et al.* 1992). Surveys along Putah Creek found beetle presence where Argentine ants were not present or had recently colonized, but the beetle was absent from otherwise suitable sites where Argentine ants had become well-established (Huxel 2000). Between 1998 and 2002, the number of sites infested by the Argentine ant increased by 3 along Putah Creek and the American River (30 sites total were examined) (Huxel 2000; Holyoak and Talley 2001). The Argentine ant has been expanding its range throughout California since its introduction around 1907, especially in riparian woodlands associated with perennial streams (Holway 1998; Ward 1987).

Huxel (2000) concluded that, given the potential for Argentine ants to spread with the aid of human activities such as movement of plant nursery stock and agricultural products, this species may come to infest most drainages in the Central Valley along the valley floor, where the beetle is found.

The beetle is also likely preyed upon by insectivorous birds, lizards, and European earwigs (*Forficularia auricularia*) (Klasson *et al.* 2005). These three predators move freely up and down elderberry stems searching for food. The European earwig is a scavenger and omnivore that was often found feeding on tethered mealworm (*Tenebrio monitor*) larvae. The earwig may be common in riparian areas and it may lay its eggs in dead elderberry shrubs. The earwig, like the Argentine ant, requires moisture and is often found in large numbers in riparian and urban areas.

Earwig presence and densities tended to be highest in mitigation sites likely because of the irrigation, although this needs to be statistically tested (Klasson *et al.* 2005).

Invasive exotic plant species may significantly alter the habitat of the beetle. Without adequate eradication and control measures these non-native species may eliminate elderberry shrubs and other native plants. Pest plants of major importance in Central Valley riparian systems include black locust (*Robinia pseudoacacia*), giant reed (*Arundo donax*), red sesbania (*Sesbania punicea*), Himalaya blackberry (*Rubus armeniacus*), tree of heaven (*Ailanthus altissima*), Spanish broom (*Spartium junceum*), Russian olive (*Eleagnus angustifolia*), edible fig (*Ficus carica*), and Chinese tallowtree (*Sapium sebiferum*). Non-woody invasives such as ripgut brome (*Bromus diandrus*), foxtail barley (*Hordeum murinum*), *Lolium multiflorum*, and starthistle/knapweed (*Centaurea* spp.) also may impair elderberry germination or establishment, or elevate the risk of fire. Invasive plant control efforts often are limited by funding, labor, coordination with landowners, and the resilience and spread of their target plants. No rangewide assessment has been completed on the overall degree of impact of invasive plants on the beetle and its habitat. However, there are a number of local efforts to control invasive riparian plant species. For example, the American River Parkway has invasive species removal efforts by Sacramento Weed Warriors (a community stewardship project associated with the California Native Plant Society) and others, and the Cosumnes River Preserve has a group of volunteers who regularly remove exotics and restore native habitats (Talley *et al.* 2006).

Several other factors may threaten the beetle including fire, flooding, and over-grazing by livestock. The condition of elderberry shrubs can be adversely affected by fire, which is often common at the urban-wildland interface. Brush fires initially have a negative effect on shrub condition and, therefore, beetle larvae through direct burning and stem die-off. A year after fire, however, surviving elderberry resprout and display rapid stem growth (Crane 1989). Fires often scarify the hard elderberry seed coat leading to germination of seedlings the following season (Crane 1989). Frequent or repeated fire, however, may kill remaining shoots, root crowns and seeds, causing elderberry to be eliminated from an area for many years since recruitment by seeds is patchy and generally slow (Crane 1989). Elderberry shrubs appeared suitable for the beetle two to six years after burning, but were often uninhabited, with the presence of old, burned exit holes suggesting pre-burn occupancy and post-burn vacancy (Talley *et al.* 2006.). The post-fire lag in occupancy is likely the result of the limited movements of the beetle. Beetle occupancy occurred six to seven years post burn and, as in the alluvial plain of the American River Parkway, is about the same within the post-burn compared with unburned areas (Talley *et al.* in press). No quantitative studies of the net effects of fire on the beetle have been undertaken (e.g., examining beetle and elderberry through time after burns or in areas with varying burn frequencies and magnitude).

The beetle can tolerate flooding of its riparian habitat. The animal has higher occupancy rates in riparian than non-riparian habitats, and associations between the beetle and proximity to rivers were either not observed or there was a weak positive correlation with nearness to the river (Halstead and Oldham 1990; Talley 2005; Talley *et al.* in press). These findings illustrate that

the beetle is not likely harmed by flooding and that higher habitat quality may be associated with rivers. In addition, if elderberry, a facultative riparian shrub, can withstand flooding, then the beetle likely will survive these events. Most floods occur during winter or early spring when the beetle is in its early life history stages, so that the effects of floods are even less likely to affect the beetle. If the shrub is exposed to prolong flooding (i.e. anoxia) and becomes severely stressed, then the beetle may be affected. The duration and magnitude of flooding at which elderberry stresses is uncertain and the levels of stress that affect the beetle is also unknown. Elderberry shrubs have adaptations that plants use to persist with flooding such as lenticels and aerenchyma, demonstrating that it is probably at least somewhat flood tolerant. Finally, if an area is flooded too frequently so that elderberry cannot survive then no beetles would be able to inhabit the area (Talley 2005).

Another potential factor in the beetle's decline is the effects of inappropriate levels of livestock grazing, which can result in destruction of entire elderberry plants and inhibition of elderberry regeneration. Cattle, sheep and goats readily forage on new elderberry growth, and goats will consume even decadent growth. Well-manicured stands of elderberries, such as occurs due to livestock grazing, have generally been shown to have a relative absence of beetles (Service 1984). The effects on the beetle of both grazing and exotic plant invasions are likely significantly exacerbated by the problem of habitat fragmentation of elderberries. Such fragmentation increases the edge:interior ratio of habitat patches, thereby facilitating the adverse effects of these outside influences.

The global average temperature has risen by approximately 0.6°C during the 20th Century (IFPC 2001, 2007; Adger *et al* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IFPC 2001, 2007; Adger *et al.* 2007), and that it is "very likely" that it is largely due to manmade emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Anonymous 2007; Inkley *et al.* 2004; Adger *et al.* 2007; Kanter 2007) likely imperils sensitive species, and the resources necessary for their survival. Since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, and diseases. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat.

There are 9 records for the beetle in the CNDDB for Solano County. The nearest of these records is approximately three miles to the west of the Walters Road extension portion of the project, in the foothills northwest of the City of Fairfield. Additional records occur along Putah Creek, Lake Berryessa, and the nearby foothills approximately eight miles north of the BSA.

Focused surveys for elderberry shrubs were conducted by Jones & Stokes Associates on October 9, 2001 and October 13, 2005. Additional surveys were conducted by PBS&J in March 27, 2007, April 3, 2007, and September 23, 2008. Surveys detected seven elderberry shrubs within 100 feet from the edge of disturbance; all of which occur along Alamo Creek adjacent to its crossing under Leisure Town Road, just south of Elmira Road. Two shrubs occur

on the east side of Leisure Town Road, four shrubs occur on the west side, and one cluster of stems that are less than one inch in diameter also occurs on the west side. A single potential beetle exit hole was observed on one of the shrubs on the west side of Leisure Town Road. Based on current project designs, it is expected that four of these seven shrubs, two on each side of Leisure town road, will be removed during the construction of road/bridge improvements proposed for these areas. The Service has determined that the beetle is reasonably certain to occur within the project area because of the biology and ecology of the animal, the presence of suitable habitat and the recent observations of a beetle exit hole within an elderberry shrub located in the action area and within the same watershed as the proposed project.

Critical Habitat Status and Baseline

Vernal Pool Fairy Shrimp Critical Habitat

The Service designated 597,821 acres of critical habitat for the vernal pool fairy shrimp in 2005 (Service 2005b). In determining which areas to designate as critical habitat, the Service considers those physical and biological features (primary constituent elements) that are essential to the conservation of the species, and that may require special management considerations and protections (50 CFR § 424.14).

The primary constituent elements of critical habitat for vernal pool fairy shrimp are the habitat components that provide: (1)(i) topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below in paragraph (2)(i), providing for dispersal and promoting hydroperiods of adequate length in the pools; (ii) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands; (iii) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and (iv) Structure within the pools described above in paragraph (2)(ii), consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter. (3) Existing manmade features and structures, such as buildings, roads, railroads, airports, runways, other paved areas, lawns, and other urban landscaped areas do not contain one or more of the primary constituent elements.

A portion of the BSA lies within critical habitat for fairy shrimp, Critical Habitat Unit 16, sub units 16A, 16B, and 16C. The main unit encompasses approximately 12,574 acres and is

essential to the conservation of the species because it is needed to maintain the current geographic and ecological distribution of the species. Critical habitat sub unit 16C is near the intersection of Leisure Town Road and Vanden Road, critical habitat sub unit 16B is near the intersection of Walters Road and Air Base Parkway, and critical habitat sub unit 16A near the intersection of Walters Road and SR 12.

Vernal Pool Tadpole Shrimp Critical Habitat

The Service designated 228,785 acres of critical habitat for the vernal pool tadpole shrimp in 2005 (Service 2005b). In determining which areas to designate as critical habitat, the Service considers those physical and biological features (primary constituent elements) that are essential to the conservation of the species, and that may require special management considerations and protections (50 CFR § 424.14).

The primary constituent elements of critical habitat for vernal pool tadpole shrimp are the habitat components that provide: (1)(i) Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described below in paragraph (2)(i), providing for dispersal and promoting hydroperiods of adequate length in the pools; (ii) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 41 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands; (iii) Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed, or the results of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding; and (iv) Structure within the pools described above in paragraph (2)(ii), consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter, (3) Existing manmade features and structures, such as buildings, roads, railroads, airports, runways, other paved areas, lawns, and other urban landscaped areas do not contain one or more of the primary constituent elements.

A portion of the BSA lies within tadpole shrimp, critical habitat units 11, sub units 11A, 11B, and 11C. Critical Habitat Unit 11 is identical to critical habitat unit 16 for fairy shrimp. The main unit encompasses approximately 12,574 acres and is essential to the conservation of the species because it is needed to maintain the current geographic and ecological distribution of the species. Critical habitat sub unit 11B is near the intersection of Leisure Town Road and Vanden Road, critical habitat sub unit 11C is near the intersection of Walters Road and Air Base Parkway, and Critical habitat sub unit 11D is near the intersection of Walters Road and SR 12.

Contra Costa Goldfields Critical Habitat

The Service designated 14,730 acres of critical habitat for Contra Costa goldfields in 2005 (Service 2005b). In determining which areas to designate as critical habitat, the Service considers those physical and biological features (primary constituent elements) that are essential to the conservation of the species, and that may require special management considerations and protections (50 CFR § 424.14).

The primary constituent elements of critical habitat for goldfields are the habitat components that provide: (1)(i) Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools described below in paragraph (2)(i), providing for dispersal and promoting hydroperiods of adequate length in the pools; (ii) Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands; (3) Existing manmade features and structures, such as buildings, roads, railroads, airports, runways, other paved areas, lawns, and other urban landscaped areas do not contain one or more of the primary constituent elements.

A portion of the BSA lies within goldfields critical habitat unit 4, sub units 4A, 4B, and 4C. This unit encompasses approximately 5,929 acres and is essential to the conservation of the species because it is needed to maintain the current geographic and ecological distribution of the species. Critical habitat sub unit 4A is near the intersection of Leisure Town Road and Vanden Road, critical habitat sub unit 4B is near the intersection of Walters Road and Air Base Parkway, and critical habitat sub unit 4C is near the intersection of Walters Road and SR 12.

Effects of the Action

Vernal Pool Fairy Shrimp/ Vernal Pool Tadpole Shrimp

Construction of the proposed project will result in the loss of 0.97 wetted acre of vernal pool crustacean habitat. All vernal pool crustaceans occupying the 0.97 acres will be killed upon implementation of the proposed project because the pools will be cut and filled by construction activities. Cysts will be buried and not able to hatch in future years, resulting in both kill of those individuals, but also loss of future generations. Construction of the proposed project will also result in the loss of vernal pool crustaceans occupying 3.72 wetted acres from indirect effects. All vernal pool crustaceans occupying the 3.72 acres will be harmed upon implementation of the proposed action or sometime in the near future due to changes in pool hydrology, erosion, sedimentation, or contamination.

Implementation of the proposed action would result in the loss of vernal pool crustaceans due to: construction and grading activities as they relate to the widening of existing roadways; construction of a northern extension of Walters Road between Cement Hill Road and the intersection of Air Base Parkway; a grade separation (overpass) of the UPRR mainline tracks as part of the Walters Road Extension; bicycle and pedestrian paths; landscaping; and utilities relocation.

In addition to the effects associated with leveling land for road construction purposes (e.g., filling low lying areas), infrastructure development can have indirect effects on the hydrology of vernal pool habitats and the surrounding upland areas. The proposed project involves the coverage of land surfaces with concrete and asphalt, the installation of drainage systems, watering systems, *etc.* These activities can affect the amount and quality of water available to the perched water tables characteristic of vernal pool areas. Changes to the perched water table can lead to alterations in the rate, extent, and duration of inundation (water regime) of the remaining habitat on site after construction (Hanes *et al.* 1990, Hanes and Stromberg 1998). Grading for roads may affect the water regime of vernal pool habitat, particularly when grading involves cutting into the substrata in or near these areas. Exposure of sub-surface layers of soil at road cuts may hasten the loss of water from adjacent habitat by mass flow through networks of cracks, lenses of coarser material, animal burrows, old root channels, or other macroscopic channels. Any decrease in the duration of inundation of vernal pool habitat can affect the reproductive success of species present, including the vernal pool crustaceans.

Erosion and sedimentation associated with road building can alter vernal pool habitat through the transport and deposition of sediments into these areas, thereby altering the depth, temperature, and water quality of a pool or complex.

Cutting and filling a portion of a pool will decrease the size of the pool resulting in a change in the period of inundation and in the capacity of the pool to buffer potential changes in water temperature caused by solar radiation. The biota of vernal pools and swales can change when the hydrologic regime is altered and small changes can have deleterious effects on entire populations of vernal pool crustaceans (Bauder 1986, 1987). Survival of aquatic organisms like vernal pool fairy shrimp and vernal pool tadpole shrimp are directly linked to the water regime of their habitat (Zedler 1987). Therefore, construction within vernal pool areas will, at times, result in the decline of vernal pool crustaceans, including these two listed species.

Indirect effects of the expansion and new roads constructed as part of the proposed project include alteration to surface and subsurface water flow and alteration of inundation patterns; increases in contaminants from roadway surfaces and the use of pesticide and/or mechanical means to control vegetation along right of ways further out into sensitive areas; increases in erosion and sedimentation, potential effects to plant pollinators, the introduction of exotic vegetation, and changes in land use patterns (i.e., urbanization) as a result of the proposed roadway construction. Increases in contamination will occur from roadways being built in areas that no roadways were built before and the increase in vehicle traffic as the proposed project will

be a new route for commuters to get to Hwy 12 from I-80. Contamination of vernal pools from adjacent areas may injure or kill vernal pool species directly or indirectly via pathways including the alteration of chemical properties of a pool, such as pH, and inhibiting and/or disrupting biochemical processes creating less suitable conditions for reproduction, germination, or growth (Service 2005a). Vernal pools next to new or existing roadways may become contaminated from surface runoff by toxic chemical such as petroleum products, grease and oil (Service 2005a). All of these effects may result in decreased cyst viability, decreased hatching success, and decreased survivorship among early life stages, thereby reducing the number of mature adults in future wet seasons.

Expansion (widening and lengthening) of existing roads in or near the watersheds of vernal pool habitat can lead to increases of chemical laden runoff (e.g., petroleum products) from the road surfaces than what presently occurs. This road runoff can kill listed species by poisoning or decreasing their reproductive abilities. Road maintenance activities along expanded roads may include the introduction of pesticides into receiving vernal pools and/or activities such as routine mowing, discing, and/or grading of shoulders and ditches. Pesticides such as herbicides are specifically designed to control vegetation and are generally not target specific, although some are specific to certain types of plants such as broadleaf plants or grasses. Therefore, any spraying of pesticides to control invasive, non-native vegetation may affect vernal pool crustaceans through direct contact and/or indirect spray drift, run-off, sub-surface transport, *etc.*

The effects of vernal pool crustaceans habitat loss will be minimized by the preservation and creation of habitat as outlined in the "Conservation and Minimization Measures".

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp Critical Habitat

The proposed action is not expected to appreciably diminish the value of the critical habitat for the vernal pool crustaceans, or prevent critical habitat designations from conservation and recovery of these two species. The project will result in the loss of 1.5 acres total habitat out of 539 total acres in critical habitat sub units 16C and 11B, which lie along Vanden Road just south of its intersection with Leisure Town Road. The project will also result in the loss of 1.2 total acres of aquatic and upland habitat out of 710 total acres in critical habitat sub units 16B and 11C, which lie along existing Walters Road south of its intersection with Airbase Parkway. Where the BSA crosses critical habitat sub units 16A and 11D at the intersection of SR 12 and Walters Road there will be no work for this project outside the existing road footprint, and therefore there will be a not likely to adversely affect on those two critical habitat sub units. The total combined loss of critical habitat units 16 and 11 is 2.70 acres, which is less than half of one percent of the total designated critical habitat in the units.

Primary constituent elements 1, 2, and 3 for the vernal pool crustaceans will stay intact in the remainder of these units during and after project completion and will continue to provide associated upland habitat.

Contra Costa Goldfields

Construction of the proposed project will result in the loss of 0.57 wetted acre of goldfields habitat. All goldfields occupying the 0.57 acres will be killed upon implementation of the proposed project because the pools will be cut and filled by construction activities. Seed will be buried under asphalt and those seeds will no longer be viable to bloom. Construction of the proposed project will also result in the loss of goldfields occupying 2.45 wetted acres from indirect effects. All goldfields occupying the 2.45 acres will be killed upon implementation of the proposed action or sometime in the near future due to changes in pool hydrology, erosion, sedimentation, or contamination. Implementation of the proposed action would result in the permanent loss of goldfields due to: the widening of existing roadways; construction of a northern extension of Walters Road between Cement Hill Road and the intersection of Air Base Parkway; a grade separation (overpass) of the UPRR mainline tracks as part of the Walters Road Extension; bicycle and pedestrian paths; landscaping; and utilities relocation.

In addition to the effects associated with leveling land for construction purposes (i.e., filling low lying areas), infrastructure development can have indirect effects on the hydrology of vernal pool habitats and the surrounding upland areas. Projects involving, or facilitating, the coverage of land surfaces with concrete and asphalt, the installation of drainage systems, watering systems, *etc.*, can affect the amount and quality of water available to the perched water tables characteristic of vernal pool areas. Changes to the perched water table can lead to alterations in the rate, extent, and duration of inundation (water regime) of the remaining habitat. Grading for roads may affect the water regime of vernal pool habitat, particularly when grading involves cutting into the substrata in or near these areas. Exposure of sub-surface layers of soil at road cuts may hasten the loss of water from adjacent habitat by mass flow through networks of cracks, lenses of coarser material, animal burrows, old root channels, or other macroscopic channels. Any decrease in the duration of inundation of vernal pool habitat can affect the reproductive success of species present, including the goldfields. Erosion and sedimentation associated with road building can alter vernal pool habitat through the transport and deposition of sediments into these areas, thereby altering the depth, temperature, and water quality of a pool or complex.

Indirect effects include alteration to surface and subsurface water flow and alteration of inundation patterns; increases in contaminants from roadway surfaces and the use of pesticide and/or mechanical means to control vegetation along right of ways; increases in erosion and sedimentation, potential effects to plant pollinators, the introduction of exotic vegetation, and changes in land use patterns (i.e., urbanization) as a result of the proposed project. All of these effects have the potential to disturb the reproductive abilities of individual plants by decreasing seed and nutlet production, plant death, competition from non-native plants, and lack of pollination, thereby resulting in decreased numbers and/or distribution of plants in subsequent generations.

Roads in or near the watersheds of vernal pool habitat can lead to additional effects through the introduction of chemically laden runoff (i.e., petroleum products) from the road surfaces. The urban runoff from chemical contamination can kill listed species by poisoning or decreasing their reproductive abilities. Road maintenance activities may include the introduction of pesticides into the environment and/or activities such as routine mowing, discing, and/or grading of shoulders and ditches. Pesticides such as herbicides are specifically designed to control vegetation and are generally not target specific, although some are specific to certain types of plants such as broadleaf plants or grasses. Therefore, any spraying of pesticides to control invasive, non-native vegetation may affect goldfields through direct contact and/or indirect spray drift, run-off, sub-surface transport, *etc.*

There is an increased risk of introducing weedy, non-native plants into the vernal pools and swales during construction due to soil disturbance from clearing and grubbing operations and, in general, the vegetation disturbance associated with the use of heavy equipment. Many non-native plants can out-compete native vegetation, thereby reducing the reproductive success of the natives. In extreme cases, entire areas can be permanently devoid of native vegetation as a result of non-native introductions.

The effects of goldfields habitat loss will be minimized by the preservation and creation of habitat as outlined in the "Conservation and Minimization Measures".

Contra Costa Goldfields Critical Habitat

The proposed action is not expected to appreciably diminish the value of the critical habitat for goldfields, or prevent the critical habitat designations from conservation and recovery of this species. The project will result in the loss of 1.5 acres of total habitat out of 539 total acres in critical habitat sub units 4A, which lies along Vanden Road just south of its intersection with Leisure Town Road. The project will also result in the loss of 1.2 acres of upland and aquatic out of 710 total acres in critical habitat sub unit 4B, which lies along existing Walters Road south of its intersection with Airbase Parkway. Where the BSA crosses critical habitat sub unit 4C at the intersection of SR 12 and Walters Road there will be no work for this project outside the existing road footprint, and therefore there will not likely adversely affect that critical habitat sub unit. The total combined loss of to critical habitat to unit 4 is 2.70 acres, which is less than half of one percent of the total designated critical habitat in the units.

Primary constituent elements 1, 2 and 3 for goldfields will stay intact in the remainder of these units during and after project completion and will continue to provide associated upland habitat.

California Tiger Salamander

The proposed project is likely to result in direct adverse effects to the salamander in the Central California DPS (salamander). The proposed project will eliminate salamander habitat and cause direct mortality, injury, or harassment of individual juveniles and adults. Implementation of the

proposed action will result in the permanent loss of 22.7 acres of upland salamander habitat due to: the widening of existing roadways on Leisure Town Road and Vanden Road; bicycle and pedestrian paths; landscaping; and utilities relocation. No permanent or seasonal wetlands or ponds appropriate for salamander breeding will be directly lost or indirectly affected from implementation of the proposed action. The effects of this habitat loss will be minimized by the preservation of upland salamander habitat as outlined in the "Conservation and Minimization Measures".

Mortality or injury of the salamander could occur from being killed by trenching, cutting, and filling to expand and build new roadway portions. Mortality or injury of the salamander could also occur from being crushed by project related equipment or vehicles cutting into existing habitat, and construction debris within the action area. Individual salamanders could also could fall into trenches, pits, or other excavations, and be killed, or unable to escape, be killed due to desiccation, entombment, starvation, or increased predation. Salamander mortality and injury can occur when the animals attempt to cross roads and are hit by vehicles. Mortality or injury of salamanders will be minimized by the biological monitor translocating salamanders that are found on the project site above ground. Therefore, the Service has determined that these effects are reasonably certain to occur.

Valley Elderberry Longhorn Beetle

There are 7 elderberry shrubs identified within the BSA of the proposed project. Of the 7 elderberry shrubs located in the BSA, four are within 100 feet of construction. Implementation of the proposed action will result in direct effects to four shrubs (with 16 total stems greater than one inch diameter at ground level) and to beetles that inhabit those shrubs, due to: The proposed project includes the widening of existing roadways; improvements at the Leisure Town Road crossings of Alamo Creek and New Alamo Creek; and a new crossing of McCoy Creek. No individual beetles inhabiting the three elderberry shrubs greater than 100 feet from construction will be affected as a result of implementation of the proposed action because of the conservation measures proposed by STA as outlined in this biological opinion. Mortality, injury, or harassment of the beetle could occur from the elderberry shrub being trimmed and removed from the project site, particularly if the transplant does not survive once removed from its natural habitat or stems are damaged during transport to the conservation site. Transplantation of elderberry shrubs that are or could be used by beetle larvae is expected to adversely affect the beetle. Beetle larvae may be killed or the beetles' life cycle interrupted during or after the transplanting process. For example: 1. Transplanted elderberry shrubs may experience stress or become unhealthy due to changes in soil, hydrology, microclimate, or associated vegetation. This may reduce their quality as habitat for the beetle, or impair their production of habitat-quality stems in the future. 2. Elderberry shrubs may die as a result of transplantation. 3. Branches containing larvae may be cut, broken, or crushed as a result of the transplantation process.

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. There are no cumulative effects from non-Federal actions that are reasonably certain to occur within the action area at this time.

Conclusion

After reviewing the current status of the vernal pool crustaceans, goldfields, Central California DPS salamander, and the beetle, environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the Jepson Parkway Project, as proposed, is not likely to jeopardize the continued existence of the vernal pool crustaceans, goldfields, Central California DPS salamander, and the beetle. As proposed, the project will not adversely modify critical habitat for the vernal pool crustaceans and goldfields because of the relatively small amount of critical habitat that will be affected.

Primary constituent elements 1, 2 and 3 for vernal pool crustaceans and goldfields will stay intact in the remainder of the critical habitat units during and after project completion and will continue to provide associated upland habitat.

Implementation of the proposed project will have direct permanent effects and indirect effects to vernal pool crustaceans and goldfields as a result of grading and changing hydrology of wetland habitat. Design measures in the project description will minimize effects to vernal pool crustaceans and goldfields by modifying the roadway alignment, shifting the centerline, and/or widening primarily to one side or another, narrowing inside shoulder widths, dry season construction, protective fencing and adding an additional 670 feet of bridge to span habitat. STA has also proposed to preserve habitat off site and acquire a separate parcel to create additional habitat, and preserve it in perpetuity. The habitat that STA has proposed to preserve for goldfields is at the Goldfields Mitigation Bank(bank), which is located entirely within critical habitat and the Jepson Prairie Core area for goldfields, as identified in the recovery plan (Service 2005a). LSA conducted a multi year goldfields population study at this bank and five other sites in Solano County (LSA 2009). LSA identified over 9 million plants at the bank, which was one of the highest identified densities among the sites in the study. The bank is also identified in the Final Administrative Draft of the Solano County Multispecies Habitat Conservation Plan (draft HCP) as being an area of high conservation priority for goldfields (SCWA 2009). The draft HCP has identified the area that the bank is in as subunit 1E, a known core population of goldfields (SCWA 2009). The bank is now protecting in perpetuity 95 percent of this subunit. By STA purchasing compensation credits at this bank they will be contributing to the recovery goals set forth in the recovery plan by helping to protect 90 percent of all known occurrences of goldfields. Therefore the Service has determined that the project as proposed will not indirectly or directly

reduce, appreciably, the likelihood of both the survival and recovery of vernal pool crustaceans and goldfields in the wild.

Implementation of the proposed project will have direct permanent effects to the Central California DPS salamander as a result of grading upland habitat. Design measures in the project description will minimize effects to the Central California DPS salamander by avoiding breeding habitat, such as construction timing and protective fencing, and preserving approximately 68.1 acres of habitat for the salamander. The project also lies in the western-most range of the species in Solano County, and is expanding roads that are already in place and not creating new roads that may create new barriers to salamander movement. The salamander habitat affected by this project occurs in the northern portion of the action area where the widening of existing roads is proposed, and salamander habitat does not occur in the southern portion of the action area where new roadway construction will occur. Therefore the Service has determined that the project as proposed will not indirectly or directly reduce, appreciably, the likelihood of both the survival and recovery of the salamander in the wild.

Implementation of the proposed project will have direct permanent effects to the beetle as result of removing, trimming, and transplantation of elderberry shrubs. Design measures in the project description will minimize effects to the beetle by transplanting and trimming the elderberry shrubs in the dormant season to increase chances the shrub will survive transplantation, and planting additional seedlings and associated natives. Therefore the Service has determined that the project as proposed will not indirectly or directly reduce, appreciably, the likelihood of both the survival and recovery of the beetle in the wild.

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 harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a 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. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including 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 this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by Caltrans so they become binding conditions of project authorization for the exemption under 7(o) (2) to apply. Caltrans has a continuing duty to regulate the activity that is covered by this incidental

take statement. If Caltrans (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of 7(o)(2) may lapse.

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

Amount or Extent of Take

The Service expects that incidental take of the vernal pool crustaceans, Central California DPS salamander, and beetle may occur during this action. The extent of the take will be difficult to detect or quantify because of the ecology and biology of these species. Additionally, their size and cryptic nature makes the finding of a dead specimen unlikely. Seasonal population fluctuations also may mask the ability to determine the exact extent of take.

Due to the difficulty in quantifying the number of vernal pool crustaceans, Central DPS salamanders, and beetles that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of vernal pools/ponded depressions (vernal pool crustacean habitat), number of acres of upland habitat (salamander), and number of elderberry stems over 1 inch in diameter (beetle) that will become unsuitable for vernal pool crustaceans, salamanders, and beetles due to direct or indirect effects as a result of the action. Therefore, the Service estimates that the proposed action will result in the take of all vernal pool crustaceans inhabiting 4.69 acres of habitat (0.97 acres direct plus 3.72 acres indirect), all salamanders inhabiting or utilizing 22.7 acres of upland habitat, all beetles inhabiting 16 elderberry stems identified in the action area. Anticipated take is expected to be in the form of harm, harassment, injury, and mortality from habitat loss and modification, construction related disturbance, reduced fitness, and increased vehicular traffic.
Upon implementation of the following reasonable and prudent measures, incidental take associated with the proposed project on the vernal pool crustaceans, salamander, and beetle in the form of mortality, harm, and harassment from habitat loss or degradation will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined in this biological opinion that this level of anticipated take is not likely to result in jeopardy to the vernal pool crustaceans, Central California DPS salamander, or the beetle.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effects of the Jepson Parkway Project on the vernal pool crustaceans, Central California DPS salamander, and beetle:

1. All conservation measures outlined in the project description, and as restated in this Biological Opinion will be fully implemented. Further, these conservation measures shall be supplemented by Terms and Conditions (a) through (d) below.

In order to be exempt from the prohibitions of section 9 of the Act, Caltrans shall ensure they comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1. The following Term and Conditions will implement Reasonable and Prudent Measure number one (1):

   a. Caltrans shall minimize the effects from project related activities through implementation of the conservation measures as described in the project description of this biological opinion, unless otherwise supplemented by these Terms and Conditions. Caltrans shall include Special Provisions requiring strict adherence to the Conservation Measures and the *Terms and Conditions* of this biological opinion in the solicitation for bid information. In addition, Caltrans shall educate and inform contractors involved in the project as to the requirements of the biological opinion.

   b. Caltrans shall provide documentation to the Service on the parcel to be acquired for creation, establishment of a conservation easement, development of a creation and management plan, and provision of a perpetual endowment sufficient to cover management and maintenance of protected lands for the benefit and recovery of vernal pool crustaceans and goldfields prior to groundbreaking on phase 3. All documents must be reviewed and approved by the Service prior to groundbreaking on Phase 3. Please see the attached off-site Compensation site guidance (Sacramento Fish and Wildlife Office Selected Review Criteria for Section 7 Off-Site Compensation Revised Oct. 2009).

   c. At least 90 days prior to groundbreaking on Phase 3, Caltrans shall submit a plan for Service approval for the collection, storage, and application of innoculum material from affected features into created features. The plan shall outline equipment used for collection, storage methods, personnel, and timing of collection and application.

d. The Service shall be notified within one (1) working day of the finding of any injured salamanders. Injured salamanders shall be cared for by a licensed veterinarian or other qualified person. Notification must include the date, time, and location of the incident or of the finding of a injured animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are Chris Nagano, Division Chief, Endangered Species Program at the Sacramento Fish and Wildlife Office (916) 414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division (916) 414-6660. Caltrans must also contact CDFG immediately in the case of a dead or injured listed species. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045.

Reporting Requirements

The Service shall be notified within one (1) working day of the finding of any dead salamanders, beetles, or vernal pool crustaceans. Notification must include the date, time, and location of the incident or of the finding of a dead animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are Division Chief, Endangered Species Program at the Sacramento Fish and Wildlife Office (916) 414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division (916) 414-6660. Caltrans must also contact CDFG immediately in the case of a dead or injured listed species. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045.

Sightings of any federal or state listed animal species should be reported to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the Act directs Federal agencies to utilize 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 that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information or data bases. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations. The Service recommends the following conservation actions

1. Enhancing habitat connectivity and wildlife passage across roads as well as reducing road effects should be included in the *Purpose and Needs* section of environmental documents.

2. Caltrans should include a wildlife passage section in their biological assessments that include an analysis of the existing passage and how the project will affect passage. The analysis should include identification of the species' resources on both sides of the project boundaries, an appropriately timed road mortality survey to identify "hot spots", and strategic locations where the species could benefit from the enhancement of an existing crossing or the installation of a new crossing. Caltrans District 4 should coordinate with the University of California at Davis Road Ecology Center to develop a passage and road effects approach. Further guidance is provided by FHWA's *Wildlife Vehicle Collision Reduction Study* available at: http://www.fhwa.dot.gov/environment/hconnect/wvc/index.htm (FHWA 2008).

3. Roadways can constitute a major barrier to wildlife movement. Therefore, Caltrans should incorporate culverts, tunnels, or bridges on highways and other roadways that allow safe passage by listed animals and other wildlife. Include photographs, plans, and other information in biological assessments if "wildlife friendly" crossings are incorporated into projects. Efforts should be made to establish upland culverts designed specifically for wildlife movement rather than accommodations for hydrology.

4. Caltrans should consider participating in regional habitat conservation planning in Solano County for listed species, and sensitive species.

5. Caltrans should consider establishing functioning preservation and creation conservation banking systems to further the conservation of listed species. Such banking systems also could possibly be utilized for other required mitigation (i.e., seasonal wetlands, riparian habitats, etc.) where appropriate. Efforts should be made to preserve habitat along roadways in association with wildlife crossings.

6. Caltrans should continue to develop and implement their Early Statewide Biological Mitigation Planning Project that has been developed by the University of California at Davis, Road Ecology Center through Caltrans funding.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed Jepson Parkway Project in Solano County, California. 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 maintained (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 that was 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, any operations causing such take must cease pending reinitiation.

If you have questions regarding our response to the Jepson Parkway project, please contact Michelle Tovar, Senior Fish and Wildlife Biologist (Michelle_Tovar@fws.gov) or Jana Affonso, the Sacramento Valley Branch Chief (Jana_Affonso@fws.gov), of my office at (916) 414-6645.

Sincerely,

for Susan K. Moore
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Sacramento Fish and Wildlife Office
Selected Review Criteria for Section 7 Off-Site Compensation
Revised Oct. 2009

Property Assurances and Conservation Easement

- ☐ Title Report (preliminary at proposal, and Final Title Insurance at recordation), shall be no older than six months;
- ☐ Property Assessment and Warranty;
- ☐ Subordination Agreement **[if there is any outstanding debt on the property]**;
- ☐ Legal Description and Parcel Map;
- ☐ Conservation Easement (should use the current multi-agency standardized CE template document); or
- ☐ Non-Template Conservation Easement;

Site Assessment and Development

- ☐ Phase I Environmental Site Assessment;
- ☐ Restoration or Development Plan;
- ☐ Construction Security ***[if applicable]***;
- ☐ Performance Security;

Site Management

- ☐ Interim Management Plan;
- ☐ Interim Management Security Analysis and Schedule;
- ☐ Long-Term Management Plan;
- ☐ Endowment Fund Analysis and Schedule;

**Guidelines to assist in understanding what is required are detailed on pages 2–7.

Guidelines

Property Assurances and Conservation Easement (CE)

Title Report

1. Who holds fee title to property? Should be the Project Applicant. If not, there may be liability and contracting issues.
2. Are there any liens or encumbrances (existing debts or easements) on the property?
    a. Review necessary supporting instruments to evaluate liens and encumbrances. Property owner should submit a "*Property Assessment and Warranty*," which discusses each and every exception listed on the Preliminary and Final Title Insurance Policies, evaluating any potential impacts to the conservation value that could result from the exceptions (see below).
    b. The *Property Assessment and Warranty* template is available at http://www.fws.gov/sacramento/es/cons_bank.htm, and should include a summary and full explanation of all exceptions remaining on the title, with a statement that the owner/Grantor accepts responsibility for all lands being placed under the CE as available for the primary purposes of the easement, as stated in the easement, and assures that these lands have a free and clear title and are available to be placed under the CE.
3. Could any of these liens or encumbrances potentially interfere with either biological habitat values or ownership? If existing easements can potentially interfere with the conservation values/habitat of the property, those portions of the land should be deducted from the total compensation acreage (or number of credits) available on the site.
4. A *Subordination Agreement* is necessary if there is any outstanding debt on the property. Review *Subordination Agreement* for adequacy—the lending bank or other lien holder must agree to fully subordinate each lien or encumbrance.

Legal Description and Parcel Map

1. Ensure accuracy of map, and location and acreage protected under the CE.
2. Both the map and the legal description should explain the boundaries of the individual project compensation site. The site should *not* have 'leftover' areas for later use.

Conservation Easement from Template

1. The current CE template can be found at http://www.fws.gov/sacramento/es/cons_bank.htm.
2. Who will hold the easement?
    a. Must have third-party oversight by a qualified non-profit or government agency. Qualifications include:
        i. Organized under IRC 501(c)(3);

ii. Qualified under CA Civil Code § 815;
iii. Bylaws, Articles of Incorporation, and biographies of Board of Directors on file at, and approved, by USFWS.
1. Must meet requirements of USFWS, including 51% disinterested parties on the Board of Directors;

b. Must have satisfactorily completed the CDFG due diligence process for easement/endowment holders and/or be accredited by the Land Trust Accreditation Commission http://www.landtrustaccreditation.org/home.

3. If not using the multi-agency template, applicant should specify objections they have to the template as provided, and may substantially delay processing as they will require Solicitor review. Alternate CEs must be approved by the USFWS prior to recording.

Non-Template Conservation Easements

1. You must either 1) add USFWS as a third-party beneficiary, or 2) add language throughout the document, in all appropriate places, that will assure USFWS the right to enforce, inspect, and approve any and all uses and/or changes under the CE prior to occurrence (including land use, biological management or ownership).
2. Include, at a minimum, language to:
   a. Reserve all mineral, air, and water rights under the CE as necessary to maintain and operate the site in perpetuity;
   b. Ensure all future development rights are forfeited;
   c. Ensure all prohibited uses contained in the multi-agency conservation agreement template are addressed; and
   d. Link the CE, Management Plan, and the Endowment Trust Fund within the document (e.g., note that each exists to support the others, and where each of the documents can be located if a copy is required).
3. Insert necessary language, particularly, but not exclusively, per: (can compare to multi-agency CE template)
   a. Rights of Grantee
   b. Grantee's Duties
   c. Reserved Rights
   d. Enforcement
   e. Remedies
   f. Access
   g. Costs and Liabilities
   h. Assignment and Transfer
   i. Merger
   j. Notices

Site Assessment and Development

Phase I Environmental Site Assessment

1. The Assessment must show that the compensation site is not subject to any recognized environmental conditions as defined by the American Society for Testing and Materials (ASTM) Standard E1527-05 "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, available at http://www.astm.org/Standards/E1527.htm, (i.e., the presence or likely presence of any Hazardous Substances or petroleum products).
2. If the Phase I Environmental Site Assessment identifies any recognized environmental conditions, the Project Applicant must represent and warrant to the USFWS that all appropriate assessment, clean-up, remedial, or removal action has been completed.

Development Plan *[not required if doing preservation only]*

1. The overall plan governing construction and habitat establishment activities required to be conducted on the Property, including, without limitation, creation, restoration, and enhancement of habitat.
   a. This plan should include the baseline conditions of the Property including biological resources, geographic location and features, topography, hydrology, vegetation, past, present, and adjacent land uses, verified *Waters of the U.S. Jurisdictional Determination,* if applicable, species and habitats occurring on the property, a description of the activities and methodologies for creating, restoring, or enhancing habitat types, a map of the approved modifications, overall habitat establishment goals, objectives and Performance Standards, monitoring methodologies required to evaluate and meet the Performance Standards, an approved schedule for reporting monitoring results, a discussion of possible remedial actions, and any other information deemed necessary by the USFWS.
2. Any permits and other authorizations needed to construct and maintain the site shall be included and in place prior to the start of construction of the habitat.
3. Full construction plans for any habitat construction must be *USFWS-approved prior* to the start of construction of the habitat.

Construction Security

   a. The Project Applicant shall furnish a Construction Security in the amount of 100% of a reasonable third party estimate or contract to create, restore, or enhance habitats on the property in accordance with the Development Plan.
   b. The Construction Security shall be in the form of an irrevocable standby letter of credit, or a cashier's check.
      i. The letter of credit, if chosen, shall be issued for a period of at least one year, and shall provide that the expiration date will be

automatically extended for at least one year on each successive expiration date unless, until extension is no longer necessary.

Performance Security

c. The Project Applicant shall furnish a Performance Security in the amount of 20% of the Construction Security.
d. The Performance Security shall be in the form of an irrevocable standby letter of credit, or a cashier's check.
    i. The letter of credit, if chosen, shall be issued for a period of at least one year, and shall provide that the expiration date will be automatically extended for at least one year on each successive expiration date unless, until extension is no longer necessary.

4. The Construction and Performance Securities must:
    a. Be held by a qualified, Service-approved, non-profit organization or government agency [see requirements under CE above], and
    b. Be held according to minimum standards for assuring maximum success in earning potential, and will include assurances for no loss of principle, and
    c. Disbursements or releases from each of the funds must be for documented expenditures, as they occur.

Site Management

Interim Management Plan

1. The Interim Management Plan should identify the short-term management, monitoring, and reporting activities to be conducted from the time construction ends until the Endowment Fund has been fully funded for one year and all the Performance Standards in the Development Plan have been met.

Interim Management Security Analysis and Schedule

a. The Project Applicant shall furnish an Interim Management Security (in the form of a standby letter of credit) in the amount equal to the estimated cost to implement the Interim Management Plan during the first year of the Interim Management Period, as set for in the Interim Management Security Analysis and Schedule
b. The Interim Management Security Analysis and Schedule shall consist of a table and/or spreadsheet that shows all of the tasks (management, monitoring, reporting), task descriptions, labor (hours), cost per unit, cost frequency, timing or scheduling of the tasks, the total annual funding necessary for each task, and any associated assumptions for each task required by the Interim Management Plan. The total annual expenses should include administration and contingency costs.
c. The Interim Management Security must:

i. Be held by a qualified, Service-approved, non-profit organization or government agency [see requirements under CE above], and
ii. Be held according to minimum standards for assuring maximum success in earning potential, and will assurances for no loss of principle.
iii. Disbursements or releases from the fund must be for documented expenditures, as they occur.

Long-Term Management Plan (LTMP)

1. The LTMP template can be found at http://www.fws.gov/sacramento/es/cons_bank.htm and identifies the long-term management, monitoring and reporting activities to be conducted after the interim Management Period.
2. The LTMP should include at minimum:
   a. Purpose of the Project and purpose of the LTMP;
   b. A baseline description of the setting, location, history, and types of land use activities, geology, soils, climate, hydrology, habitats present (once project meets Performance Standards), and species descriptions;
   c. Overall management, maintenance and monitoring goals; specific tasks and timing of implementation; and discussion of any constraints, which may affect goals;
   d. The Endowment Fund Analysis and Schedule (see below),
   e. Discussion of Adaptive Management actions for reasonably foreseeable events and possible thresholds for evaluating and implementing Adaptive Management;
   f. Rights of access to the Property and prohibited uses of the Property as provided in the CE; and
   g. Procedures for Property transfer, land manager replacement, amendments, and notices.
3. A copy of the LTMP must be either recorded with the CE, or the CE must state in its body that the current management plan can be obtained upon request from the USFWS, if not using the CE template.

Endowment Fund Analysis and Schedule

a. Can use a PAR or PAR-like analysis that must be based upon the final, approved LTMP.
b. The analysis and schedule shall consist of a table and/or spreadsheet that shows all of the tasks (management, monitoring, reporting), task descriptions, labor (hours), cost per unit, cost frequency, timing or scheduling of the tasks, the total annual funding necessary for each task, and any associated assumptions for each task required by the Interim Management Plan. The total annual expenses should include administration and contingency costs.
c. The Endowment Fund must:

i. Be held by a qualified, Service-approved, non-profit organization or government agency [see requirements under CE above], and
ii. Be held according to minimum standards for assuring maximum success in earning potential, and will include assurances for no loss of principle.
iii. Disbursements or releases from the fund must be for documented expenditures, as they occur.