United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
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TRLIA

Ms. Alicia Kirchner
Chief, Planning Division
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Biological Opinion for the Upper Yuba River Levee Improvement Project, Yuba County, California

Dear Ms. Kirchner:

This is in response to your June 10, 2010, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the Upper Yuba River Levee Improvement Project (proposed project) in Yuba County, California. Your request was received on June 11, 2010. The Service has reviewed the information submitted by your office describing the effects of the proposed project on the federally-threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle) and concurs that the proposed project is likely to adversely affect the beetle. The Service has also reviewed the effects of the proposed project on the federally-endangered vernal pool tadpole shrimp (*Lepidurus packardi*) and federally-threatened vernal pool fairy shrimp (*Branchinecta lynchi*). Based on the project description including the conservation measures proposed by Three Rivers Levee Improvement Authority (TRLIA), the Service concurs with your determination that the proposed project is not likely to adversely affect the vernal pool tadpole shrimp or vernal pool fairy shrimp. These measures include placement and daily monitoring of silt fencing. Changes to the project description would require reinitiation as described at the end of this biological opinion. The project action area is not located within any areas designated or proposed as critical habitat for any federally-listed species; therefore no designated or proposed critical habitat for the species will be affected. This response is in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This biological opinion (BO) is based on information provided in the U.S. Army Corps of Engineers' (Corps) letter requesting consultation and their June 2010 biological assessment. A record of this consultation is on file at the Sacramento Fish and Wildlife Office.

CONSULTATION HISTORY

March 8, 2010. The Corps and the Service exchanged e-mails regarding compensation ratios for valley elderberry longhorn beetle.

April 13, 2010. The Service, Corps, TRLIA, and California Department of Water Resources (DWR) attended a site visit to the Anderson Road valley elderberry longhorn beetle compensation site to discuss the potential of using this site as compensation for the proposed project. The Service indicated that this site potentially could be used for compensation provided a census of the existing elderberry shrubs and associated natives was done in the area they proposed to use for compensation.

June 10, 2010. The Corps initiated section 7 consultation on the proposed project.

BIOLOGICAL OPINION

Description of 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." The proposed project is located in the southern portion of Yuba County along the Yuba River south levee (YRSL), upstream of the confluence of the Yuba River and Feather River. The proposed improvements will be located from about Simpson Lane to the Yuba Goldfields. The total length of the project is 3.9 miles. The project improvements will be located within the area of maintenance responsibilities of Reclamation District (RD) 784. This area also includes a borrow site which is located on two adjacent agricultural fields along the project alignment.

Description of Proposed Action

The proposed project will involve levee repairs and improvements along the 3.9 miles of YRSL. The intended outcome of the repairs and improvements is to ensure that all portions of the YRSL meet the engineering and design standards of the Central Valley Flood Protection Board (CVFPB) and the Corps and that the YRSL meets geotechnical requirements for through-seepage and under-seepage at the water surface elevation for the 200-year flood event.

Cutoff Walls

Because of the depths and thickness of pervious strata generally present along the YRSL, the most practical method of constructing a cutoff wall is the slurry wall method. In this method, a cutoff trench is excavated and filled with a soil-bentonite slurry to keep the trench from collapsing during excavation; the trench is then backfilled with native soil mixed with cement-bentonite or bentonite only to provide a cutoff with reduced permeability.

A soil-bentonite slurry cutoff wall is proposed to be constructed through the centerline of the levee crown and through sand and gravel layers in the foundation to inhibit levee through- and

under-seepage for 2.9 miles. The wall will be about 3 feet wide and range from 55 to 80 feet deep. The existing levee will have about seven feet of material removed and stockpiled at the proposed borrow site in order to provide a sufficient capacity for placement of a long arm excavator which will excavate the cutoff wall trench and backfill with the soil-bentonite slurry mix. After settlement of the cutoff wall is complete, the levee crown will be restored. A six-inch minimum aggregate base traffic surface will be placed on the levee crown to comprise a 16-foot wide access road. After construction, erosion resistant mulch with grass seed will be sprayed over the levee slopes.

Seepage and Stability Berms

Seepage berms are wide embankment structures made up of low-permeability materials that resist accumulated water pressure and safely release seeping water. A seepage berm is typically one-third the height of the levee, extending outward from the landside levee toe a sufficient distance (up to 400 feet), and laterally along the levee as needed relative to the seepage conditions. A seepage berm mainly addresses the deficiency of under-seepage from potential heaving and rupturing at the landside toe by adding weight needed to counteract uplift pressures.

A stability berm is made of weighted, compacted earth intended to provide levee stability when deficiencies arise due to through-seepage. A landside stability berm provides support as a buttress to the slope when landside levee stability becomes undermined as a result of seepage. A stability berm provides a filtered seepage path that allows seepage to occur but reduces the potential for boil formation and the associated erosion and loss of embankment and foundation material.

An 80-foot wide seepage berm is proposed that will be placed for 0.25 mile. This 80-foot wide seepage berm will be a minimum of three feet high at its toe and slope up towards the levee at a minimum 50:1 slope. The berm, at the toe of the levee, will be about 5.5 feet high and will be constructed of local semi-permeable material obtained from the borrow areas.

On top of the seepage berm, a stability berm will be built at a 5:1 slope, such that the top of the stability berm meets the landside slope of the levee at the 200-year water surface elevation (WSE). The stability berm will be constructed of local semi-permeable material obtained from borrow areas.

For the last 259 feet of the proposed project, the seepage berm will be widened to 150 feet, and raised to match the elevation of the existing levee crown, forming a project interface buffer with the high ground cobble mounds of the Yuba Goldfields. This thickened levee berm will tie to existing grades with 2:1 slopes.

Construction of the berms will consist of clearing, grubbing, and stripping the existing ground surface and placing a one-foot-thick layer of crushed rock across the ground surface. Bulldozers will then excavate and stockpile borrow material from a nearby borrow site. Front-end loaders load the borrow material into haul trucks, and the haul trucks subsequently transport it to the berm site. The haul trucks dump the material and motor graders spread it evenly, placing about

three to five feet of embankment fill material over the drain material. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction. After construction, erosion resistant mulch with grass seed will be sprayed over the levee slopes.

Seven elderberry shrubs with twenty-seven stems over one inch in diameter at ground level will be transplanted due to the last 259 linear feet of seepage berm construction.

Restore Levee Cross Section

Levee geometry corrections along the YRSL will be conducted to bring the levee into compliance with Corps standards for repair of existing levees and to provide three feet of freeboard above the 200-year flood elevation. Geometry corrections will be required for the portions of the existing YRSL that do not meet these criteria.

To analyze existing levee geometry, the most recent digital terrain model and topographic surveys were utilized to generate cross sections of the existing levee surface, at 100-foot intervals along the centerline of the levee crown, and compared to the criteria listed above to determine which areas require geometry corrections.

Based on the levee cross section data it was determined that the levee crown widths throughout most of the project area do not meet the minimum Corps levee geometry criteria stated above. The crown width narrows to less than eight feet wide in some areas and will be corrected to the Corps required 20-foot width. In addition, all areas where existing waterside levee slopes are steeper than 3:1 or landside levee slopes are steeper than 2:1, will be corrected to meet the minimum requirements for repair of existing project levees within the existing levee footprint.

The levee slope and all areas to have fill placed on them will be cleared and grubbed of all vegetation and stripped to a depth of six inches. These surfaces will then be appropriately prepared to allow for effective placement of material and to allow for a fully integrated composite levee section when construction is complete. Material similar to that comprising the remaining portion of the levee will be placed in six-inch lifts and compacted to achieve 95 percent density at optimum moisture content. The replaced portion of the levee will be appropriately keyed into the existing body of the levee. Erosion resistant mulch with grass seed will be sprayed over the restored levee slope.

Waterside Levee Slope Erosion Protection

To protect against future potential erosion of the YRSL immediately downstream of the Yuba Goldfields, the waterside slope will be protected with rock slope protection. The proposed rock slope protection blanket will extend for 0.6 mile. The rock slope protection will be two feet of riprap, with a 6-inch aggregate base fill layer and geotextile fabric. The rock slope protection will average 42 feet wide and will extend from the 200-year WSE down the waterside slope to the toe of the levee, and 20 feet from the waterside toe out into the adjacent swale that due to sandy soils does not hold water or contain wetland vegetation.

The waterside levee slope and the adjacent swale invert area that will lie beneath the riprap blanket will be cleared, grubbed, and stripped of all vegetation for a minimum depth of six inches. Suitable filter fabric material will be placed on the stripped foundation. A six-inch layer of aggregate base fill layer will be placed on top of the filter fabric. An additional two-foot thick layer of riprap will be placed on top of the aggregate base fill layer.

Eighteen elderberry shrubs with 344 stems greater than one inch in diameter at ground level will be transplanted due to the construction of waterside levee slope erosion protection.

Erosion Protection and Stormwater Pollution Prevention

Where soil along the waterside or landside surface of the existing YRSL is disturbed during project implementation, an approved grass cover will be placed for erosion protection. Temporary erosion/runoff control measures will be implemented during construction to minimize stormwater pollution resulting from erosion and sediment migration from the construction and staging areas. These temporary control measures may include implementing construction staging in a manner that minimizes the amount of area disturbed at any one time; providing secondary containment for small quantity storage of construction equipment fuel and oil; and the management of stockpiles and disturbed areas by means of earth berms, diversion ditches, straw wattles, straw bales, silt fences, gravel filters, mulching, revegetation, and temporary covers as appropriate. Erosion and stormwater pollution control measures will be consistent with National Pollutant Discharge Elimination System (NPDES) permit requirements and will be included in a storm water pollution prevention plan (SWPPP).

After completion of construction activities, temporary facilities will be removed and disturbed areas will be restored and reclaimed as appropriate. Site restoration activities for areas disturbed by construction activities, including laydown/staging areas, may include regrading, reseeding, use of straw wattles and bales, application of straw mulch, and other measures deemed appropriate.

Borrow Sources

It is estimated that a net total of about 70,000 cubic yards (cu.yd.) of borrow material will be required for the proposed project improvements. The need for off-site borrow material will be limited where possible. However, it is still anticipated that borrow material will be needed from off-site, but local sources. Most if not all borrow material for the proposed project will come from two adjacent parcels to the project alignment. Any borrow sites other than the two parcels discussed in this biological opinion will be reviewed by the Corps and the Corps will reinitiate section 7 consultation on the proposed project with the Service if use of these borrow sites may affect federally-listed species.

Once removed, borrow material could be used in the construction of seepage berms, in the required levee geometry corrections, for reconstruction of levee embankments degraded during cutoff wall construction, in the levee crown restoration, or for other purposes. The two adjacent parcels to the project alignment are more than sufficient to meet the borrow material needs for

the project. Prior to excavation activities, the borrow material will be tested for contaminants to verify that it is clean enough for use as levee fill.

About 122,000 cu. yd. of material will be excavated from the existing YRSL and cutoff wall trenches and will be stockpiled at the borrow site. This excavated material will be used to the extent practicable in the proposed improvements or will be backfilled at the borrow site after excavation of the borrow site. About 42,000 cu. yd. of material will be needed to construct the proposed seepage berm and about 157,000 cu. yd. of material will be needed to complete the proposed improvements.

The borrow site will be considered as an area of excavation. The top two feet of soil will be stripped and stockpiled to be used later. Excavators will remove material suitable for levee construction and will load trucks that will then transport the material to different locations in the project area using existing roads. Returning trucks to the borrow site will dump excavated levee material that cannot be reused in the reconstructed levee. This unusable levee material will be spread and lightly compacted to help temporarily reclaim the borrow site. The borrow site may also be used for construction staging, stockpiling, and storage of equipment during construction activities. As a result of excavation activities, the borrow site will be about three to five feet lower than its current elevation. After all available borrow material has been removed and backfill with unusable levee material has occurred, the stockpiled stripped material will be spread over the backfilled material and lightly compacted. The surface material of the borrow site will be similar to the existing material; however, subsurface material may be different. The borrow site will be graded so that it drains away from the YRSL but drainage may flow into the borrow site. Future use of the reclaimed borrow site could be for agriculture, such as pasture or orchard.

Aggregate base needed to surface the access road on the levee crown, drain material required for berm construction, and similar materials will be obtained from commercial sand and gravel operations in the Marysville-Yuba City area and will be hauled to the project alignment by truck. The Corps will review where TRLIA proposes to obtain rock material and reinitiate section 7 consultation with the Service if use of these sites may affect federally listed species.

Relocation of Utilities and Levee Penetrations

Pacific Gas and Electric Company (PG&E) power lines are located along the entire length of the levee within the levee limits. These power lines may need to be de-energized or temporarily relocated for clearance during excavation operations for the cutoff wall. In addition, there are ten PG&E utility poles that are located within the proposed operation and maintenance corridors. Due to requirements from the CVFPB to maintain a vegetation and structure free zone in the proposed project's operation and maintenance corridors, it is anticipated that any PG&E poles located within the proposed project's operation and maintenance corridors will be relocated about 10 feet outside of the proposed operation and maintenance corridors. A two-inch PG&E gas pipeline is located at project station 137+28 to serve the Peach Tree Golf and Country Club. The gas pipeline will be removed during degradation of the levee. After installation of the cutoff

wall, a new replacement pipeline will be installed in coordination with PG&E and to meet the CVFPB's requirements.

Other levee penetrations (pipeline, conduits, or similar structures passing through the levee) related to the Linda County Water District Wastewater Treatment Plant, the Peach Tree Golf and Country Club, and the Luis Farm will be addressed during construction of the cutoff walls summarized below.

Linda County Water District – The domestic water line for the Peach Tree Golf and Country Club located at project station 148+55 consists of a six-inch diameter ductile iron pipeline located three feet deep through the foundation of the levee. Prior to installation of the cutoff wall, the levee will be lowered at the location of the pipeline and the pipeline removed. After cutoff wall installation, a new replacement pipeline will be installed in coordination with Linda County Water District and to meet the CVFPB's requirements.

Peach Tree Golf and Country Club – The two inch sanitary sewer force main located at project station 125+22 that was installed in 2008 will be removed during degradation of the levee. After installation of the cutoff wall, a new replacement pipeline will be installed in coordination with the Golf and Country Club and to meet the CVFPB's requirements.

Luis Farm – The 24-inch corrugated metal irrigation pipe located at project station 195+20.56 5.5 feet deep will also be relocated prior to installation of the cutoff wall when the levee is lowered to the level of the pipe. After cutoff wall installation a new replacement pipeline will be installed in coordination with the owners of the farm and the CVFPB's requirements.

There are also three existing 12-inch corrugated metal drain pipes located at project stations 149+29, 157+32, and 163+32. These pipelines provide drainage between the project levee and an adjacent berm. During construction of the proposed project it is anticipated that these pipelines will be removed and replaced.

Staging Areas and Access

Prior to and during construction of the proposed project several staging areas will be developed to allow for efficient use and distribution of materials and equipment. Additional staging areas within the project area may be developed based on contractor needs and will be reviewed by the Corps who will reinitiate section 7 consultation with the Service if these areas may affect federally-listed species. Personnel, equipment, and imported materials will reach the project site via State Route 70, North Beale Road, Hammonton-Smartville Road, Simpson Lane, and Simpson-Dantoni Road. At the project site, the primary construction corridor will include the crest of the existing YRSL, existing levee toes, and roads used for access to the work area, including Dantoni Road, Griffith Avenue, and Bryden Road. The access roads will also serve as haul routes to move the borrow material around the project area.

Operation and Maintenance Corridors

To provide space for operation and maintenance of the levee, for flood fighting, and for possible expansion of the levee in the future, TRLIA will acquire land to provide a 50-foot operation and maintenance corridor at the landside toe of the levee. Where this corridor conflicts with existing structural facilities, the corridor will be reduced to a minimum of ten feet. An operation and maintenance corridor of 15 feet will be acquired along the waterside levee toe. A 15-foot vegetation free zone will be required along the waterside and landside levee toes.

Nine elderberry shrubs with 115 stems greater than one inch in diameter at ground level will be transplanted to create the 15-foot vegetation free zone.

Disposal of Excess Materials

Because of the nature of the proposed project it is expected that excess materials such as soil, will be generated that will require disposal. Excess excavated materials will be placed in the borrow area temporarily and then either disposed of on-site, or hauled off-site and placed in a suitable disposal area. Debris and excess material requiring disposal in a landfill will be hauled off-site to a suitable facility.

Construction Scheduling

A construction period of up to four months is planned for the project, beginning in the summer of 2010 with contractor mobilization, and ending in November 2010 with clean-up and contractor demobilization. The proposed project could be constructed using two different scenarios: construction over a four month timeframe working 15 hours per day, or construction over a three month timeframe working 24 hours per day. It is likely that under the second scenario construction will not need to occur continuously for 24 hours per day for the entire three month period and will likely include a combination of 15 hour per day activities and 24 hour per day activities.

In addition to the elderberry shrubs which will be transplanted due to the proposed construction twenty-six elderberry shrubs are located within 100 feet of cutoff wall construction, levee reshaping, Operation and Maintenance corridor creation, waterside levee slope protection, and berm construction. These twenty-six elderberry shrubs will not be transplanted because the conservation measures listed below are sufficient to avoid adversely affecting them. Conservation measures to avoid and minimize effects to valley elderberry longhorn beetle habitat are described below.

Conservation Measures

The following measures shall be implemented to avoid, minimize, and compensate potential adverse effects on the valley elderberry longhorn beetle:

- Worker awareness trainings for construction personnel shall be conducted by a qualified biologist approved by the Service prior to beginning construction activities and as needed when new personnel begin work on the project. The program shall inform all construction personnel about the life history and status of the beetle, the need to avoid damaging the elderberry plants, measures to avoid and minimize impacts on this species and its habitat, the conditions of relevant regulatory permits, and the possible penalties for not complying with these requirements. Written documentation of the training shall be submitted to the Service within 30 days of the completion of training.

- All areas to be avoided during construction activities, specifically the 100-foot buffer zone around elderberry shrubs, shall be fenced and flagged. In areas where there will be encroachment on the 100-foot buffer, a minimum setback of at least 20 feet from the dripline of each elderberry shrub shall be provided in most cases. In some cases, in particularly the eastern end of the project area, construction activity may be required within 20 feet of a shrub. In these cases, k-rails shall be placed at the greatest possible distance from the shrubs, along the property line.

- Signage shall be erected every 50 feet along the edge of avoidance areas with the following information: "This area is habitat of the valley elderberry longhorn beetle, a federally-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." The signage shall be clearly readable from a distance of 20 feet, and shall be maintained for the duration of construction.

- Pre-construction and post-construction surveys shall be completed for the elderberry shrubs in the project area. Pre-construction surveys shall document compliance with conservation measures. The post-construction survey shall confirm that there was no additional damage to any of the elderberry shrubs than as described in this document.

- Temporary construction impacts within the buffer area (area within 100 feet of elderberry shrubs) shall be restored. If any portion of the buffer area is temporarily disturbed during construction, it shall be revegetated with native plants and erosion control shall be provided. Measures such as, fencing, signs, weeding, and trash removal shall be implemented as appropriate. A written description of how the buffer areas are to be restored, protected, and maintained after construction is completed shall be provided to the Service.

- All drainage water during and following construction shall be diverted away from the elderberry shrubs.

- Dirt roadways and disturbed areas within 100 feet of elderberry shrubs shall be watered at least twice a day to minimize dust emissions.

- Transplant 34 elderberry shrubs with 311 stems between 1 and 3 inches, 109 stems between 3 and 5 inches and 66 stems greater than 5 inches at ground level, and provide additional plantings as described in Service's 1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines). Elderberry shrubs that require removal will be transplanted. Because all 34 elderberry shrubs will be transplanted between August and October 2010 (outside of the elderberry dormant season) TRLIA has proposed to compensate an additional 2.5 times the Conservation Guidelines ratios. Shrubs will be planted either at the Anderson Road Compensation Site or at a Service-approved conservation bank. Elderberry and associated native seedlings at Anderson Road were established in 1996 for the Sacramento River Flood Control Project, Phase II compensation, and the site has been monitored for 10 years. Transplanting will occur outside of the transplantation window (approximately November through the first two weeks of February) identified in the Conservation Guidelines. TRLIA will work with the Service on determining the transplant and additional planting location (Table 2).

Table 2: Proposed minimization ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes when transplanted in August or September 2010.

Location	Stems (maximum diameter at ground level)	Exit Hole on Shrub (Yes or No)	Elderberry Seedling Ratio	Out of Season Multiplier	Associated Native Plant Ratio	Number of Stems Observed	Required Elderberry Plantings	Required Associated Native Plant Plantings
Riparian	stems ≥1" & ≤3"	No	2:1	2.5	1:1	97	485	485
Riparian	stems > 3" & <5"	No	3:1	2.5	1:1	24	180	180
Riparian	stems ≥5"	No	4:1	2.5	1:1	16	160	160
Non-riparian	stems ≥1" & ≤3"	No	1:1	2.5	1:1	214	535	535
Non-riparian	stems >3" & <5"	No	2:1	2.5	1:1	85	425	425
Non-riparian	stems ≥5"	No	3:1	2.5	1:1	50	375	375
Total replacement plantings							2,160	2,160
Total Elderberry shrubs to be transplanted								34
4,320/10 = 432 valley elderberry longhorn units or 17.85 acres								

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components: (1) the *Status of the Species*, which evaluates the valley elderberry beetle's

range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the valley elderberry longhorn beetle in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the valley elderberry beetle; (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 valley elderberry beetle; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the valley elderberry beetle.

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 valley elderberry beetle's 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 valley elderberry beetle. The jeopardy analysis in this BO places an emphasis on consideration of the range-wide survival and recovery needs of the valley elderberry beetle and the role of the action area in the survival and recovery of the valley elderberry beetle 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.

Status of the Species

Listing. 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 (formerly 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* (USFWS 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.

Life History. The elderberry shrub (*Sambucus* sp.) is the sole host plant for the valley elderberry longhorn 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* (USFWS 1984) and Barr (1991) further describe the beetle's life history.

Population Structure. 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 (USFWS 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).

Distribution and Range. 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 2005, the California Range wide distribution extends from the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDB 2005). The 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 2006).

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.

Reasons for Decline and Threats to Survival. 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 Loss - 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 California Department of Fish and Game 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 even 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% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% 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.

Habitat Fragmentation - 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, will 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.

Predation - 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, in prep.). 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 (in prep.) 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).

Pesticide Drift - Direct spraying with pesticides and related pesticide drift is a potentially harmful factor for the beetle. A wide range of such spraying is done to control mosquitoes, crop diseases, and undesirable plants and insects. Although there have been no studies specifically focusing on the direct and indirect effects of pesticides on the beetle, evidence suggests that the species may be adversely affected by some pesticide applications. Commonly used pesticides within the range of the beetle include insecticides, most of which are broad-spectrum and likely toxic to the beetle; herbicides, which may harm or kill its host elderberry plants; and broad-spectrum pesticides toxic to many forms of life. The greatest pesticide use occurs in the San Joaquin Valley. Four counties in this region had the highest use: Fresno, Kern, Tulare, and San

Joaquin (CDPR 2006). The peak timing of application depends on the chemical agent and other factors including the activity period of the targeted pest insects; the use of the agents may coincide with the most vulnerable period of beetle adult activity, egg-laying and initial larval exposure on the outside of elderberry stems (Talley *et al.* 2006). The California Department of Pesticide Regulation (CDPR) in 1997 listed 239 pesticide active ingredients applied in proximity to locations of beetle (same square mile per Marovich and Kishaba 1997 cited in Talley *et al.* 2006). Pesticide active ingredients sold in California have averaged on the order of 600 million pounds per year since about 1998 (CDPR 2006).

Pesticide use reported to the CDPR is only a fraction of the pesticides sold in California each year. About two-thirds of the active ingredients sold in a given year are not subject to use reporting, including home-use pesticide products. Recent studies of major rivers and streams documented that 96 percent of all fish, 100 percent of all surface water samples and 33 percent of major aquifers contained one or more pesticides at detectable levels (Gilliom 1999). Pesticides were identified as one of the 15 leading causes of impairment for streams included on the Clean Water Act section 303(d) lists of impaired waters. Because the beetle occurs primarily in riparian habitat, the contamination of rivers and streams likely has affects on this species and its habitat. Given the amount and scope of pesticide use, along with unreported household and other uses, and the proximity of agriculture to riparian vegetation in the Central Valley, it appears likely that pesticides are affecting the beetle and its elderberry habitat.

Invasive Plant Species - 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*), Himalayan 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).

Other Threats - 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 valley elderberry longhorn 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 will 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 (USFWS 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.

Environmental Baseline

The beetle currently inhabits the Central Valley from southern Shasta County south to Kern County in the San Joaquin Valley (Barr 1991; Talley *et al.* 2006). Within this range, there are approximately 190 records of the animal, largely based on exit holes (CNDDB 2006; Talley *et al.* 2006).

The beetle was listed as a threatened species due to the loss of its riparian habitat (USFWS 1980). Quantifying the loss of elderberry shrubs as a result of the agricultural and urban development over the past 200 years is near impossible. However, recent studies have identified plant communities that are associated with elderberry (Vaghti *et al.* submitted) and estimating loss of these communities offers insight into the loss of the beetle and its habitat. Lang *et al.* (1989) observed fewer numbers of elderberry shrubs in the lower reach (i.e., between Sacramento and Colusa) of the Sacramento River than the northern reach (i.e., Chico to Red Bluff). They attributed this difference to the loss of elderberry shrubs and riparian habitat in the southern reach of the Sacramento River as a result of extensive flood control activities such as the construction and maintenance of levees. The Central Valley Historic Mapping Project (Geographic Information Center 2003) observed similar decreases in the amount of riparian habitat. Loss of riparian habitat between 1900 and 1990 in the Central Valley was about 96% in the southern portion of the Valley (Kern County to Fresno County) (16,000 acres remaining), 84% in the middle Valley (Merced County to San Joaquin County) (21,000 acres remaining) and 80% in the northern Valley (Sacramento and Solano counties to Shasta County) (96,000 acres remaining).

In addition to the riparian habitat loss described by Lang *et al.* (1989), both the number of sites with elderberry shrubs and the density of elderberry within sites decreased between studies of the same areas in 1991 and 1997 which resulted in a lower number of occupied sites and shrub groups (Barr 1991; Collinge *et al.* 2001). Holyoak and Talley (2001) investigated natural recruitment and mortality rates of elderberry at seven sites along Putah Creek and the American River that had been previously sampled by Collinge *et al.* (2001). They observed that mortality and recruitment rates were similar between the two areas, illustrating that elderberry shrubs likely replace themselves in these relatively undisturbed areas.

In the northern portion of the beetle's range along the Sacramento River and 13 of its tributaries (including lands in Butte, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo and Yuba counties), the beetle occurs in drainages that function as distinct, relatively isolated metapopulations (Collinge *et al.* 2001). Half of the 14 drainages in the Sacramento Valley surveyed by Barr (1991) in 1991 and again by Collinge *et al.* (2001) in 1997 remained unoccupied in both studies. The beetle experienced extirpation in two drainages and neither were recolonized. Collinge *et al.* (2001) concluded that because of dispersal limitations, unoccupied drainages were likely to remain unoccupied and those where the resident beetle population became extirpated were not likely to be recolonized. One of the implications of their results for conservation was that there is little chance that natural populations will recover following declines (Collinge *et al.* 2001).

The increase in the amount of riparian habitat through restoration and compensation efforts is valuable, but remains small in comparison to estimated historic losses of the habitat. Approximately 50,000 acres of existing riparian habitat has been protected in the Sacramento and San Joaquin Valley since 1980. In addition, approximately 5,000 acres of habitat has been restored for the benefit of the beetle (including planting of elderberries) and another 1,600 acres of riparian habitat has been restored however, no elderberry plantings were included (Talley *et al.* 2006). An undetermined amount of additional habitat has been restored as a result of compensation for section 7 projects. Despite the efforts of a number of agencies and

organizations, the 5,000 acres of restoration activities is less than 1 percent of the estimated 890,000 acres of the historic riparian habitat lost in the Central Valley. Loss of the beetle and its habitat continues, including conversion of agricultural lands, urban development and other activities that are often unreported. The ability of restoration and enhancement of conservation sites to fully compensate for adverse effects to the animal and its lost remnant natural habitat, is uncertain (Holyoak *et al.* in press).

Evidence of valley elderberry longhorn beetles was documented in the California Natural Diversity Database 2010, along the Yuba River about two miles upstream of the project area. The action area contains components that can be used by the listed animal for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as recent observations of this listed species.

Effects of the Proposed Action

The proposed project will result in the transplantation, outside of the action area, of the 34 elderberry shrubs within the action area with stems greater than 1.0 inch in diameter. The 34 shrubs affected shrubs have 311 stems between 1 and 3 inches, 109 stems between 3 and 5 inches and 66 stems greater than 5 inches at ground level.

Loss of an elderberry shrub or even a stem can affect valley elderberry longhorn beetle breeding and feeding because adult beetles rely solely on elderberry foliage and flowers for food and must lay their eggs on elderberry stems to successfully reproduce. Due to the schedule of the project elderberry shrubs will be transplanted outside of the elderberry shrubs dormant season (November 1 to February 15). Additional stress occurs to elderberry shrubs when transplanted outside of their dormant season particularly when temperatures are high. This stress increases the likelihood of shrub mortality and consequently an additional temporal loss of habitat for the beetle. Beetles that inhabit those shrubs would die as a result of the shrubs dying. To offset the temporal loss of habitat by transplanting elderberry shrubs outside if the dormant season, the Corps and TRLIA have proposed to increase compensation by 2.5 times the recommended ratios in the Conservation Guidelines. Increasing the compensation will provide additional available habitat for the valley elderberry longhorn beetle.

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.

Temporal loss of habitat may occur. Although conservation measures for effects on the valley elderberry longhorn beetle will involve creation or restoration of habitat, it generally takes five or more years for elderberry plants to become large enough to support beetles, and it may take 25 years or longer for riparian habitats to reach their full value. Temporal loss of habitat may cause fragmentation of habitat and isolation of subpopulations.

Habitat creation will minimize the effect of permanent and temporary habitat loss on the valley elderberry longhorn beetle. The Anderson Road site is within the floodplain of the Feather River and was created as compensation for valley elderberry longhorn beetle by the Corps. TRLIA proposes to use a portion which has not been attributed to any other Corps project. The site will be managed in perpetuity for riparian habitat including valley elderberry longhorn beetle habitat, through the site operations and maintenance manual. This site provides connectivity to existing riparian habitat along the Feather River corridor and allows for dispersal of valley elderberry longhorn beetles.

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 project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. Any future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or result in take of listed valley elderberry longhorn beetle and are, therefore, cumulative to the proposed project.

Conclusion

After reviewing the current status of the valley elderberry longhorn beetle, the environmental baseline for the species, the effects of the proposed project, and the cumulative effects on this species, it is the Service's opinion that the proposed Upper Yuba River Levee Improvement Project, as described herein, is not likely to jeopardize the continued existence of the valley elderberry longhorn beetle.

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 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 nondiscretionary and must be implemented by the Corps in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity that is covered by this incidental take statement. If the Federal agency (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of a dead specimen unlikely. The species occur in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of 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 elderberry stems one inch or greater in diameter at ground level (beetle habitat) that will become unsuitable for beetles due to direct or indirect effects as a result of the action. Therefore, the Service estimates that all beetles inhibiting 34 elderberry plants containing stems 1 inch or greater at ground level (311 stems between 1-3 inches, 109 stems between 3 and 5 inches and 66 stems $\geq$5 inches; see Table 2 in the text) will be harmed or killed as a result of the proposed action.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize the effects of the proposed project on the beetle:

All the conservation measures as described in the project description, and as restated here in this biological opinion, must be fully implemented and adhered to. Further, these conservation measures shall be supplemented by Terms and Conditions 1 and 2 as well as the following Reporting Requirements.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, the Corps and TRLIA must comply with the following terms and conditions, which implement reasonable and prudent measure number one. These terms and conditions are non-discretionary.

The following Terms and Conditions implement the Reasonable and Prudent Measure:

1. The Corps shall include full implementation and adherence to conservation measures as a condition of any permit issued for the project.

2. TRLIA shall require that all personnel (including contractors) associated with the proposed project are made aware of the conservation measures and the responsibility to implement them fully.

Reporting Requirements

A post-construction compliance report prepared by the monitoring biologists must be submitted to the Deputy Assistant Field Supervisor at the Sacramento Fish and Wildlife Office within thirty (30) calendar days of the completion of construction activity or within thirty (30) calendar days of any break in construction activity lasting more than thirty (30) calendar days. This report shall detail: (i) dates that groundbreaking at the project started and the project was completed; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the valley elderberry longhorn beetle, if any; (v) occurrences of incidental take of any these species; and (vi) other pertinent information.

The Corps must require TRLIA to report to the Service immediately any information about take or suspected take of federally-listed species not exempted in this BO. TRLIA must notify the Service within 24 hours of receiving such information. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contact persons are, Deputy Assistant Field Supervisor, Endangered Species Program at (916) 414-6600, and the Resident Agent-in-charge of the Service's Law Enforcement Division at (916) 414-6660.

Any contractor or employee who during routine operations and maintenance activities inadvertently kills or injures a listed wildlife species must immediately report the incident to their representative. This representative must contact the 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.

CONSERVATION RECOMMENDATIONS

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of new information. These measures may serve to further minimize or avoid the adverse effects of a proposed action on listed, proposed, or candidate species, or on designated critical habitat. They may also serve as suggestions on how action agencies can assist species conservation in furtherance of their responsibilities under section 7(a)(1) of the Act, or recommend studies improving an understanding of a species' biology or ecology. Wherever possible, conservation recommendations should be tied to tasks identified in recovery plans. The Service is providing you with the following conservation recommendations:

1. The Corps and TRLIA should assist in investigating the importance of larval and adult mortality factors such as Argentine ant, other natural enemies, and pesticide drift.

2. The Corps and TRLIA should provide funding to researchers for studies on the autecology and live history of both the valley elderberry longhorn beetle and elderberry shrubs.

3. The Corps should use environmental restoration authorities to acquire currently occupied valley elderberry longhorn beetle habitat and restore adjacent areas.

4. To be kept informed of actions minimizing or avoiding adverse effects or benefiting listed and proposed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation with the Corps on the Upper Yuba Levee Improvement Project. As provided in 50 CFR 402.16, re-initiation 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 proposed action 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 listed species or critical habitat that was not considered in this opinion; or (4) a new species or critical habitat is designated that may be affected by the proposed action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

If you have any questions regarding this BO on the Upper Yuba River Levee Improvement Project, please contact Jennifer Hobbs at (916) 414-6541 or Jana Affonso, Chief, Sacramento Valley Branch at (916) 414-6645.

Sincerely,

for Susan K. Moore
Field Supervisor

cc:
John Suazo, Corps, Sacramento, CA
Paul Brunner, TRLIA, Rancho Cordova, CA

Literature Cited

Barr, C.B. 1991. The Distribution, Habitat, and Status of the Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* Fisher (Insecta: Coleoptera: Cerambycidae). U.S. Fish and Wildlife Service, Sacramento, California. 134 pp.

California Natural Diversity Database (CNDDB). 2005. Natural Heritage Division, California Department of Fish and Game. Sacramento, California.

Collinge, S.K., M. Holyoak, C.B. Barr, and J.T. Marty. 2001. Riparian habitat fragmentation and population persistence of the threatened valley elderberry longhorn beetle in central California. Biological Conservation 100:103-113.

Crane, M. F. 1989. *Sambucus cerulea.* IN: W.C. Fischer (compiler). *The fire effects information system* [Data base]. USDA, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Missoula, Montana.

Fahrig, L. 1997. Relative Effects of Habitat Loss and Fragmentation on Population Extinction. Journal of Wildlife Management. 61:603-610.

Frayer, W. E., D. D. Peters, and H. R. Pywell. 1989. Wetlands of the California Central Valley: Status and Trends, 1939 to mid-1980's. U.S. Fish and Wildlife Service, Region 1. Portland, Oregon.

Halstead, J.A., Oldham, J.A. 1990. Revision of the Nearctic *Desmocerus* Audinet-Serville with emphasis on the federally threatened valley elderberry longhorn beetle (Coleoptera: Cerambycidae). Environmental Section Staff Report, Kings River Conservation District, Fresno, CA.

Holway, D.A. 1998. Distribution of the Argentine ant (*Linepithema humile*) in Northern California. Conservation Biology 9:1634-1637.

Human, K.G. & D.M. Gordon 1997. Effects of Argentine ants on invertebrate biodiversity in northern California. Conservation Biology. 11: 1242 – 1248.

Huxel, G.R., M. Holyoak, T. Talley, and S. Collinge. 2003. Perspectives of the Recovery of the Threatened Valley Elderberry Longhorn Beetle. In California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration. 2003.

Huxel, Gary .R. 2000. The Effect of the Argentine ant on the threatened valley elderberry longhorn beetle. Biological Invasions 2:81-85.

Huxel, G. R. and A. Hastings. 1999. Habitat loss, fragmentation, and restoration. Restoration Ecology 7:1-7.

Katibah, E. F. 1984. A Brief History of Riparian Forests in the Central Valley of California. Pages 23-29 *in* Warner, R. E. And K. M. Hendrix (eds.). California riparian systems: ecology, conservation, and productive management. University of California Press, Berkeley, California.

Lande, R. 1988. Genetics and demography in biological conservation. Science 241:1455-1460.

Lang, J., J. Jokerst, and G. Sutter. 1989. Habitat and Populations of the valley elderberry longhorn beetle along the Sacramento River. USDA Forest Service Gen. Tech. Rep. PSW-110.

Primack, R.B. 1998. Essentials of Conservation Biology. Second Edition. Sinaur Associates. Sunderland, Massachusetts.

Roberts, W.G., J.G. Howe, and J. Major. 1977. A Survey of Riparian Forest Flora and Fauna in California. Pages 3-20 *in* A. Sands (ed.) Riparian Forests in California: their Ecology and Conservation. University of California, Davis, California.

Shaffer, M.L. 1981. Minimum Populations Sizes for Species Conservation. Bioscience 31: 131-134.

Smith, S. 1977. A Short Review of the Status of Riparian Forests in California. Pages 1-2 *in* A. Sands (ed.) Riparian Forests in California: their Ecology and Conservation. University of California, Davis. Davis, California.

Talley, T. 2005. Spatial Ecology and Conservation of the Valley Elderberry Longhorn Beetle. Dissertation. UC Davis.

Talley, T., E. Fleishman, M. Holyoak, D. Murphy, and A. Ballard. 2007. Rethinking a rare-species conservation strategy in an urban landscape: The case of the valley elderberry longhorn beetle. Biological Conservation. Vol. 135, No. 1, pp 21-32.

Talley, T., M. Holyoak, and D. Piechnik. 2006. The Effects of Dust on the Federally Threatened
Valley Elderberry Longhorn Beetle. Environmental Management Vol. 37, No. 5, pp. 647–658.

Thompson, K. 1961. Riparian forests of the Sacramento Valley, California. Annals of the Association of American Geographers 51: 294-315.

U.S. Fish and Wildlife Service (USFWS). 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

_____. 1984. Valley Elderberry Longhorn Beetle Recovery Plan. Endangered Species Division, Portland, Oregon. 62 pp.

Vaghti, M., M. Holyoak, A. Williams, T. Talley, A. Fremier, and S. Greco. 2009. Understanding the Ecology of Blue Elderberry to Inform Landscape Restoration in Semiarid River Corridors. Environmental Management. Vol. 43, pp. 28-37.

Ward, P.S. 1987. Distribution of the introduced Argentine ant (*Iridomyrex humilis*) in natural habitats of the lower Sacramento Valley and its effects on the indigenous ant fauna. Hilgardia 55:1-16.

Warner, R.E. and K.M. Hendrix. 1985. Riparian resources of the Central Valley and California Desert. California Department of Fish and Game. 226 pp.

Way, M.J., M.E. Cammell, and M.R. Paiva. 1992. Studies on egg predation by ants *Hymenopteru: Formicidue)* especially on the eucalyptus borer *Phoracnnthu semipunctatc~ (Cnleuptera: Cerambycidae)* in Portugal. Bulletin of Entomological Research X2:425-432.