

## **Appendix B: U.S. Fish and Wildlife Service Section 7 Consultation**



## 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:  
81420-2009-F-1206

OCT 22 2013

Mr. Zachary Simmons  
U.S. Army Corps of Engineers  
1325 J Street  
Sacramento, California 95814

Subject: Formal Consultation for the Millerton Road Widening Project, Fresno County, California

Dear Mr. Simmons:

This is the U.S. Fish and Wildlife Service's (Service) response to the U.S. Army Corps of Engineers' (Corps) March 23, 2011 request for initiation of formal consultation on the proposed Millerton Road Widening Project (project) in Fresno County, California. The Corps is considering issuance of Nationwide Permit (NWP) 14 for linear transportation projects to Fresno County Public Works and Planning, as administered by the Corps pursuant to Section 404 of the Clean Water Act for the project.

This document represents the Service's biological opinion on the effects of the project on the federally-listed as threatened central California Distinct Population Segment of the California tiger salamander (central California tiger salamander) (*Ambystoma californiense*) and vernal pool fairy shrimp (*Branchinecta lynchi*) and the federally-listed as endangered San Joaquin kit fox (*Vulpes macrotis mutica*) and vernal pool tadpole shrimp (*Lepidurus packardii*) listed under the Endangered Species Act of 1973, as amended (Act). Critical habitat for vernal pool tadpole shrimp has been designated but does not occur in the action area.

Based on the information you have provided to us, the Service concurs with your determination that the project is not likely to adversely affect the San Joaquin kit fox. We concur with your determination because: 1) we agree that this species is not reasonably likely to be in the action area; and 2) the applicant has proposed to implement the *U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior To or During Ground Disturbance* (Service 1999).

This biological opinion is based on: (1) the Service's technical assistance with the Corps (Service File #81420-2009-TA-1206); (2) the Corps' March 23, 2011 request for consultation; (3) the *Millerton Road Widening Project Biological Assessment* (biological assessment) prepared by Analytical Environmental Services (AES) and received with the Corps' request for

consultation; (4) AES's November 29, 2012 response to the Service's October 09, 2012 request for additional information; (5) other information available to the Service. The Service received complete information on this project on March 14, 2013.

### **Consultation History**

*March 01, 2009.* AES sent in a request to conduct wet season vernal pool branchiopod surveys. The request was authorized via email.

*September 01, 2009.* 90 day report for 2008-2009 wet season vernal pool branchiopod surveys received in our office.

*March 29, 2011.* The Corps submitted a request for initiation of formal consultation on the project.

*September 28, 2012.* The Service sent a letter notifying the Corps that additional information regarding effects to critical habitat in the project area is needed to initiate formal consultation as outlined in the regulations governing interagency consultations.

*November 29, 2012.* The Service received an email response to our September 28, 2012 request for additional information.

*December 05, 2012.* The Service emailed the Corps and AES to request additional information on the proposed central California tiger salamander surveys, proposed fencing areas, and project phasing sections outlined in the biological assessment.

*December 13, 2012.* The Service emailed the Corps and AES to request additional information on the specifications of the proposed Friant-Kern canal bridge, the erosion control measures, and the drainage facilities.

*January 24, 2013.* The Service received an email from AES in response to our December 13, 2012 request for additional information.

*January 30, 2013.* The Service received an email from AES in response to our December 05, 2012 request for additional information.

*February 20, 2013.* AES proposed additional avoidance measures for central California tiger salamander in an updated biological assessment.

*March 14, 2013.* The Service received an email from AES in response to our March 13, 2013 request for additional information on project timing.

## **BIOLOGICAL OPINION**

### **Description of the Proposed Action**

The project is located 11 miles north of the City of Clovis, Fresno County, California, in Section 9, 10, and 11, Township 11 south, Range 21 east, Mount Diablo Base and Meridian, with a center point near UTM 11s 261225 meters east, 4096650 meters north in the Friant U.S. Geological Survey (USGS) 7.5-minute topographical quadrangle.

According to the biological assessment, Fresno County Public Works and Planning (Fresno County) proposes to widen eastbound and westbound Millerton Road from the current two-lane configuration to a four-lane configuration from the intersection of Millerton Road and North Friant Road eastward for approximately 4.7 miles. A description of the project components follow:

#### **Millerton Road**

The proposed project includes expanding the road to a four-lane configuration, with four 12-foot-wide travel lanes, two 6-foot-wide paved shoulders, and 4-foot-wide treated dirt shoulders. A 16-foot-wide median would separate the eastbound and westbound traffic. Implementation of the project would require expansion of the existing right-of-way from approximately 60 feet wide to 106 feet wide, which is 53 feet on either side of the current roadway's centerline, except where additional width is necessary for cut and fill. Left-turn lanes are to be 11 feet or 12 feet wide, where appropriate, and will be separated from opposing traffic by a 4-foot-wide raised medium, at minimum. Right-turn lanes, if required, will be 11 feet wide. The minimum design speed for the roadway is 45 miles-per-hour (mph) and conforms to a higher design speed of 55 mph, where practical.

#### **Intersection Improvements**

##### *North Fork Road*

This intersection is near the western end of the project corridor. Some modifications to the intersection will be required to accommodate a right-turn lane for the southbound Millerton Road traffic and a new median to conform with the new road section.

##### *State of California/Cal Fire Station Entrance*

The CalFire station entrance/Forest Service Road is located approximately 500 feet west of the Friant-Kern Canal and Millerton Road intersection. The project would result in minor modifications along the subject roadway entrance to match the grade of Millerton Road.

##### *Friant Dam Access Road*

Implementation of the proposed project may require a realignment of the Friant Dam access road at the intersection with the Millerton Roadway.

*Winchell Cove Road*

This is an asphalt roadway owned by the State of California that provides access to the marina area with the Millerton Lake State Recreation Area (SRA). The intersection will be reestablished to coincide with the roadway changes and will include accommodations for slow-moving boat trailers coming from the marina.

*Brighton Crest Entrance Road*

The project would result in modifications to this intersection to match the new alignment.

*Casino Entrance/Table Mountain Road*

This is a two-lane T-intersection entrance to the Table Mountain Casino. The existing northwest corner radius of the intersection is inadequate for bus turns. The project would result in modifications to the intersection to accommodate bus turns. The current intersection signals would be modified to accommodate two additional lanes. The new alignment will consist of two left turn lanes.

*Church Entrance/Table Mountain Road*

This is a two-lane T intersection east of the Table Mountain Casino serving the Table Mountain Rancheria Church, employee parking, and other facilities. The intersection will be redesigned to match the new four-lane alignment. The new alignment will include a left turn lane from Millerton Road.

*Private Road and Driveway Intersections*

There are approximately 18 other private roads and driveways that intersect the existing roadway. Adjustment of these facilities would occur to match the new alignment's grade.

*Friant-Kern Canal Bridge*

The proposed project includes the construction of a new two-lane pre-stressed I-girder bridge to serve the westbound traffic over the Friant-Kern Canal, while the existing Friant-Kern Canal bridge would be retained and utilized for the eastbound traffic. The proposed bridge would be approximately 13 feet upstream of the existing bridge. The design for the approximately 160-foot long bridge would be similar to that of the existing bridge, including two 12-foot travel lanes a 4-foot shoulder, an 8-foot shoulder/bicycle lane, and two guard rails occupying 1 foot 5 inches of paved roadway each. The total width of the bridge would be approximately 38 feet 10 inches. Construction is proposed to occur during the Friant-Kern Canal's scheduled shut-off period from mid-November to the end of January to avoid construction of coffer dams and temporary culverts along the canal.

### Drainage Facilities

Three cobble-lined ditches are proposed along Millerton Road to accommodate stormwater runoff flows. Two of the ditches will replace existing ones while the third is located where water has historically flowed along the roadway gutter without erosion problems.

Drainage improvements for the proposed facilities would be designed to convey the estimated runoff. Proposed culverts will generally coincide with the location of the existing pipe culverts. The corrugated metal pipe culverts will be circular and unlined. In addition to the culverts along the new alignment of Millerton Road, three culverts are required at road crossings north of Millerton Road as a result of the expansion, that include Winchell Road, the Friant Dam access road, and the California State Recreation Area access road. Sixty-five culverts will be installed as part of the project, this includes replacement culverts.

### Equipment Staging

Equipment staging will occur within the existing and proposed right-of-way for Millerton Road. No equipment will be staged or stored on property adjacent to the project disturbance footprint.

Project work will occur between the hours of 6:00 am and 9:00 pm Monday through Friday, and between the hours of 7:00 am and 5:00 pm on Saturday and Sunday.

### Storm Water Runoff Control Measures

Temporary erosion control measures such as silt fences, and staked straw bales shall be employed for disturbed areas. No disturbed surfaces will be left without erosion control measures in place during the winter and spring months.

Construction is expected to last approximately 24 months and will begin in the summer of 2013 or the summer of 2014.

### Proposed Avoidance and Minimization Measures

The Corps will add special conditions to their NWP to ensure Fresno County and their contractors implement the following guidelines to minimize or avoid impacts to listed species that have the potential to occur within the vicinity of the project area:

#### *Construction Guidelines*

1. At least 15 days prior to the onset of any construction-related activities, Fresno County shall submit to the Service, for approval, the name(s) and credentials of biologists it requests to conduct activities specified for this project. Information included in a request for approval must include, at a minimum: (1) relevant education; (2) relevant training on species identification, survey techniques, handling individuals of different age classes, and handling of different life stages; (3) a summary of field experience conducting requested activities (to include

project/research information and actual experience with the species); (4) a list of biological opinions under which they were authorized to work with the listed species and at what level (such as construction monitoring versus handling), this should also include the names and qualifications of persons under which the work was supervised as well as the amount of work experience on the actual project including detail on whether the species was encountered or not.

2. A Service-approved biologist will conduct habitat sensitivity training to all construction personnel. The training shall include discussions of the biology, distribution, and ecology of the central California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp; required practices before the start of construction, general measures that are being implemented to conserve these species as they relate to the proposed action, penalties for non-compliance, and boundaries of the action area and of the permitted disturbance zones. All workers shall be informed during the worker education program of the importance of preventing spills and of the appropriate measures to take should a spill occur. Supporting materials containing training information will be prepared and distributed. Upon completion of training, all construction personnel will sign a form stating that they have attended the training and understand all the conservation measures. Training shall be conducted in languages other than English, as appropriate. Proof of this instruction will be kept on file with the applicant and this record shall be made available to the Service for compliance verification and shall be included in the first month reporting requirement.
3. All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 65 feet from any water body.
4. All construction pipe, culverts, or similar structures that are stored at the construction site for one or more overnight periods will be thoroughly inspected before the pipe is subsequently moved, buried, or capped. If during inspection a central California tiger salamander is discovered inside a pipe, that section of pipe shall not be moved until the salamander has escaped on its own or the Service will be contacted for further instruction.
5. Project personnel will exercise caution when commuting to the construction area to minimize any chance for the inadvertent injury or mortality of species encountered on major roads leading to and from the construction area. Project related vehicles and equipment will not exceed 20 miles per hour in the action area.
6. Vehicles and equipment will be thoroughly inspected for the presence of central California tiger salamander prior to movement. If a salamander is found the Service shall be contacted for further guidance. No equipment will be moved until the salamander has left voluntarily.
7. All stakes, flagging, and fencing used to delineate the construction area will be removed no later than 30 days after construction and restoration are complete.

8. A litter control program shall be instituted at the entire project site. Fresno County will ensure the contractor will provide closed garbage containers for the disposal of all food-related trash items (e.g., wrappers, cans, bottles, food scraps). All garbage will be removed daily from the project site.
9. The Service-approved biologist shall have oversight over the implementation of all conservation measures, and shall have the authority to stop project activities if any of the requirements associated with these measures are not being fulfilled.

#### Proposed Conservation Measures for Listed Species

##### *Central California Tiger Salamander*

1. Fresno County will minimize the effects of the permanent loss of 26.37 acres of central California tiger salamander habitat (0.23 acres of breeding habitat, 26.14 acres of upland habitat) by funding the purchase of 79.11 acres (using a 3:1 compensation ratio for permanent effects) of conservation credits. These credits shall be purchased prior to onset of ground breaking activities from a Service-approved conservation bank with a service area that includes the action area.
2. If at any time, a central California tiger salamander is located, all work in the immediate vicinity will cease, and the animal will be allowed to leave voluntarily or the Service will be contacted for further guidance.
3. To prevent inadvertent entrapment of central California tiger salamanders during construction, at the end of each work day all excavated, steep-walled holes or trenches will be covered with plywood or similar materials or will be filled with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals. If, at any time, a trapped central California tiger salamander is located, all work in the immediate area will cease, the animal will be allowed to leave on its own or the Service will be contacted for further instruction. The appropriate contact is Thomas Leeman, Chief, San Joaquin Valley Division, (916) 414-6600.
4. Plastic monofilament netting is prohibited because central California tiger salamander can become caught in this type of erosion control material. Tightly woven (less than 0.25 inch diameter) biodegradable fiber netting or biodegradable coconut coir matting shall be used for erosion control or other purposes to ensure that central California tiger salamander do not become entrapped. This limitation will be communicated to the contractors through use of special provisions included in the bid solicitation package.



5. Construction within potential central California tiger salamander breeding habitat will be timed to occur during the dry season, between approximately April 15 and October 15, so as to avoid impacting breeding individuals at seasonal wetland locations. The dry season window may depend on rainfall and/or site conditions.

#### *Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp*

1. Fresno County will minimize the effects of the direct loss of 0.233 acres of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat by funding the purchase of 0.69 acres (using a 3:1 compensation ratio) of preservation credits. These credits shall be purchased prior to onset of ground breaking activities from a Service-approved conservation bank.

#### 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 action area for this project includes the project footprint, which consists of a permanently disturbed area of 59.65 acres. Land cover within the project footprint is composed of 26.14 acres of grassland and woodland, 0.29 acres of riparian habitat, 32.86 acres of roadway, and 0.362 acres of wetland features.

#### **Analytical Framework for the 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 range wide condition of the species in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the *Environmental Baseline*, which evaluates the conditions 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 of 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 central California tiger salamander and vernal pool fairy shrimp critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account

any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the central California tiger salamander and vernal pool fairy shrimp.

The analysis in this Biological Opinion places an emphasis on using the intended range-wide recovery function of central California tiger salamander and vernal pool fairy shrimp 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.

### **Analytical Framework for the Jeopardy Analysis**

In accordance with policy and regulation, the following analysis relies on four components: (1) the *Status of the Species*, which evaluates the range-wide condition of the species, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on the species.

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 central California tiger salamander vernal pool fairy shrimp and vernal pool tadpole shrimp 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 central California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp in the wild.

The following analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the central California tiger salamander, vernal pool fairy shrimp and vernal pool tadpole shrimp and the role of the action area in the survival and recovery of the central California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp 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**

#### **Central California Tiger Salamander**

*Species Description:* The central California distinct population segment of the tiger salamander was listed as threatened on August 04, 2004. The central California tiger 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). Central California tiger 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 sides of the body; whereas other salamander species tend to have brighter yellow spotting that is heaviest on the dorsal surface.

*Distribution:* The historic distribution for the California tiger salamander in the Central Valley and surrounding foothills included northern Yolo County southward to northwestern Kern County and northern Tulare County. Currently, the central California tiger salamander is known to occupy the Bay Area (central and southern Alameda, Santa Clara, western Stanislaus, western Merced, and the majority of San Benito counties), Central Valley (Yolo, Sacramento, Solano, eastern Contra Costa, northeastern Alameda, San Joaquin, Stanislaus, Merced, and northwestern Madera counties), southern San Joaquin Valley (portions of Madera, central Fresno, and northern Tulare and Kings Counties), and the Central Coast Range (southern Santa Cruz, Monterey, northern San Luis Obispo, and portions of western San Benito, Fresno, and Kern counties).

*Life History:* The central California tiger 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 individuals 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 central California tiger salamanders are abundant. Subadult and adult central California tiger salamanders typically spend the dry summer and fall months in the burrows of small mammals, such as California ground squirrels and Botta's pocket gopher (Storer 1925; Loredó and Van Vuren 1996; Petranka 1998; Trenham 1998). Central California tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Although central California tiger 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. Central California tiger salamanders depend on persistent small mammal activity to create, maintain, and sustain sufficient underground refugia for the species.

Upland burrows inhabited by central California tiger 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. Van Hattem (2004) found that salamanders move, feed, and remain active in their burrows. Because 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 central California tiger salamanders.

Central California tiger 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 fewer adults migrating and breeding in drought years (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Historically, breeding ponds were likely limited to vernal pools, but now include livestock stock ponds. Ideal breeding ponds are typically fishless, free of non-native predators, and seasonal or semi-permanent (Barry and Shaffer 1994; Petranksa 1998). After breeding and egg laying is complete, adults leave the pool and return to their upland refugia (Loredo *et al.* 1996; Trenham 1998). Adult central California tiger salamanders often continue to emerge nightly for approximately the next two weeks to feed in their upland habitat (Shaffer *et al.* 1993).

Following metamorphosis, juvenile central California tiger 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. The peak emergence of these metamorphs in ponds is typically between mid-June and mid-July (Loredo and Van Vuren 1996; Trenham *et al.* 2000). Juveniles remain active in their upland habitat, emerging from underground refugia during rainfall events to disperse or forage (Trenham and Shaffer 2005).

Dispersal and migration movements made by central California tiger salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the movement of salamanders between a pond and 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, 80 percent of individuals returned to their natal/ birth pond to breed, while 20 percent dispersed to other ponds (Trenham *et al.* 2001). After breeding, adult central California tiger salamanders return to upland habitats, where they may live for one or more years before attempting to breed again (Trenham *et al.* 2000).

Central California tiger 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, Orloff (2011) estimated that captured central California tiger salamanders were traveling a minimum of 0.5 miles to the nearest breeding pond and that some individuals were likely traveling more than 1.3 miles to and from breeding ponds. Central California 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.

*Threats:* The central California tiger salamander is imperiled throughout its range due to a variety of human activities (Service 2004). Current factors associated with declining central California tiger salamander populations include continued habitat loss and degradation due to agriculture and urbanization; hybridization with the non-native eastern tiger salamander (*Ambystoma tigrinum*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003); and predation by introduced species. Central California tiger 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 threatened the viability of metapopulations (broadly defined as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or “rescuing” extirpated habitat patches). Other threats include disease, predation, interspecific competition, urbanization and population growth, exposure to contaminants, rodent and mosquito control, road-crossing mortality, and hybridization with non-native salamanders. The central California tiger salamander is also prone to chance environmental or demographic events, to which small populations are particularly vulnerable.

#### Central California Tiger Salamander Critical Habitat

Critical habitat for the central California tiger salamander was designated in the *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Tiger Salamander, Central Population* (Service, 2005). There are 31 units designated for the central California tiger salamander, totaling 199,109 acres.

Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species’ conservation and that may require special management considerations or protection (50 CFR 424.12(b)). The Service is required to list the known PCEs together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:

1. Space for individual and population growth, and for normal behavior;
2. Food, water, air, light, minerals, or other nutritional or physiological requirements;
3. Cover or shelter;
4. Sites for breeding, reproduction, rearing of offspring, or dispersal; and
5. Generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

The PCEs defined for the central California tiger salamander were derived from its biological needs. The PCE's and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of central California tiger salamander ecology. Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the PCEs essential to the conservation of the central California tiger salamander are: 1) Standing bodies of fresh water (including natural and manmade (e.g. stock) ponds, vernal pools, and other ephemeral or permanent water bodies which typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall (PCE 1); 2) upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that central California tiger salamander depend on for food, shelter, and protection from the elements and predations (PCE 2); 3) Accessible upland dispersal habitat between occupied locations that allow for movement between such sites (PCE 3).

Please refer to the final designation of critical habitat for central California tiger salamander for additional information (Service, 2005).

#### Vernal Pool Fairy Shrimp

For the most comprehensive assessment of the species' range wide status, please refer to the *Vernal Pool Fairy Shrimp (Branchinecta lynchie) 5-Year Review: Summary and Evaluation* (Service 2007) for the current status of the species. No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2007 5-year review was finalized, with loss of vernal pool habitat being the most significant effect. While there have been continued losses of vernal pool habitat throughout the various vernal pool regions identified in the Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (Service, 2005a), including the Southern Sierra Foothills Vernal Pool Region where the proposed project is located, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

#### Vernal Pool Fairy Shrimp Critical Habitat

Critical habitat for the vernal pool fairy shrimp was designated in the *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants* (Service, 2005b). There are 35 units designated for the vernal pool fairy shrimp, totaling 597,821 acres.

The PCEs defined for the vernal pool fairy shrimp were derived from its biological needs. The PCE's and, therefore, the resulting physical and biological features essential for the conservation of the species were determined from studies of vernal pool fairy shrimp ecology. Based on the species needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the

Service determined that the PCEs essential to the conservation of the vernal pool fairy shrimp are: 1) 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, providing for dispersal and promoting hydroperiods of adequate length in the pools (PCE 1); 2) 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 for vernal pool fairy shrimp and 41 days for vernal pool tadpole shrimp, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction (PCE 2); 3) 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 (PCE 3); and 4) structure within the pools 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 (PCE 4).

Please refer to the final designation of critical habitat for vernal pool fairy shrimp for additional information (Service, 2005b).

### Vernal Pool Tadpole Shrimp

For the most comprehensive assessment of the species' range wide status, please refer to the *Vernal Pool Tadpole Shrimp (Lepidurus packardii) 5-Year Review: Summary and Evaluation* (Service 2007b) for the current status of the species. No change in the species' listing status was recommended in this 5-year review. Threats evaluated during that review and discussed in the final document have continued to act on the species since the 2007 5-year review was finalized, with loss of vernal pool habitat being the most significant effect. While there have been continued losses of vernal pool habitat throughout the various vernal pool regions identified in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service, 2005a), including the Southern Sierra Foothills Vernal Pool Region where the proposed project is located, to date no project has proposed a level of effect for which the Service has issued a biological opinion of jeopardy for the species. The Service is in the process of finalizing its most current 5-year review for the species.

## Environmental Baseline

### Central California Tiger Salamander

The Service considers the 25.09 acres of nonnative annual grassland and the 1.05 acres blue oak woodland in the action area as upland habitat for the central California tiger salamander. Numerous California ground squirrels (*Spermophilus beecheyi*) and their burrows were observed in the action area. Central California tiger salamander tends to rely on deep, persistent mammal burrows for protection from desiccation and for foraging (Madison and Ferrand, 1998; Regosin *et al.*, 2003; Trenham *et al.*, 2001. in Searcy *et al.*, 2013). The 0.233 acres of seasonal wetlands

in the action area are assumed in the biological assessment to provide suitable central California tiger salamander aquatic habitat. The existing Millerton Road is considered unsuitable upland forage or refuge habitat, but the roadway area could be used for dispersal. The remaining 0.419 acres within the action area are comprised of the Friant-Kern canal, an ephemeral drainage, and roadside ditch.

Surveys for central California tiger salamander have not been conducted at the project site. However, central California tiger salamander larvae were observed in a seasonal wetland on the south side of Millerton Road within Millerton Lake State Recreation Area in 2008 and 2009. The observations occurred at CNDDDB occurrence number 125 (CNDDDB 2013), which is an estimated 0.05 miles from the existing Millerton Roadway. The tiger salamanders were observed in approximately two inches of ponded water during a wetland delineation conducted in March 2008. In March of 2009 central California tiger salamander were observed in the same seasonal wetland. There are 4 additional presumed extant CNDDDB occurrences within a 1 mile radius of the action area, 3 of which are breeding occurrences.

Although the action area is fragmented by the existing Millerton roadway, the Service believes that central California tiger salamander is reasonably certain to occur in the action area because it is within the range of the species and provides suitable breeding, feeding and sheltering habitat for the species.

#### Central California Tiger Salamander Critical Habitat

A portion of the action area lies within the Southern San Joaquin Region Unit-2 (SJR Unit-2), of designated Critical Habitat for the central California tiger salamander. SJR Unit-2 contains approximately 10,193 acres of land that includes ephemeral aquatic habitats suitable for breeding and upland areas for dispersal, shelter, and foraging. This unit represents the distribution of central California tiger salamander in the northern end of the Southern San Joaquin Valley region and the Southern Sierra Foothills vernal pool region. The action area contains the three PCEs identified within the critical habitat designation for this species. Critical habitat within the action area comprises 20.66 acres of non-native grassland habitat and 0.17 acres of breeding habitat.

#### Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

In the action area, it is reasonably likely that previously existing seasonal wetlands that were suitable as habitat for the vernal pool fairy shrimp were removed by past actions including the original construction of the Millerton Roadway.

AES biologists conducted one wet season protocol-level vernal pool branchiopod survey for the project during the 2009 wet season, between January and July. AES's sampling methods followed the Service's 1996 *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* (Guidelines) (Service 1996). Vernal pool fairy shrimp and vernal pool tadpole shrimp were not found. Rather than completing additional sampling to complete the guidelines, AES has elected



to infer presence of the vernal pool fairy shrimp and vernal pool tadpole shrimp within the 0.233 acres of seasonal wetlands in the action area based on suitable habitat features, the quality of the seasonal wetlands, and the close proximity of known species occurrences.

The Service anticipates that the vernal pool fairy shrimp and vernal pool tadpole shrimp are reasonably certain to occur within the action area based on the biology and ecology of these species and the presence of suitable aquatic habitat necessary for all its life-cycle functions in the form of seasonal pools.

#### Vernal Pool Fairy Shrimp Critical Habitat

A portion of the action area lies within designated vernal pool fairy shrimp critical habitat Unit-24. Unit-24 contains approximately 28,950 acres of land. The action area contains four PCEs identified within the critical habitat designation: PCE 1, 2, 3, and 4. Critical habitat within the action area comprises 10.28 acres of uplands and 0.01 acre of seasonal wetland habitat.

### **Effects of the Proposed Action**

#### Central California Tiger Salamander

The Service believes there is a reasonable likelihood that central California tiger salamander is utilizing the 26.14 acres of annual grassland and oak woodland in the action area for upland refugia. Additionally, the Service believes there is a reasonable likelihood that central California tiger salamander is utilizing the 0.233 acres of seasonal wetland for breeding. The Service believes the greatest effects to this species will be in the form of mortality of, or injury to, juveniles or adults that are entombed or crushed in burrows or run over by project related equipment and vehicles during vegetation clearing and grading activities. Removal of seasonal wetland habitat in the action area will cause harm to this species as salamanders attempting to return to these wetlands in the next breeding season will not be able to breed, thereby preventing a new offspring cohort, and the returning salamanders themselves are likely to suffer harm through dessication and/or predation by avian and terrestrial predators. Temporary barriers to dispersal such as silt fencing and straw bales will cause harm and harassment by changing the species behavior (e.g. central California tiger salamander would have to go around barriers), thereby increasing the likelihood of predation or desiccation.

#### Central California Tiger Salamander Critical Habitat

The project will result in the permanent loss of 20.66 acres of PCE 1 and 0.17 acres of PCE 2 through vegetation clearing and grading activities. Additionally, portions of the project will create temporary barriers to dispersal between aquatic PCE 1 and PCE 2, therefore temporarily affecting PCE 3.

### Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

The widening of the Millerton Roadway may result in direct effects on populations of vernal pool fairy shrimp and vernal pool tadpole shrimp through loss or degradation of 0.233 acres of seasonally inundated wetlands that support the reproductive cycle of these species. Direct adverse effects, such as harm or mortality by crushing and destroying cysts or preventing them from hatching due to the destruction of their habitat, may also occur during construction of the project.

### Vernal Pool Fairy Shrimp Critical Habitat

The project will result in the permanent loss of 10.28 acres of land categorized as PCE 1 and 0.01 acres of land adjacent to the existing roadway that is categorized as PCE 2, 3, and 4 for this species through vegetation clearing and grading activities.

### **Cumulative Effects**

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

The Service is not aware of any non-Federal actions currently planned in the project action area.

### **Conclusion**

After reviewing the current status of the central California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp, the environmental baseline for the area covered by this biological opinion, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of these species. The Service reached this conclusion because: the action area is relatively small and the project-related effects to the central California tiger salamander would not rise to the level of precluding recovery of the species or reducing the likelihood of their survival; the project-related effects to the vernal pool fairy shrimp would not rise to the level of precluding recovery of the species or reducing the likelihood of their survival and effects will occur outside the San Joaquin Vernal Pool Region core recovery area; and the project-related effects to the vernal pool tadpole shrimp would not rise to the level of precluding recovery of the species or reducing the likelihood of their survival and effects will occur outside the San Joaquin Vernal Pool Region core recovery area. The core recovery areas have been identified as necessary sites needed to recover vernal pool fairy shrimp and vernal pool tadpole shrimp. In addition, the conservation measures, including conservation of habitat for these species through purchasing credits at a Service-approved conservation bank will minimize the effects of the proposed project on the species and further aid in the conservation of these species. These conservation banks protect and manage habitat for these species in perpetuity.

After reviewing the current status of the central California tiger salamander and vernal pool fairy shrimp critical habitat, the environmental baseline for the area covered by this biological opinion, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to adversely modify designated critical habitat for the central California tiger salamander and vernal pool fairy shrimp. The Service reached this conclusion because the project-related effects to the central California tiger salamander critical habitat and vernal pool fairy shrimp critical habitat will not appreciably diminish their value of the critical habitat for recovery of the central California tiger salamander and vernal pool fairy shrimp. The effects to the central California tiger salamander and vernal pool fairy shrimp critical habitat units are at small, discrete locations. Effects to the central California tiger salamander critical habitat equate to an estimated 0.2 percent of SJR Unit-2 and effects to vernal pool fairy shrimp critical habitat equate to an estimated 0.03 percent of critical habitat Unit 24.

### **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by FWS regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior 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 the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions, or (2) fails to require Fresno County Public Works and Planning to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

**Amount or Extent of Take****Central California Tiger salamander**

It is not possible to quantify the number of individual central California tiger salamanders that will be impacted as a result of the proposed project because the number of individuals within the project action area is unknown and cannot be determined due to the fact that any salamanders present will be living below ground in burrows. Since we cannot quantify the number of individual salamanders that we anticipate will be subject to this incidental take and since take is expected to result from the impacts to habitat, the number of acres of destroyed habitat becomes a direct surrogate for the species that will be taken. The Service anticipates 26.37 acres of suitable habitat for the central California tiger salamander will be permanently lost as a result of the proposed project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the proposed project in the form of harm, harassment, injury, and death of the central California tiger salamander caused by habitat loss and construction activities will become exempt from the prohibitions described under Section 9 of the Act.

**Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp**

It is not possible to quantify the number of individual vernal pool fairy shrimp and vernal pool tadpole shrimp cysts that will be taken as a result of the proposed project due to the fact that there is no reliable way to estimate the number of shrimp cysts that may be in the seasonal wetland sediment. The anticipated loss of individuals of this species also cannot be quantified due to seasonal fluctuations in their numbers, random environmental events, changes in water regime at their vernal pool habitat, or additional environmental disturbances. Therefore, the quantity of acres of habitat for this species impacted by the project will be used as a surrogate for quantifying take. The Service anticipates 0.233 acres of seasonal wetland habitat suitable for vernal pool fairy shrimp and vernal pool tadpole shrimp will be permanently lost as a result of the project. Upon implementation of the reasonable and prudent measures, these levels of incidental take associated with the project of vernal pool fairy shrimp and vernal pool tadpole shrimp caused by habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act.

**Effect of the Take**

In the accompanying biological opinion, the Service has determined that this level of anticipated take is not likely to jeopardize the continued existence of the central California tiger salamander, vernal pool fairy shrimp, or vernal pool tadpole shrimp.

### **Reasonable and Prudent Measures**

The following reasonable and prudent measure is necessary and appropriate to minimize the effects of the proposed action on the central California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

1. All of the conservation measures for central California tiger salamander, vernal pool fairy shrimp, and vernal pool tadpole shrimp proposed in the biological assessment and additional communication, the *Description of the Proposed Action*, and as supplemented and modified below, must be fully implemented.

### **Terms and Conditions**

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These Terms and Conditions are nondiscretionary.

The following Terms and Conditions implement Reasonable and Prudent Measure 1:

1. The Corps shall assure through their Nationwide Permit special conditions that Fresno County and their contractors implement the proposed avoidance and minimization measures.
2. In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps shall adhere to the following reporting requirements. Should this anticipated amount or extend of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.
  - a. The Corps shall monitor and document to the Service on a monthly basis, the amount of habitat disturbed during project-related construction and/or operation to ensure that the amount of habitat affected does not exceed the amount of take anticipated by this biological opinion.
  - b. For those components of the action that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death could occur, the Corps shall immediately contact the Service's Sacramento Fish and Wildlife Office (SFWO) at (916) 414-6600 to report the encounter. If an encounter occurs after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the Corps shall follow the steps outlined in the Disposition of Individuals section below.

**Disposition of Individuals Taken**

In the case of injured and/or dead central California tiger salamanders, the Service shall be notified of events within one day and the animals shall only be handled by a Service-approved biologist. Injured California tiger salamanders shall be cared for by a licensed veterinarian or other qualified person. In the case of a dead animal, the individual animal shall be preserved and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or until the Service takes custody of the specimen. The Corps must report to the Service within one calendar day any information about take or suspected take of federally-listed species not exempted in this opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contacts are Daniel Russell, Deputy Assistant Field Supervisor, Endangered Species Program, Sacramento, at (916) 414-6600 and Rebecca Roca, 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 his representative at his contracting/employment firm and to the Corps. This representative must contact the Service within one calendar day in the case of a federally-listed species.

**CONSERVATION RECOMMENDATIONS**

Conservation recommendations are suggestions of the Service regarding discretionary measures to minimize or avoid further adverse effects of a proposed action on listed, proposed, or candidate species or on designated critical habitat, or regarding the development of new information. 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. Fresno County should include culverts, tunnels, or other structures along roads and highways in known central California tiger salamander population areas to allow for safe passage of this species. Such crossing may contribute to creating safe dispersal corridors for multiple wildlife species, and will help reduce road mortalities and enhance public safety. Fresno County and their consultants are encouraged to explore designs and include photos, plans, and other information in its biological assessments concerning the incorporation of wildlife passageway designs into its projects.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

**REINITIATION—CLOSING STATEMENT**

This concludes the Service's review of the Millerton Road Widening Project, as outlined in your March 19, 2011 letter and follow up communication. 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 an extent not considered in this biological 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 biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions regarding this Millerton Road Widening Project biological opinion please contact Hunter Kunkel, Fish and Wildlife Biologist, or Thomas Leeman, Chief, San Joaquin Valley Division, at the letterhead address or at (916) 414-6600.

Sincerely,

A handwritten signature in dark ink, appearing to read 'J. Norris', with a long horizontal flourish extending to the right.

Jennifer M. Norris  
Field Supervisor

cc:

Ms. Annee Ferranti, California Department of Fish and Wildlife, Fresno, CA

**Literature Cited**

- Barry, S. J. and H. B. Shaffer. 1994. The status of the California tiger salamander (*Ambystoma californiense*) at Lagunita: A 50-year update. *Journal of Herpetology* 28(2): 159–164.
- California Department of Fish and Game (CDFG). 2012. California Natural Diversity Database. Full report for selected elements: *Ambystoma californiense*, *Branchinecta lynchi*, *Lepidodurus packardii*, and *Vulpes macrotis mutica*. Sacramento, California.
- Fitzpatrick, B. M. and H. B. Shaffer. 2004. Environmental-dependent admixture dynamics in a California tiger salamander hybrid zone. *Evolution* 58(6): 1282–1293.
- Loredo, I., and D. V. Vuren. 1996. Reproductive Ecology of a Population of the California Tiger Salamander. *Copeia* 4:895–901.
- Loredo, I., D. V. Vuren and M. L. Morrison. 1996. Habitat use and migration behavior of the California tiger salamander. *Journal of Herpetology* 30(2): 282–285.
- Orloff, S. 2007. Migratory movements of California tiger salamander in upland habitat- a five-year study, Pittsburg, California. 60 pp.
- Petranksa, J. W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, D.C. 37 pp.
- Riley, S. P. D., H. B. Shaffer, S. R. Voss, and B. M. Fitzpatrick. 2003. Hybridization between a rare, native tiger salamander (*Ambystoma californiense*) and its introduced congener. *Biological Applications* 13(5): 1263–1275.
- Searcy, C. A., E. Gabbai-Saldate, and H. B. Shaffer. 2013. Microhabitat Use and Migration Distance of an Endangered Grassland Amphibian. *Biological Conservation* 158: 80–87.
- Shaffer, H. B., R. N. Fisher, and S. E. Stanley. 1993. Status report: the California tiger salamander (*Ambystoma californiense*). Final report for the California Department of Fish and Game. 36 pages plus figures and tables. 62 pp.
- Shaffer, H. B., G. B. Pauly, J. C. Oliver, and P. C. Trenham. 2004. The molecular phylogenetics of endangerment: cryptic variation and historic phylogeography of the California tiger salamander, *Ambystoma californiense*. *Molecular Ecology* 13: 3033–3049.
- Stebbins, R. C. 1985. A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, Massachusetts. 5 pp.



- \_\_\_\_\_. 1989. Declaration of R.C. Stebbins in support of petition of writ of mandate. Sierra Club and Richard Pontuis v. Gilroy City Council, Shappell Industries *et al.* Santa Clara County Superior Court. March 16, 1989. 11 pp. plus exhibits.
- \_\_\_\_\_. 2003. A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, Massachusetts. 560 pp.
- Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publications in Zoology, 27:1-1-342.
- Sweet, S. 1998. Letter to Dwight Harvey, U.S. Fish and Wildlife Service with an unpublished report titled Vineyard development posing an imminent threat to *Ambystoma californiense* in Santa Barbara County, California. University of California, Santa Barbara, California.
- Trenham, P. 1998a. Radio tracking information. University of California, Davis, California.
- \_\_\_\_\_. 2001. Terrestrial habitat use by adult Central California tiger salamanders. Journal of Herpetology 35:343-346.
- Trenham, P. C., W. D. Koenig, and H. B. Shaffer. 2001. Spatially autocorrelated demography and interpond dispersal in the salamander *Ambystoma californiense*. Ecology 82: 3519-3530.
- Trenham, P.C., H.B. Shaffer, W.D. Koenig and M.R. Stromberg. 2000. Life History and Demographic variation in the CTS (*Ambystoma californiense*). Copeia 2000(2):365-377.
- Trenham, P. C., and H. B. Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15:1158-1168.
- U.S. Fish and Wildlife Service (Service). 1996. 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. 11 pp.
- \_\_\_\_\_. 2003a. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. 9 pp.
- \_\_\_\_\_. 2003b. Endangered and Threatened Wildlife and Plants; Listing of the Central California Distinct Population Segment of the California Tiger Salamander; Proposed Rule. Federal Register 68(100): 28647-28670.
- \_\_\_\_\_. 2004. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the California Tiger Salamander; and Special Rule Exemption for Existing Routine Ranching Activities. Federal Register 69(149): 47212-47248.

- \_\_\_\_\_. 2005. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Tiger Salamander, Central Population. Federal Register 70(162): 49380–49458.
  - \_\_\_\_\_. 2005a. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Sacramento, California.
  - \_\_\_\_\_. 2005b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Four Vernal Pool Crustaceans and Eleven Vernal Pool Plants. Federal Register 70(154): 46924–46999.
  - \_\_\_\_\_. 2007. Vernal pool fairy shrimp (*Branchinecta lynchii*) 5-Year Review: Summary and Evaluation. Sacramento, California. 74 pp.
  - \_\_\_\_\_. 2007b. Vernal Pool Tadpole Shrimp (*Lepidurus packardii*) 5-year Review: Summary and Evaluation. Sacramento, California. 50 pp.
  - \_\_\_\_\_. 2011b. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Sonoma County Distinct Population Segment of California Tiger Salamander. Federal Register 76(169):54345–54372.
- Van Hattem, M. G. 2004. Underground ecology and natural history of the California tiger salamander. Master of Science thesis. San Jose State University, San Jose, California. 65 pp.