

## **APPENDIX F: JULY 28, 2017, BIOLOGICAL OPINION (BUENA VISTA LAKE ORNATE SHREW)**

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In Reply Refer to:  
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2012-F-0247-R001

# United States Department of the Interior

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



**JUL 28 2017**

Marlys A. Osterhues  
Chief, Environmental & Corridor Planning Division  
Office of Railroad Policy and Development  
U.S. Department of Transportation, Federal Railroad Administration  
1200 New Jersey Avenue, SE  
Washington, D.C. 20590

Subject: Reinitiation of Formal Consultation on the California High-Speed Train System:  
Fresno to Bakersfield Section Project, Fresno, Tulare, Kings, and Kern Counties  
Biological Opinion (08ESMF00-2012-F-0247)

Dear Ms. Osterhues:

This letter is in response to the April 17, 2017 letter from the California High-Speed Rail Authority (Authority), on behalf of the Federal Railroad Administration (FRA), requesting reinitiation of formal consultation with the U.S. Fish and Wildlife Service (Service) on the California High-Speed Train System: Fresno to Bakersfield Section Project (Project), in Fresno, Tulare, Kings, and Kern Counties, California, Construction Packages 1c, 2-3 and 4 (CP 1c, CP 2-3, CP 4). The biological opinion was originally issued on February 28, 2013, and amended April 1, 2014 (2013 FB-BO) (Service File Number 08ESMF00-2012-F-0247). In addition, in a letter dated June 24, 2016, the Authority on behalf of the FRA requested a minor amendment to the 2013 FB-BO for modifications to the approved project due to proposed Early Work Variations for CP 2-3, including roadway work for mitigation of transportation impacts, use and demolition of acquired properties, and creation of a temporary geotechnical test embankment and associated borrow site. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.* (Act) and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR§402).

At issue is the revision of the Biological Opinion to include the federally-listed as endangered Buena Vista Lake ornate shrew (*Sorex ornatus relictus*); remove the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*); revise effects to include additional activities for the federally-listed as endangered Tipton kangaroo rat (*Dipodomys nitratooides nitratooides*) and blunt-nosed leopard lizard (*Gambelia sila*); address the effects of additional activities for the federally-listed as threatened Central California Distinct Population Segment of the California tiger salamander (*Ambystoma californiense*); and revise effects due to increased disturbance acreage for the federally-listed as endangered blunt-nosed leopard lizard, San Joaquin kit fox (*Vulpes macrotis mutica*), Tipton kangaroo rat, Kern mallow (*Eremalche kernensis*), San Joaquin woolly-threads (*Monolopia congdonii*) and the federally-listed as threatened Hoover's spurge (*Chamaesyce hooveri*).

The 2013 FB-BO issued on February 28, 2013, analyzed the Project's effects on federally-listed species and exempted take for the Project, which originally ran from the proposed Fresno station in downtown Fresno southeast to the Bakersfield station east of downtown Bakersfield. At the request of the Authority and the FRA in their letter of October 8, 2013 (FRA 2013), we amended the 2013 FB-BO to reflect 140 administrative edits proposed by the Authority that clarified language throughout the 2013 FB-BO but did not alter the Project's description. In addition, we included slight changes proposed by the Authority to the Project's footprint as a result of realigning one track, and we added habitat preservation and restoration activities proposed by the Authority on their purchased mitigation parcel located along Cross Creek in Kings and Tulare counties. We exempted take associated with these changes and restoration activities through our amended BO letter to the FRA, dated April 1, 2014 (2013 FB-BO as amended April 1, 2014).

The Project's original Biological Assessment (BA) prepared by the Authority (Authority and FRA 2012) did not consider Buena Vista Lake Ornate Shrew (BVLOS) as a potentially affected species, based on limited available information on the species' range. As a result, the 2013 FB-BO did not analyze impacts to BVLOS. Results of recent trapping and camera detection efforts (Brian Cypher et al. 2017) and the discovery of a carcass in an area previously not known to support BVLOS (Bill Vanherweg pers. comm. 2017) indicate that the range of BVLOS overlaps the Project alignment, and that the Project's footprint contains areas of suitable habitat as well as marginally suitable habitat. Therefore, this document represents the Service's biological opinion on the effects of the proposed action on BVLOS.

In September 2014, the Service published a notice in the Federal Register to withdraw a proposal to delist the valley elderberry longhorn beetle (VELB) (Service 2014). In the withdrawal notice, the Service refined the range of the VELB to a smaller area than what was initially published in the delisting proposal. The range revision resulted from a Service review of published scientific literature and consultations with experts on the VELB. As a result, the Service no longer considers Kings, Kern, and Tulare counties within the VELB range. Further, consultations with experts since September 2015, indicate that the VELB likely does not occur in Fresno and Madera counties, further reducing the species' known range. Any elderberry shrubs within these counties are no longer considered VELB habitat and are not subject to the Service's VELB guidelines and conservation measures. Currently, the Service considers the VELB range to be along the valley floor and low foothills from Tehama County south through Merced County.

The 2013 FB-BO did not analyze effects to Tipton kangaroo rat (TKR) as a result of relocation activities and burrow excavation (trapping, handling, holding, transporting, and relocating), and Cultural Resources Management (CRM) activities required to mitigate the Project's impacts to cultural resources. Further, the 2013 FB-BO did not analyze effects to blunt-nosed leopard lizard (BNLL) and Central California tiger salamander (CTS) as a result of burrow excavation (handling, holding, transporting, and relocating) and Cultural Resources Management (CRM) activities. Therefore, this reinitiation addresses effects to TKR, BNLL and CTS as a result of these activities.

In addition, this reinitiation addresses modifications to the approved Project and revises estimates of habitat loss to six of the 12 federally-listed species as a result of the Early Work Variations. Finally, this reinitiation reflects the refinement of the potential effects analysis on Hoover's spurge as provided by the Authority in a memorandum dated June 18, 2014.

This reinitiation is based on the following: (1) the April 17, 2017 letter requesting reinitiation of formal consultation and the April 2017 *Fresno to Bakersfield Project Section Construction Packages 2/3 and 4 Biological Assessment Addendum 003* (BVLOS BA), enclosed with the April 17 letter; (2) email

correspondence between representatives of the Service and the Authority, including the May 4, 2017 email from the Authority requesting clarifications to the status of the VELB and covered activities for take of TKR; (3) the June 24, 2016 letter requesting a project update amendment to the 2013 FB-BO and the June 2016 *Biological Opinion Informal Consultation for Fresno to Bakersfield Early Work Variations Amendment 001* (Early Works BA), enclosed with the June 24 letter; (4) the June 18, 2014 memorandum from the Authority refining the analysis of potential effects on Hoover's spurge; (5) telephone correspondence between representatives of the Service and the Authority; and (6) other information available to the Service including notification of recent additional positive and negative BVLOS detection efforts (Cypher et al. 2017).

**Table A. Estimates of habitat loss for the Federally-listed Buena Vista Lake ornate shrew within the Fresno to Bakersfield Section Project.**

<b>BVLOS Habitat Type</b>	<b>Total*</b>
More Mesic Suitable Habitat	39.02
More Xeric Suitable Habitat	<u>37.79</u>
<b>Suitable Habitat Total</b>	<b>76.81</b>
<b>Marginal Habitat Total</b>	<b>51.18</b>

\* This column includes calculations of features that were characterized as suitable habitat in both more mesic habitat (moist soil associated with canals and water impoundments, riparian vegetation, emergent wetland vegetation) and more xeric habitat (grasslands and alkali sink scrub within 200 feet of canals and other water sources). The acreage included in the more xeric suitable habitat features was calculated assuming a 60-foot-wide construction corridor along the proposed roadwork at Avenue 88 from the edge of the canal west to Road J33. This acreage may be refined upon final design of the roadwork. In addition, this column includes calculations of marginal habitat that are present within the project footprint and are in addition to the areas of suitable habitat.

**Table B. Revised estimates of habitat loss for Federally-listed species within the Fresno to Bakersfield Section Project.**

<b>Federally-listed Species (habitat)</b>	<b>2013 FB-BO Incidental Take Statement*</b>	<b>Additions from Early Work Variations</b>	<b>Revised Total</b>
San Joaquin kit fox (highly suitable)	754.56	14.38	<b>768.94</b>
San Joaquin kit fox (other habitat)	4,596.67	35.70	<b>4,632.37</b>
Tipton kangaroo rat	453.85	14.17	<b>468.02</b>
blunt-nosed leopard lizard	98.06	10.41	<b>108.47</b>
vernal pool tadpole shrimp ( <i>Lepidurus packardii</i> ) (direct)	0.0041	0.00	<b>0.0041</b>
vernal pool tadpole shrimp (indirect)	0.0560	0.00	<b>0.0560</b>
California jewelflower ( <i>Caulanthus californicus</i> )	15.00	0.00	<b>15.00</b>
Kern mallow	214.36	3.57	<b>217.93</b>
San Joaquin woolly-threads	489.34	2.43	<b>491.77</b>
California tiger salamander (aquatic)	18.30	0.00	<b>18.30</b>
California tiger salamander (upland)	18.70	0.00	<b>18.70</b>
vernal pool fairy shrimp ( <i>Branchinecta lynchi</i> ) (direct)	29.77	0.00	<b>29.77</b>
vernal pool fairy shrimp (indirect)	103.52	0.00	<b>103.52</b>
Hoover's spurge	2.54	3.57	<b>6.11</b>

\* This column includes changes included in the April 12, 2014 amendment, and presents the Project's maximum estimated habitat disturbance, which was evaluated using a minimum and maximum acreage range for each of these species. The Service anticipates actual impact acreage will be less, and will be refined once the Authority has gained access to all construction areas.

The Service has determined that these revisions within CP 2-3 and CP 4 do not change our jeopardy determination provided in the 2013 FB-BO.

### BIOLOGICAL OPINION

**The 2013 FB-BO is amended as follows. New sections and paragraphs are added to their corresponding sections and page numbers, and deleted paragraphs are identified. Minor text changes (i.e., individual numbers or sentences) are shown as underlined for added text and strike-out for deleted text.**

On page 7, at the end of **Consultation History**, add:

- June 18, 2014: The Service received the Authority's Memorandum refining the analysis of potential effects on Hoover's spurge, consistent with the final environmental impact report/final environmental impact statement.
- June 24, 2016: The Service received the Authority's request to amend the 2013 FB-BO to address the June 2016 *Biological Opinion Informal Consultation for Fresno to Bakersfield Early Work Variations Amendment 001* enclosed.
- July 12, 2016: The Service received via email the undated revised *Tulare County Road Overlay Work Areas at Road 24 and Road 40 in Support of the California High Speed Rail, Construction Package 2-3 Biological Resources Assessment*.
- August 26, 2016: The Service provided via email comments on the undated draft *Project Description and Proposed Small Mammal Trapping (Presence/Absence) for HSR CP2-3 Road Overlay Work at Road 24 and Road 40 in Tulare County*.
- November 1, 2016 The Service received via email the *2016 Blunt-nosed Leopard Lizard Survey Results* for CP 4 dated September 15.
- November 15, 2016 The Service attended a site visit with the Authority to known BVLOSe occurrence locations including Kern National Wildlife Refuge (KNWR), Main Drain Canal, and Atwell Island.
- February 22, 2017 The Service attended a meeting with the Authority and its consultants at the consultant's office to discuss BVLOS conservation measures.
- March 1, 2017 The Service attended a site visit with the Authority, FRA and CDFW to a recent BVLOS occurrence location at Pixley National Wildlife Refuge (PNWR). In addition, BVLOS habitat at Poso Creek and Lake Alpaugh was visited, and potential TKR relocation sites were visited.
- March 31, 2017 The Service provided comments and substantially updated data gathered from field visits to the Authority on the draft *Analysis of Potential Habitat for the Buena Vista Lake Shrew – Phase 1* dated January 2017.
- April 3, 2017 The Service provided additional field data to further refine the draft *Analysis of Potential Habitat for the Buena Vista Lake Shrew – Phase 1* dated January 2017.

- April 19, 2017 The Service received via email the April 17, 2017 letter from the Authority requesting reinitiation of formal consultation with the April 2017 *Fresno to Bakersfield Section Construction Packages 2/3 and 4 Biological Assessment Addendum 003* enclosed.
- April 24, 2017 The Service received via email the *San Joaquin Kit Fox Den Replacement Plan: CP 4, Kern County California* dated April 12, 2017.
- April 26, 2017 The Service received via email the *Construction Phase Weed Control Plan* for CP 4.
- May 3 and 8, 2017 The Service received via email draft BNLL survey area maps prepared by the CP 2-3 Design/Build team and draft BNLL survey area maps from the CP 4 PCM team
- June 14-30, 2017: The Service received emails from the Authority providing and refining BVLOS acreage calculations for the Early Work Variations, and providing distance calculations for recent BVLOS detections to closest water sources. The Service also received via email a letter report dated June 8, 2017, concerning a Kern mallow observation along the CP, 2-3 alignment. The Service exchanged emails with the Authority concerning corrected listed species acreage calculations for the Early Work Variations.
- July 3, 6, and 21, 2017: The Service provided via email information to the Authority concerning BVLOS habitat north of Jackson Avenue in response to a June 20, 2017 email request. The Authority provided via email information to the Service concerning revised habitat calculations for the Early Work Variation.

### Description of the Proposed Action

On page 8, under **Project Description**, delete the fifth paragraph concerning elderberry shrubs.

On page 24, add before **Construction Methods**:

### Other Project Components

Since certification of the *Fresno to Bakersfield Section California High-Speed Train (HST) Final Project Environmental Impact Report/Environmental Impact Statement* (EIR/EIS, Authority and FRA 2014) and through the design-build process, refined infrastructure improvements and modified project elements have been identified. These additional project components are described briefly below.

#### *Mitigation of transportation impacts in Tulare County*

Mitigation measures in the Final EIR/EIS require that if a proposed permanent road closure restricts access, alternative access shall be provided through connections to existing roadways or through new road connections, if feasible. Extension of the HST alignment through southwestern Tulare County will result in closures of local roadways and redirection of traffic to grade-separated crossings. The Authority and the County of Tulare have entered into a cooperative agreement to address modifications to transportation infrastructure necessary to implement the approved HST project and to satisfy required mitigation measures.

The following provides a summary of the proposed improvements:

- Avenue 136 – Add an additional lane, plus shoulders
- Road 24 – Resurface
- Avenue 120 – Add an additional lane, plus shoulders (Hess Avenue)
- A new frontage road between Avenue 120 that would be an extension of Road 40 to north of Avenue 112 within Tulare County's right-of-way – Construct new roadway, plus shoulders
- Road 40 Resurface
- Avenue 88 – Construct new roadway, plus shoulders.

The following provides a summary of the proposed improvements on roadways adjacent to Allensworth:

- Avenue 56 (County Road J22) – Resurface and add shoulders – Resurface and add additional lane
- Avenue 24 – Resurface and add additional lane

A bridge structure is proposed over the Kings County Canal (i.e., Homeland Canal) along Avenue 88 to provide for connectivity of access for this mitigation feature. In addition, a box three-season undercrossing with 15.5 feet of vertical clearance and a 24-foot width will be provided where Avenue 24 crosses the HST alignment.

There would be a total of 87.79 acres of land in Tulare County modified for the roadway improvements. This includes 29.96 acres required for construction staging that would result in short-term temporary impacts and 57.83 acres of permanent impacts.

#### *Demolition activities*

The proposed Early Work Variations include demolition actions on five properties and conversion to temporary construction easement use on an additional three properties for a total of 4.56 acres. Portions of each of the eight properties were included in the original Final EIR/EIS footprint and were therefore assessed in the 2014 FB-BO. The Early Work Variations involve extending the project footprint to the entire extent of these parcels, and demolition of structures (four residences and one animal pen) on the five remaining properties. The areas within each property that were not included in the Final EIR/EIS footprint, and therefore are not analyzed in the 2014 FB-BO, are the areas that are part of the Early Work Variations footprint.

#### *Geotechnical test embankment and borrow site*

To address the potential for soil settlement, a temporary geotechnical test embankment will be built to simulate an HST embankment and evaluate the amount and rate of settlement of existing soils along the southern end of CP 2-3. The total area of disturbance, including the test site, access ramp and borrow location, would be 10.19 acres. The geotechnical test embankment would be located on the proposed HST alignment, south of Avenue 32 near Allensworth. Access to the geotechnical test location would be from California Highway 43 through Palmer Avenue, Road 84, Avenue 39, Young Road, and Avenue 32. Prior to construction, the temporary geotechnical test area would be prepared in a similar manner to what is anticipated for the HST embankments. The test embankment area is located on lands that have been continually disked by the landowners. The geotechnical test embankment would be built using 40,000 cubic yards of soil from a borrow site located within the HST alignment near Avenue 56. The test embankment would cover an area of

approximately 220 feet by 260 feet at its base (at current grade elevation) and an area of 60 feet by 100 feet on top of the test embankment, and would be approximately 40 feet above the existing grade. Side slopes would be 1 foot vertical for each 2 feet of horizontal. The soil would be compacted to the same standards as the proposed HST embankments. If the soils are suitable for embankment to support the HST tracks, they will remain in place as part of the permanent embankment. If determined to be unsuitable, the material will be removed and used on other portions of the project where it would meet grading specifications, such as overcrossings. If the embankment remains in place, the borrow site would be either backfilled or graded to meet the final elevation as proposed in the final design.

On page 25, under **Project Description, Construction Methods, Pre-Construction Activities**, add the following paragraph to the end of 6:

CRM activities may be required in the event of unanticipated archaeological resource discoveries during any necessary cultural resource investigations or during routine construction activities. To mitigate the Project's impacts to cultural resources, a variety of equipment and excavation techniques may be used. Additional testing during survey activities may require excavation of 0.25-x-0.5 meter hand shovel excavated test pits and screening the soil through wire mesh. Discovery of an archaeological site would require evaluation taking the form of excavating larger areas by hand with a shovel and hand auger, and screening the soil through wire mesh. Archaeological discoveries in soil too difficult to excavate by hand, located in areas difficult or dangerous for humans to access, or large enough to require mechanical assistance would require a mechanical excavator or backhoe trenching. Excavations of this size usually need a water screening installation to process the large amount of soil removed. A typical water screening installation would include one or two large container boxes with several screens set up and a system of hoses to run the water through excavated soil. In some cases the use of ground-penetrating radar to focus in on subsurface archaeological deposits may be necessary. Most archaeological deposits found in the San Joaquin Valley are within 3 feet of the ground surface. However, archaeological deposits have been found in excess of 20 feet. Paleontological deposits may be even deeper.

On page 45, under **Conservation Measures, Species Specific Conservation Measures, Tipton kangaroo rat** delete 3.a.

On page 46, under **Conservation Measures, Species Specific Conservation Measures, Tipton kangaroo rat** revise last sentence of 3.b. Small mammal trapping and relocation will be performed by a Service approved biologist(s) ~~with a valid 10(a)(1)(a) permit.~~

On page 46, under **Conservation Measures, Species Specific Conservation Measures**, add the following between TKR and CTS:

*Buena Vista Lake ornate shrew*

- 1.a FRA and Authority will conduct habitat suitability determinations in potentially suitablea BVLOS habitat not subject to previous field assessments to determine if the area falls intoa the suitable more xeric or suitable more mesic habitat categories. A report documenting thea result of the habitat assessment and concluding if the area is either not suitable, marginala habitat or suitable mesic or xeric habitat will be prepared and submitted to the Service fora review and concurrence.a

2. In all suitable (mesic and xeric) habitat areas, all above-ground herbaceous vegetation within the construction footprint will be cleared using hand tools (which can include weed whackers or mowers) under the supervision of a Service-approved BVLOS biological monitor. All leaf litter will be removed using rakes, or similar hand tools. All woody vegetation will be cut as closely to the ground as possible using hand tools (which can include chainsaws). Vegetation will be removed immediately and stored away from suitable BVLOS habitat. Such vegetation hand-removal efforts will be implemented in those areas that require vegetation removal in order to clearly detect BVLOS, and will continue at each habitat area until it is reasonably certain that BVLOS can be detected within the cleared areas.
3. After vegetation has been cleared from BVLOS suitable habitat areas, non-disturbance exclusion fencing will be installed. In those areas where installation of fencing may not be feasible, the Service will be contacted and will provide direction on a case by case basis. The fencing will be installed under the supervision of the Service-approved Project biologist along the Project footprint within BVLOS suitable more mesic and more xeric habitat areas. Fencing will be placed between areas of active construction and adjacent or nearby suitable habitat to preclude BVLOS from running across the construction site and into harm's way. The configuration of the fencing will likely vary between areas, and placement will be at the direction of the Service-approved Project biologist with input from the Service, as required. Fencing may consist of a combination of both Environmentally Sensitive Areas (ESA) Fencing and Wildlife Exclusion fencing (WEF) with one way exit/escape points.
4. If a shrew is subsequently found within the fenced work area, work will cease immediately and a section of fence removed so that the shrew may leave the fenced area on their own volition. The Service-approved biologist will monitor the shrew to ensure that any shrew has moved and remains outside the fence.
5. Prior to the start of construction activities in areas of marginal and suitable habitat (more mesic and more xeric) for BVLOS, the FRA and Authority will prepare a BVLOS monitoring and relocation plan. The plan will identify the handling and relocation methodology for any BVLOS encountered during construction activities. Handling and relocation will be conducted consistent with the Service's Survey Protocol for Determining Presence of the Buena Vista Lake Ornate Shrew (Service 2012a). The plan will identify the process for the relocating any captured BVLOS and will be approved by the Service prior to construction.
6. Impacts to more mesic suitable habitat for the BVLOS will be compensated, per conservation measure #22, at a 3:1 ratio through acquisition and preservation in perpetuity of occupied more mesic suitable BVLOS habitat, or creation of occupiable more mesic suitable BVLOS habitat. All proposed suitable BVLOS habitat compensation properties will be reviewed and approved by the Service. Impacts to more xeric suitable habitat for the BVLOS will be compensated, as described in Table C. Compensation for impacts to more xeric suitable habitat can be accomplished by one of the following methods: for each acre of more xeric suitable habitat disturbed within the Project area, provide one acre of more xeric suitable habitat directly associated with (within 200 feet of) more mesic suitable habitat within a preserved or created mitigation parcel; or preserve or create one acre of more mesic suitable habitat for every three acres of more xeric suitable habitat disturbed. Final habitat compensation may consist of a combination of these, as approved by the Service. The overall goal is to provide contiguous blocks of more mesic habitat accompanied by more

xeric habitat which supports the mesic areas, or to provide suitable habitat of either type to serve as dispersal corridors among larger occupied or occupiable areas.

**Table C. Proposed Buena Vista Lake ornate shrew habitat compensation ratios.**

BVLOS Habitat Type Taken	Mitigation Ratio	BVLOS Habitat Type to be Preserved/Created
More Mesic Suitable Habitat	3:1	More mesic suitable habitat
More Xeric Suitable Habitat	1:1	More xeric suitable habitat within 200 feet of more mesic suitable habitat
	0.33:1	More mesic suitable habitat

On page 50, under **Conservation Measures, Species Specific Conservation Measures**, *Valley elderberry longhorn beetle*, delete all three species-specific conservation measures.

On page 52, under **Action Area**, replace with:

The action area is defined in 50 CFR § 402.02, as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” For the purposes of the effects assessment, the action area includes the CHST-FB alignment footprint, lands surrounding it, the Early Work Variations area, and the 405-acre FCMS.

Several potential alignments have been identified in the Revised Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement for the proposed project. These alternatives include varying siting for not only rail alignments, but also other project infrastructure, including passenger stations, power delivery structures, maintenance-of-way facilities, operations control centers, and a Heavy Maintenance Facility. Since an alternative has not been selected to date for all components of the Fresno to Bakersfield Section, this biological opinion includes a project description and effects analysis for all alternative alignments, and assesses effects to federally-listed species based on a range of impacts from minimum to maximum (expressed in acreages). Regardless of the final alignment selected, project impacts will be similar geographically as well as in general nature and magnitude.

The project footprint extends to the physical limits of the construction activities associated with the proposed action. The project footprint includes all areas that will be permanently or temporarily affected by the proposed action. The footprint consists of the limits of cut and fill plus all access roads and areas required for operating, storing, and refueling construction equipment. The estimated project footprint for the CHST-FB Project alignment is expected to be no greater than approximately 7,189 acres.

The estimated length of the Fresno to Bakersfield alignment will extend up to 117 miles. The area affected by disturbance from noise and vibrations, dust, and lighting during project construction is expected to extend up to 1,000 feet from both sides of the track. Associated project structures, such as roadway improvements, overcrossings, related ancillary facilities, and other permanent project elements, are included in the estimated project action area for the CHST- FB Project. The project action area for the Fresno to Bakersfield alignment, including the project footprint, the Early Work Variations area, and the 405-acre FCMS is estimated to be no greater than 48,856 acres, which will be considered for the purposes of this opinion.

On page 53, under **Status of the Species**, between TKR and BNLL, add:

*Buena Vista Lake ornate shrew*

**Listing Status:** On June 1, 2000, the Service proposed to list the BVLOS as endangered (Service 2000), and on March 6, 2002, the Service determined that the BVLOS was endangered (Service 2002). Fragmentation and habitat loss are the primary causes for the decline and endangered status of the BVLOS. On August 19, 2004, the Service proposed designating a total of 4,649 acres of critical habitat in five units in Kern County for the subspecies (Service 2004), and on January 24, 2005, the Service designated 84 acres of critical habitat at the Kern Lake parcel in Kern County (Service 2005a). That rule was legally challenged, and as part of the settlement agreement the Service agreed to reconsider the designation. On October 21, 2009, the Service published a revised proposal to designate the original 4,649 acres (Service 2009). In order to address several newly identified BVLOS occurrences, on July 10, 2012, the Service published an additional revised proposed critical habitat rule identifying an additional 525 acres, and recalculated the original acreage to 4,657 acres, bringing the total proposed critical habitat to 5,182 acres in seven units in Kings and Kern counties (Service 2012b). On July 2, 2013, the Service published a final rule designating 2,485 acres of critical habitat in six units in Kings and Kern counties (Service 2013).

**Description:** Nine subspecies comprise the ornate shrew, which is widely distributed throughout California and northern Baja California (Maldonado et al. 2004). Ornate shrews are small, about the size of a mouse and have a long pointed snout, five toes on each foot, tiny beadlike eyes, soft dull black to grey-brown fur, visible external ears, and a scaly, well developed tail covered with very short hairs (Ingles 1965; Vaughan 1978; Jamerson and Peeters 1988; Churchfield 1990, as cited in Service 2002). Shrews are active during the day and night but are rarely seen due to their small size and cryptic behavior.

**Distribution:** The BVLOS formerly inhabited the interconnected network of tule marshes and other permanent and seasonal lakes, wetlands, and sloughs around the historic Tulare, Kern, and Buena Vista lakes, and presumably throughout the Tulare Basin (Williams and Harpster 2001). Joseph Grinnell described and named the Buena Vista Lake ornate shrew from three specimens collected along the east side of the old Buena Vista Lake in 1932 (Grinnell 1932). According to Grinnell (1932), Summit Lake is the highest point in the Kings River delta, where the Kings River northern distributaries would either flow north into the San Joaquin river system during periods of high water and high Tulare Lake levels, or more typically flow south to the Tulare Lake. Grinnell (1932) further noted that two shrews collected from the Kern River near Bakersfield in the collection of the Museum of Vertebrate Zoology showed characteristics associated with *relictus*.

At the time the BVLOS was described, its populations were already declining due to diversion and impounding of rivers, draining of lakes, and destruction of wetland and riparian habitat surrounding these water features primarily for agricultural development (Grinnell 1932). The current distribution of the shrew is not well known, but likely is very restricted due to the loss of over 95% of its apparently preferred wetland habitat and the lack of connectivity between populations, the channelization of streams and rivers and removal of vegetation along their edges, the unreliability of water resources at its remaining localities due to agricultural, and urban diversion. At the time the shrew was listed in 2002, it was only known to occur in four small localities with no estimate of population size. Although it has been found in additional locations since, habitat loss and fragmentation along with other anthropogenic and natural factors continues to threaten the species.

The BVLOS apparently historically occurred in wetlands around Buena Vista Lake, and presumably in wetland and riparian areas throughout the Tulare Basin (Grinnell 1932). The Tulare Basin, essentially occupying the southern half of the San Joaquin Valley, had no regular outlet to the ocean and contained Buena Vista, Kern, and Tulare lakes. These lakes were fed by the Kern, Kaweah, Tule and Kings rivers and their tributaries and were interconnected by hundreds of square miles of tule marshes and other permanent and seasonal lakes, wetlands, and sloughs (Williams and Harpster 2001). Tulare Lake was the largest freshwater lake in the U.S. west of the Mississippi River. Today the lakes and wetlands have been drained and converted into irrigated agricultural fields, though portions of the historical lake beds fill with water in years of extraordinary runoff (Williams and Kilburn 1992). The species began to decline due to the disappearance of lakes and sloughs when rivers were first impounded and diverted, lakes were drained, and the wetland and riparian areas around them were destroyed for agriculture in the late 1800's and early 1900's. As early as 1933, Grinnell found the distribution of the shrew to be highly restricted due to the widespread disappearance of its habitat (Grinnell 1933).

For more than 50 years the BVLOS was known only from the type locality at Buena Vista Lake, where it was presumed to be extinct because its wetland habitat had been replaced by agricultural lands. The BVLOS was rediscovered at Kern Lake Preserve in 1986, on private property, and at KNWR in 1992 (Williams and Harpster 2001).

When the species was listed in 2002, the BVLOS was only known to occur in four locations along an approximately 70 mile stretch on the west side of the Tulare Basin. The four locations were the former Kern Lake Preserve in the old Kern Lake bed, the Kern Fan recharge area, the Coles Levee Ecosystem Preserve, and the KNWR (Service 2002). By the time the Service published the *Buena Vista lake Ornate Shrew 5-Year Review: Summary and Evaluation* in September 2011, surveys for the BVLOS had been conducted at twenty-one sites and the shrew was found to be present in eight of them (Williams and Harpster 2001; ESRP 2005; Cypher (ESRP) pers. comm. 2010; J. Maldonado (Smithsonian Conservation Biology Institute) unpubl. data 2006, Maldonado pers. comm. 2011, as cited in Service 2011). These eight sites are Goose Lake, Atwell Island, Main Drain Canal/Chicca & Sons Twin Farms South Field Ranch, Lemoore Wetlands preserve, Coles Levee ecosystem preserve, Kern fan water recharge area, the Kern NWR, and the Kern Lake preserve.

Since 2011, BVLOS were detected during several additional trapping efforts (Table D) as well as incidentally during biological monitoring of two construction projects, and during a biological field survey at another site, as detailed below. These new detection locations show BVLOS are present in additional areas not previously known, and this information has served to 'fill-in' the known BVLOS range. None of the newly detected locations extend the range of this taxon. However, these new locations do indicate that BVLOS can persist in more xeric areas possessing certain habitat characteristics or can disperse in and through these areas during periods of sufficient moisture.

**Table D. Buena Vista Lake live-trapping and camera detections and incidental detections since 2011.**

Area	Dates	Suitable Habitat Type
Wind Wolves Preserve	Oct 2014 Oct 2016	More mesic
Bakersfield City Recharge Area	June 2014	More mesic
Kern River Overflow Canal at Semitropic Water Storage Canal Crossing	March 2017	More mesic
Kern River Overflow Canal (Goose Lake Canal population area)	April 2014	More mesic
Semitropic Ecological Reserve at Goose Lake Canal	October 2014	More mesic
Northern Semitropic Ridge Ecological Reserve	Oct - Nov 2016	More mesic
Kern National Wildlife Refuge	April 2014, Oct 2016	More xeric
Atwell Island Wetland and surrounding ditches	December 2016, March 2017	More mesic
Pixley National Wildlife Refuge	December 2016	More xeric
Kern Water Agency's Outlet Canal Crossing east-southeast of Tupman	October 2011 November 2011	More xeric
West Kern Water District's South Solar Project	May 2012	More xeric
North of Alpaugh, west of Highway 43	April 2017	More xeric

**Status & Natural History:** Shrews have a high rate of metabolism because their small size forces them to constantly search for food to maintain their body temperatures, especially in cold conditions (Newman and Rudd 1978; Aitchison 1987; Genoud 1988; McNab 1991, as cited in Service 2002). Shrews feed indiscriminately on the available larvae and adults of several species of aquatic and terrestrial insects, some of which are detrimental to agricultural crops (Holling 1959; Ingles 1965; Newman 1970; Churchfield 1990, as cited in Service 2002). They are also known to consume spiders, centipedes, slugs, snails, and earthworms on a seasonally available basis (Aitchison 1987; Jamerson and Peeters 1988, as cited in Service 2002). Food probably is not cached and stored, so the shrew must forage periodically day and night to maintain its high metabolic rate (Williams and Harpster 2001).

Due to lack of study, information about the home range size, breeding territory size, and population densities of the BVLOS is lacking. In other subspecies of ornate shrews, juveniles establish their home range, a small area in which they nest, forage, and explore, and remain in this area for most of their lives (Churchfield 1990, as cited in Service 2002). Ingles (1961) calculated an average home range size in a closely related species, the vagrant shrew (*Sorex vagrans*) found in the Sierra Nevada of California, at approximately 372 square meters (m<sup>2</sup>) (4,000 square feet (ft<sup>2</sup>)), with breeding males occupying larger territories than breeding females (Haves 1977, as cited in Service 2002). The distribution, and size, of a shrew's territory varies, and is primarily influenced by the availability of food (Ma and Talmage 2001, as cited in Service 2002).

Nothing is known specifically about the reproduction and mating system of the BVLOS. In general, the reproductive period of the ornate shrew extends from late February through September and early October (Rudd 1955; Brown 1974; Rust 1978, as cited in Service 1998). The breeding season of shrews may begin in autumn and end with the onset of the dry season in May or June. In high-quality habitat in permanent wetlands, the breeding season may be

extended (Center for Conservation Biology 1990; Williams in litt. 1989, as cited in Service 1998). Up to two litters are produced per year containing four to six young (Owen and Hoffman 1983, as cited in Service 1998). Longevity in the wild is probably 12 to 16 months, similar to other *Sorex* species (Rudd 1955, Collins and Martin 1985). Late winter/early spring shrew populations are typically composed of adults born the previous year, while summer populations tend to consist of old adults and young of the year (Rudd 1955, Newman 1976, Owen and Hoffmann 1983). Shrews, on average, rarely live more than 12 months, and each generation is largely replaced annually (Rudd 1955).

The abundance of the BVLOS within the species range is unknown due to the lack of regular surveys in areas of past occurrences and in areas possessing suitable habitat. From 1989 through the present, focused surveys for the BVLOS have been conducted at more than 40 sites and shrews have been found at 12 of them (Tennant pers. comm. 2017, 2014; Aardvark Biological Services LLC in litt. 2017 a-j; Cypher 2016; Cypher et al. 2017; Stantec 2017; Williams and Harpster 2001; Maldonado unpubl. data 2006; Service in-house files). Most surveys, using cameras, live-traps, or both, were conducted in locations containing suitable BVLOS habitat. Some detection efforts using only cameras have been conducted in marginal habitat areas. Based on the results of these surveys, the BVLOS has been documented as far south as the Wind Wolves Preserve and as far north as Lemoore (Cypher et al. 2017; Williams (ESRP) pers. comm. 2011). Population size and health cannot be estimated with the available data, but based on the scarcity of suitable habitat present in the Tulare Basin and the low number of specimens collected in areas with high quality habitat; BVLOS is expected to be rare (Maldonado unpubl. data 2006).

### *Habitat*

In general, shrews prefer moist habitat with an abundance of leaf litter and dense herbaceous cover containing terrestrial and aquatic insect prey (Kirkland 1991; Ma and Talmage 2001). Vegetation community types in which BVLOS have been captured include non-native grassland, freshwater marsh, riparian forest, vernal marsh, alkali sink scrub, and recently disturbed areas that may support ruderal vegetation. Typical grass and shrubs in these communities include sedges (*Carex* spp.), foxtail barley (*Hordeum murinum*), wild rye (*Elymus* spp.), spikerushes (*Eleocharis* spp.), saltgrass (*Distichlis* spp.), black mustard (*Brassica nigra*), rushes (*Juncus* spp.), bromes (*Bromes* spp.), stinging nettle (*Urtica dioica*), mulefat (*Baccharis salicifolia*), alkali heath (*Frankenia salina*), bush lupine (*Lupinus albus*), wild rose (*Rosa californica*) along with cattails (*Typha* spp.), tules (*Schoenoplectus acutus*), and other aquatic plants (ESRP 2005, Cypher et al. 2017). Areas with an overstory of willows (*Salix* spp.) or cottonwoods (*Populus* spp.) appear to be favored, but may not be an essential habitat feature (ESRP 2005).

Williams and Harpster (2001) found habitat considered most suitable for the BVLOS contains riparian and wetland vegetation communities with an abundance of leaf litter and dense herbaceous cover. BVLOS were most commonly found in close proximity to a reliable body of water (Williams and Harpster 2001). BVLOS primarily have been found in communities characterized by dense mats of leaf litter or herbaceous vegetation. The insect prey of the shrew also thrives in the dense matted vegetation. The BVLOS currently exists on small remnant patches of natural habitat in and around the margins of a landscape that is otherwise dominated by agriculture (Service 2013).

Moist soil in areas with an overstory of willows or cottonwoods appears to be favored by BVLOS, but is not an essential habitat feature (Maldonado pers. comm. 2011). Maldonado et al. (2004) also noted that a high percentage of captured BVLOS were found within 1 meter of the water line and closely associated with a dense, riparian understory which provides food,

cover, and moisture. According to Cypher et al. (2017) “habitat conditions for shrews can be temporally and spatially dynamic due to seasonal, annual, or anthropogenic variation in moisture availability.”

There appear to be two categories of suitable habitat for BVLOS: more mesic and more xeric. However, BVLOS tend to be found more consistently in the more mesic suitable habitat (Cypher pers. comm. 2017). The more mesic suitable habitat includes areas of moist soils associated with riparian and fresh emergent wetland vegetation along the edge of marshes, ponds, rivers, creeks, and unlined canals with unmaintained banks, often with a deep, well-developed leaf litter layer and a complex vegetative over story. This more mesic suitable habitat is the type typically described in publications and biological reports discussing BVLOS habitat, and where the majority of known occurrences have been recorded. However, these types of habitats are more often surveyed. Cypher et al. (2017) states “Some areas appear to at least retain moist soils, if not standing water, on a year-round basis in most years. Such areas likely constitute “refugia” for BVLS”.

The more xeric suitable habitat category typically possesses fairly dense vegetation that provides cover for the BVLOS in certain grasslands, alkali desert scrub, alkali sink scrub, and sometimes disturbed habitats. These more xeric habitats may not be located immediately adjacent to standing or perennial water, but a seasonal or artificial water source tends to be present or is located in relative close proximity (typically within several hundred feet). The presence of such a feature is important because it may create or sustain the moist soils required to support the invertebrate prey base. Records of BVLOS detections around residential buildings may also be attributed to the residual moisture associated with human structures. According to Cypher et al. (2017) “As suitable habitat conditions expand in seasons or years with more moisture or due to anthropogenic activities, BVLS appear to expand into these temporally suitable areas. As these areas dry, shrews either retreat back to refugia or eventually die out.” Examples of recent detections in these more xeric habitats are in Table E.

**Table E. BVLOS Detections in More Xeric Habitats**

Kern Lake Preserve near dry Gator Pond	December 1986	2 – 3 shrews observed in previously disced, weedy site; area dry but with high water table.
KNWR headquarters	1992 and 1994	1 shrew observed under sprinkler, 1 dead in live trap, 1 dead under sink (residual moisture around residence)
BLM Atwell Island headquarters house	2001 through 2011	2 dead and 2 live shrews observed around residence.
KNWR Tour Route, Unit 1	2014	2 shrews captured in dry, seasonally inundated annual grassland 100 feet from ponded area
Pixley National Wildlife Refuge	2016	Shrews detected at camera stations in area of saltgrass, annual grasses and forbs, within several hundred feet of Deer Creek
Construction site, east-southeast of Tupman	2011	2 shrews seen at canal construction site that carried water but with no bank vegetation.
Solar project west-northwest of I-5 and Highway 43 junction	2012	1 shrew seen near ground clearing at construction site
Levee Road, north of Alpaugh, Tulare County	2017	1 dead shrew in sparse annual grassland area adjacent to canal with no vegetation.

Besides suitable habitat, additional habitat areas may be categorized as 'marginal habitat'. These areas could be used by BVLOS for movement and dispersal, or in the absence of more suitable habitat. Marginal habitat areas may provide only one or two partial characteristics (flowing or standing water, or marginally complex vegetative cover, or marginal leaf litter, seasonal inundation, etc.) such that they potentially could provide limited support for BVLOS. These areas may be small and highly isolated by agricultural development.

### *Threats*

Rapid agricultural, urban, and energy developments since the early 1900s have severely reduced and fragmented native habitats throughout the San Joaquin Valley (Mercer and Morgan 1991). Historically, the former Tulare, Buena Vista, Goose, and Kern lakes, along with their respective overflow marshes, covered 19 percent of the Tulare Basin in the southern San Joaquin Valley (Werschkull et al. 1992). Around the turn of the 20th century, the Tulare Basin had 104,890 ha (259,189 ac) of valley fresh water marsh, 177,005 ha (437,388 ac) of valley mixed-riparian forests, and 105,333 ha (260,283 ac) of valley sink scrub, for a total of 387,229 ha (956,860 ac) of potentially suitable BVLOS habitat. By the early 1980s, the combined total had been reduced to 19,019 ha (46,996 ac), less than 5 percent of the original habitat (Werschkull et al. 1992). As of 1995, intensive irrigated agriculture comprised 1,239,961 ha (3,064,000 ac) or about 96 percent of the total lands within the Tulare Basin.

All of the natural plant communities in the Tulare Basin have been affected by the transformation of this area to agriculture and energy development (Spiegel and Anderson 1992; Griggs et al. 1992). As more canals were built, and more water was diverted for irrigation of the floodplains of the major rivers of the southern San Joaquin Valley, less water was available to keep the riparian forests alive, and less water reached the lakes. By the early 1930s, the former Tulare, Buena Vista, Goose, and Kern lakes were virtually dry and had been connected to agriculture (Griggs et al. 1992).

Although no cases of disease related to BVLOS have been documented, their small population size and restricted distribution increases their vulnerability to epidemic diseases. The BVLOS, like most small mammals, are host to numerous internal and external parasites, such as round worms, mites, ticks, and fleas, which may infest individuals and local populations in varying degrees with varying adverse effects (Churchfield 1990; Maldonado pers. comm. 1998). However, the extent of disease has not been documented for this species.

Most vertebrate carnivores of the Tulare Basin, such as coyotes (*Canis latrans*), foxes, long-tailed weasels (*Mustela frenata*), raccoons (*Procyon lotor*), feral cats (*Felis catus*), and dogs (*Canis familiaris*), as well as certain avian predators such as hawks, owls, herons, jays, and egrets, are all known predators of small mammals. While many predators find shrews unpalatable because of the distasteful secretion and offensive odor from their flank glands and feces, several of the avian predators, such as barn owls (*Tyto alba*), short eared owls (*Asio flammeus*), long-eared owls (*Asio otus*), and great horned owls (*Bubo virginianus*) have a poor sense of smell and are known to prey on shrews (Ingles 1965; Aitchison 1987; Marti 1992; Holt and Leasure 1993; Marks et al. 1994; Houston et al. 1998), and probably BVLOS (Maldonado pers. comm. 1998). The overall impact that predation may have on the number of individuals and densities of the species remains unknown.

Selenium toxicity represents a serious threat to the continued existence and recovery of the BVLOS, not only at known locations, but any potential locations throughout the Tulare Basin. The soils on the western side of the San Joaquin Valley have naturally elevated selenium concentrations. Due to extensive agricultural irrigation, selenium has been leached from the soils and concentrated in the shallow groundwater along the western side of the San Joaquin Valley. Where this shallow

groundwater reaches the surface or subsurface, selenium can accumulate in biota (flora and fauna) and result in adverse effects to growth, reproduction, and survival. Elevated concentrations of selenium have caused major wildlife mortalities in places like Kesterson (Moore et al. 1989). Some of the highest selenium levels in the western United States have been measured from groundwater within the southern San Joaquin Valley, and in drainwater evaporation ponds servicing the agricultural lands immediately surrounding the known populations of BVLOS in the Tulare Basin (California Department of Water Resources 1997; Seiler et al. 1999).

BVLOS are exposed to the wide-scale use of pesticides throughout their range, because they currently exist on small remnant patches of natural habitat in and around the margins of an otherwise agriculturally dominated landscape. The animals could be directly exposed to lethal and sublethal concentrations of pesticides from drift or direct spraying of crops, canals and ditch banks, wetland or riparian edges, and roadsides where shrews might exist. Reduced reproduction in this listed species could be directly caused by pesticides through grooming, and secondarily from feeding on contaminated insects (Sheffield and Lochmiller 2001). BVLOS could also die from starvation by the loss of their prey base (Ma and Talmage 2001; Sheffield and Lochmiller 2001). Exposure to organophosphate and carbamate insecticides can inhibit brain acetylcholinesterase activity leading to alterations in behavior and motor activity. Laboratory experiments have shown that behavioral activities such as rearing, exploring for food, and sniffing can be depressed for up to 6 hours in the common shrew (*Sorex araneus*) from environmental and dietary exposure to sublethal doses of a widely used insecticide called dimethoate (Dell'Omo et al. 1999). In their natural habitat, depression in such behavioral and motor activities could make the shrews more vulnerable to predation, and starvation. In addition, shrews may feed heavily on intoxicated arthropods after application of insecticides, and, therefore, ingest higher concentrations of pesticides than would normally be available (Schauber et al. 1997; Sheffield and Lochmiller 2001). In California, Fresno, Kern, and Tulare counties were the three highest users of pesticides in 2015 (California Department of Pesticide Regulation 2015).

The only known populations of BVLOS are also vulnerable to environmental risks associated with small, restricted populations. Impacts to populations that can lead to extinction include the loss or alteration of essential elements for breeding, feeding, and sheltering; the introduction of limiting factors into the environment such as poison or predators; and catastrophic random changes or environmental perturbations, such as floods, droughts, or disease (Gilpin and Soulé 1986). Many extinctions are the result of a severe reduction of population size by some deterministic event such as lowered birth rates due to exposure to certain toxins such as selenium, followed by a random natural event such as a crash in insect populations from an extended drought which causes the extirpation of the species. The smaller a population is, the greater its vulnerability to such perturbations (Terborgh and Winter 1980; Gilpin and Soulé 1986; Shaffer 1987). The elements of risk that are amplified in very small populations include: (1) the impact of high death rates or low birth rates; (2) the effects of genetic drift (random fluctuations in gene frequencies) and inbreeding; and (3) deterioration in environmental quality (Gilpin and Soulé 1986; Lande 1999). When the number of individuals in a population of a species or subspecies is sufficiently low, the effects of inbreeding may result in the expression of deleterious genes in the population (Gilpin 1987). Deleterious genes reduce individual fitness in various ways, most typically by decreasing survivorship of young. Genetic drift in small populations decreases genetic variation due to random changes in gene frequency from one generation to the next. This reduction of variability within a population limits the ability of that population to adapt to environmental changes (Lande 1999).

On page 58, under **Status of the Species**, *Valley elderberry longhorn beetle*, **delete** this heading and sentence.

On page 58 insert the following section.

### **Status of Critical Habitat**

The Service designated critical habitat for the BVLOS on January 24, 2005, (70 FR 3438) (Service 2005a) and a revised designation to the critical habitat was published on July 2, 2013 (78 FR 39836) (Service 2013). The final designated critical habitat encompasses approximately 2,485 acres in six units in Kings and Kern counties.

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 essential to the conservation of the species and that may require special management considerations or protection (50 CFR 424.12(b)). The Service is required to list the known physical and biological features that are essential for the conservation of the species 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 physical and biological features that are essential for the conservation of the species defined for the BVLOS were derived from species specific physical or biological needs. The physical and biological features essential for the conservation of the species were determined from studies of this species' habitat, ecology, and life history. Based on 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 physical and biological features that are essential to the conservation of the BVLOS are:

Permanent and intermittent riparian or wetland communities that contain:

- A complex vegetative structure with a thick cover of leaf litter or dense mats of low-lying vegetation. Associated plant species can include, but are not limited to, Fremont cottonwoods, willows, glasswort, wild-rye grass, and rush grass. Although moist soil in areas with an overstory of willows or cottonwoods appears to be favored, such overstory may not be essential.
- Suitable moisture supplied by a shallow water table, irrigation, or proximity to permanent or semi-permanent water; and
- A consistent and diverse supply of prey. Although the specific prey species utilized by BVLOS have not been identified, ornate shrews are known to eat a variety of terrestrial and aquatic invertebrates, including amphipods, slugs, and insects.

On page 59, under **Environmental Baseline**, *Geography, topography, and climate*, **add** the following two sentences to the end of the fourth paragraph:

The San Joaquin Valley has a drainage area of approximately 34,100 square miles and is roughly divided into a northern San Joaquin River Basin and a southern Tulare Lake Basin. The project action area is located entirely within the Tulare Lake Basin. The Tulare Lake Basin is generally flat and used extensively for agriculture. The contributing rivers are normally diverted and dewatered before reaching the southern San Joaquin Valley floor (ECORP Consulting 2007). The Tulare Basin historically would have included the water features that drained into the Tulare Lake Bed. Under the natural hydrologic regime of the southern San Joaquin Valley, drainages from the Kings River south flowed into Tulare Lake. In wetter years, the northern distributaries of the Kings River flowed north into the San Joaquin River (ECORP Consulting 2007).

On page 61, under **Environmental Baseline**, *Land use*, **add** this sentence to the end of the lacustrine habitat paragraph:

Lacustrine habitat features along the project alignment may provide habitat for the federally-listed BVLOS.

On page 62, under **Environmental Baseline**, *Land use*, **add** this sentence to the end of the riverine habitat paragraph:

Moist soil associated with the edges of riverine habitat along the project alignment may provide dispersal habitat for the federally listed BVLOS.

On page 62, under **Environmental Baseline**, *Land use*, **add** this sentence to the end of the Valley foothill riparian vegetation paragraph:

The best habitat for BVLOS appears to be in riparian and wetland communities with an abundance of leaf litter or dense herbaceous cover (Williams and Harpster 2011), and riparian vegetation along the alignment may provide such high-quality habitat.

On page 62, under **Environmental Baseline**, *Land use*, **add** this sentence to the end of the fresh emergent wetland paragraph:

Fresh emergent wetland vegetation is a preferred habitat for the federally listed BVLOS, as there are several records of BVLOS being trapped near the water's edge in this habitat (Cypher et al. 2017, Williams and Harpster 2011). Emergent wetland vegetation along the alignment may provide such high-quality habitat.

On pages 65 and 66, under **Environmental Baseline**, *San Joaquin kit fox*, **replace** third paragraph **with**:

San Joaquin kit foxes are expected to occur within all areas of suitable habitat throughout the CHST-FB project action area. An estimated 5,401.23 acres of habitat (alkali desert scrub, annual grassland, pasture, barren, urban Bakersfield, and agricultural lands) occurs within the 7,189-acre CHST-FB Project alignment footprint. Approximately 1,770.46 of the 5,401.23 acres (~ 33 percent) occur within satellite and corridor areas. Highly suitable habitat for the San Joaquin kit fox supports denning, foraging, and breeding; in the CHST-FB project action area it is composed of annual grasslands, alkali desert scrub, pasture, and barren land cover, as mapped for

this project. Approximately 768.94 acres of the 5,401.23 acres (~ 14 percent) of habitat is considered highly suitable for use by the San Joaquin kit fox (Table 4). About 52 percent (403.31 acres) of the 768.94 acres of highly suitable habitat occurs within satellite and corridor areas. The remaining 4,632.29 acres of San Joaquin kit fox habitat consists of agricultural and urban habitats between Fresno and Bakersfield (Table 4).

On page 69, under **Environmental Baseline**, *San Joaquin kit fox*, **replace** Table 4 with:

**Table 4. Range of potential habitat for the San Joaquin kit fox.**

Land Prioritization	CWHR Vegetation Community or Wildlife Association	Impact Type	Areas of Effect (Acres)	
			MIN	MAX
Southwestern Tulare County Satellite Area	<b>Natural</b>		<b>86.26</b>	<b>165.01</b>
	Annual Grassland	Direct	86.12	112.59
	Alkali Desert Scrub	Direct	0.07	37.40
	Barren	Direct	0	9.98
	Pasture	Direct	0.07	5.04
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>511.36</b>	<b>687.86</b>
	Agriculture/Crop	Direct	184.72	209.39
	Dryland Grain Crop	Direct	30.17	38.70
	Deciduous Orchard	Direct	228.81	255.10
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	10.69	75.75
	Irrigated Row and Field Crop	Direct	0	0
	Irrigated Hayfield	Direct	56.97	108.92
	Vineyard	Direct	0	0
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
BNSF	Direct	0	0	
Urban development	Direct	0	0	
Metropolitan Bakersfield Satellite Area (Urban Bakersfield)	<b>Natural</b>		<b>214.77</b>	<b>218.15</b>
	Annual Grassland	Direct	34.67	36.55
	Alkali Desert Scrub	Direct	10.13	11.14
	Barren	Direct	169.11	169.32
	Pasture	Direct	0.86	1.15
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>0</b>	<b>0</b>
	Agriculture/Crop	Direct	0	0
	Dryland Grain Crop	Direct	0	0
	Deciduous Orchard	Direct	0	0
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	0	0
	Irrigated Row and Field Crop	Direct	0	0
	Irrigated Hayfield	Direct	0	0
	Vineyard	Direct	0	0
	<b>Urban/BNSF</b>		<b>249.62</b>	<b>301.56</b>
BNSF	Direct	13.5	13.67	
Urban development	Direct	236.12	287.89	
Linkage Area	<b>Natural</b>		<b>0</b>	<b>20.15</b>
	Annual Grassland	Direct	0	1.27
	Alkali Desert Scrub	Direct	0	0
	Barren	Direct	0	18.88
	Pasture	Direct	0	0
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>104.69</b>	<b>377.73</b>
	Agriculture/Crop	Direct	3.01	96.55
Dryland Grain Crop	Direct	0	0	

	Deciduous Orchard	Direct	88.81	92.49
	Evergreen Orchard	Direct	0	0
	Irrigated Grain Crop	Direct	7.90	25.80
	Irrigated Row and Field Crop	Direct	0	6.08
	Irrigated Hayfield	Direct	4.97	29.83
	Vineyard	Direct	0	126.98
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0
<b>Remainder Areas (Outside of Recovery Areas)</b>	<b>Natural</b>		<b>164.34</b>	<b>365.63</b>
	Annual Grassland	Direct	111.05	184.46
	Alkali Desert Scrub	Direct	2.03	9.16
	Barren	Direct	28.58	134.24
	Pasture	Direct	22.69	37.77
	Valley Oak Woodland	Direct	0	0
	<b>Agriculture</b>		<b>1,643.94</b>	<b>3,265.14</b>
	Agriculture/Crop	Direct	159.49	516.12
	Dryland Grain Crop	Direct	34.85	77.80
	Deciduous Orchard	Direct	733.19	1,199.49
	Evergreen Orchard	Direct	3.42	3.42
	Irrigated Grain Crop	Direct	160.47	382.44
	Irrigated Row and Field Crop	Direct	37.62	131.24
	Irrigated Hayfield	Direct	242.04	441.09
	Vineyard	Direct	272.84	513.54
	<b>Urban/BNSF</b>		<b>0</b>	<b>0</b>
	BNSF	Direct	0	0
	Urban development	Direct	0	0

On page 71, under **Environmental Baseline**, *Tipton kangaroo rat*, line 1 **replace 453.85 with 468.02**. **Add** new third paragraph:

The TKR was not captured during limited small mammal live-trapping efforts conducted in September and October 2016, along Road 24 and Road 40 in support of the Tulare County road overlay portion of the Early Work Variations. These efforts were conducted at locations with marginal habitat (road shoulders) that contained sign of kangaroo rat occupation (appropriately-sized burrows). Mammals captured included the relatively common Heermann’s kangaroo rat (*Dipodomys heermanni*).

On page 71, under **Environmental Baseline**, **add** the following at the bottom of the page:

*Buena Vista Lake ornate shrew*

About 76.81 acres of suitable habitat (mesic and xeric) for BVLOS occurs within the project action area (Table 5). This includes the more mesic areas of moist soil associated with rivers, creeks, canals, and water impoundments, and the associated riparian and emergent wetland vegetation with extensive cover and leaf litter (about 39.02 acres), and the more xeric annual grassland and alkali desert scrub with varying amounts and types of cover and substrate within 200 feet of rivers, creeks, canals, water impoundments and other water sources (about 37.79 acres). In addition, about 51.18 acres of marginal habitat for BVLOS occurs within the project action area (Table 5). This habitat could be used by BVLOS for movement and dispersal, or in the absence of more suitable habitat, although the extent to which they might use these areas is currently unknown.

The known recent occurrence locations for BVLOS closest to the project footprint include the BVLOS carcass discovered within more xeric suitable habitat in April 2017, within about 0.30 miles south of required road work at Avenue 88 in Tulare County (part of the Early Work Variations), and BVLOS camera-detected in more xeric suitable habitat in December 2016, on the PNWR within about 1 mile east of the alignment along CP 2-3. Atwell Island, where BVLOS have been live-trapped and incidentally detected between 2001 and 2011, in both more mesic suitable habitat and marginal habitat, is about 4.5 miles west of the project footprint. Other known BVLOS occurrences are located just beyond a 10 mile distance from the project footprint.

BVLOS has not been detected during limited camera-detection efforts along the project footprint conducted from November 2016 through July 2017. These efforts were conducted in support of proposed geo-technical investigations, demolition of structures and clearing and grubbing activities at locations which varied from suitable habitat (Poso Creek, Kings River, Tule River, Cross Creek) to marginal habitat (Avenue 24 near Allensworth, Orange Avenue and 5<sup>th</sup> Avenue in Corcoran, Avenue 120 at Highway 43, Excelsior Avenue, Jackson Avenue) (Aardvark Biological Services LLC 2017a-j, Stantec 2017, Cypher 2016). BVLOS habitat requirements are not well understood, and the species distribution within the landscape is difficult to determine (Cypher 2016). Although BVLOS has not been detected within the project action area, the Service has concluded it is reasonably likely that the BVLOS may be present within the action area because suitable habitat is present and recent records indicate the presence of this species around the project action area. BVLOS are small, cryptic and difficult to detect, present in low numbers, and variable in numbers and distribution due to availability of habitat on the landscape. We do not know how they move within the landscape or how they utilize the landscape, but we know they must move through and around fragmented landscapes due to the nature of the sites in which they have been detected.

On page 72, under **Environmental Baseline**, *Central California tiger salamander*, **replace** the first paragraph **with**:

Up to 18.30 acres of potentially suitable aquatic habitat and 18.70 acres of potentially suitable upland habitat for the Central California tiger salamander occurs within the project action area (Table 5). Protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to properties where suitable habitat may exist. It is likely that the species utilizes the action area for breeding, feeding, sheltering and movement due to the presence of suitable habitat features.

On page 72, under **Environmental Baseline**, *Blunt-nosed leopard lizard*, line 1 **replace** 98.06 **with** **108.47**. **Add** new third and fourth paragraphs:

During protocol BNLL surveys conducted on parcels with permission to enter along the CP 4 alignment, at least five BNLL were observed during 2016, and two were observed in 2017 within and adjacent to the project footprint (Brian Berry pers. comm. 2017). In addition, a BNLL has been observed just over 300 feet west of the southern end of the CP 2-3 alignment (Matthew Weckes pers. comm. 2017). All of these recent observations along and adjacent to the alignment were made in the general Tulare County/Kern County line area.

It is likely that the BNLL may be present in other areas of the alignment because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

On page 73, under **Environmental Baseline**, Vernal pool fairy shrimp, delete the first sentence of the third paragraph.

On page 74, under **Environmental Baseline**, replace Table 5 with:

**Table 5. Range of potential habitat within the Fresno to Bakersfield alignment of the CHST Project (including the Early Work Variations but excluding mitigation properties) for Tipton kangaroo rat, Buena Vista Lake ornate shrew, Central California tiger salamander, blunt-nosed leopard lizard, vernal pool fairy shrimp, vernal pool tadpole shrimp, California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads**

Species	Habitat Type	Impact Type	Areas of Effect*	
			MIN	MAX
<b>Tipton kangaroo rat</b>	Alkali desert scrub, annual grassland, barren and pasture	Direct	367.18	468.02
<b>Buena Vista Lake ornate shrew</b>	More mesic suitable: moist soil associated with rivers, creeks, canals, water impoundments; associated riparian, emergent wetland vegetation; with cover and leaf litter	Direct	-	39.02
	More xeric suitable: grasslands, alkali desert scrub, alkali sink scrub within ~ 200 feet of rivers, creeks, canals, water impoundments, other water sources		-	37.79
<b>Central California tiger salamander</b>	AQUATIC: Vernal pools/seasonal wetlands	Direct	6.2	18.30
	UPLAND: alkali desert scrub, annual grasslands, pasture surrounding vernal pools/seasonal wetlands		18.6	18.70
<b>Blunt-nosed leopard lizard</b>	Alkali desert scrub, annual grassland, barren and valley foothill riparian	Direct	26.57	108.47
<b>Vernal pool fairy shrimp</b>	Vernal pools/seasonal wetlands	Direct	2.33	29.77
		Indirect	14.55	103.52
<b>Vernal pool tadpole shrimp</b>	Vernal pools/seasonal wetlands (delineated within the geographic range of the species)	Direct	0.0041	0.0011
		Indirect	0.0560	0.0560
<b>California jewelflower</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Fresno County	Direct	0	15.00
<b>Hoover's spurge</b>	Vernal pools/seasonal wetlands in Tulare County	Direct and Indirect bisected	-	6.11
<b>Kern mallow</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Tulare and Kern counties	Direct	0	217.93
<b>San Joaquin woolly-threads</b>	Unsurveyed alkali desert scrub, annual grassland, and pasture in Fresno, Kings, and Kern counties	Direct	0	491.77

\*Areas of Effect are presented in acres. A minimum and maximum range is used because there are still project components (for example, the Bakersfield Locally Generated Alternative) for which alternative alignments are being

considered. Once all project components have been identified and finalized, these ranges will be replaced with the expected acreage of disturbance.

On page 75, under **Environmental Baseline**, *Valley elderberry longhorn beetle*, **delete** this heading and three paragraphs below it.

On page 76, under **Environmental Baseline**, *Hoover's spurge*, **replace** the first paragraph with:

Hoover's spurge occurs within only one county, Tulare County, of the four surrounding the project action area. This population of Hoover's spurge is located outside of the project area and consists of five documented occurrences (CNDDDB 2017). However, Hoover's spurge may occur where suitable habitat is found within the project action area. The June 18, 2014 memorandum from the Authority concerning the refinement of potential effects to Hoover's spurge identified about 2.54 acres of potentially suitable habitat consisting of vernal pool and seasonal wetland habitat within the portion of the Fresno to Bakersfield alignment that occurs in Tulare County (Table 5). Calculations for the Early Work Variations in 2016 identified an additional 3.57 acres of potentially suitable Hoover's spurge habitat consisting of alkali desert scrub and annual grassland. Therefore, a total of 6.11 acres of potentially suitable Hoover's spurge habitat is present. Hoover's spurge was not identified during botanical surveys conducted during 2010 in areas where access was granted. However, protocol-level surveys for this species have not been conducted within the entire project action area because of limited access to other properties where suitable habitat may exist.

On page 76, under **Environmental Baseline**, *Hoover's spurge*, **replace** the last paragraph with:

It is reasonably likely that the Hoover's spurge may be present within the project action area because suitable habitat is present and records indicate the presence of this species within Tulare County.

On page 76, under **Environmental Baseline**, *Kern mallow*, **replace** 214.36 with **217.93**.

On page 77, under **Environmental Baseline**, *Kern mallow*, after full paragraph **add** the paragraph:

In May 2017, two Kern mallow plants were discovered north of Avenue 16 and south of Avenue 24 within the CP 2-3 project footprint. These two plants were discovered in a pistachio orchard on generally flat terrain.

On page 77, under **Environmental Baseline**, *Kern mallow*, **replace** sixth full paragraph with:

It is reasonably likely that the Kern mallow may be present within other portions of the project action area because suitable habitat is present and CNDDDB records indicate the presence of this species within and around the project action area.

On page 77, under **Environmental Baseline**, *San Joaquin woolly-threads*, **replace** 489.34 with **491.77**.

On page 81, under **Effects of the Proposed Action**, **replace** first paragraph with:

The CHST-IB Project will result in temporary and permanent loss of habitat for the San Joaquin kit fox, the Tipton kangaroo rat, the BVLOS, the Central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, the vernal pool tadpole shrimp, the California jewelflower, the Hoover's spurge, the Kern mallow, and the San Joaquin woolly-threads.

On page 82, under **Effects of the Proposed Action**, *San Joaquin kit fox*, *Effects associated with construction activities*, on line 3 **replace (5,351) with (5,401.23)**.

On page 82, under **Effects of the Proposed Action**, *San Joaquin kit fox*, *Effects associated with construction activities*, **replace the first two full paragraphs with:**

The potentially suitable habitats occur as fragments or patches throughout the relatively narrow, linear project action area, primarily within Fresno, Tulare, Kings, and Kern Counties. Approximately 768.94 acres of the 5,401.23 acres (~ 14 percent) of suitable habitat along the alignment is considered to be highly suitable for use by the San Joaquin kit fox (alkali desert scrub, annual grassland, pasture, barren lands, summed from Table 4). The remaining 4,632.29 acres of San Joaquin kit fox habitat consists of agricultural and urban habitats between Fresno and Bakersfield (Table 4). The 768.94 acres of highly suitable habitat that will be permanently lost as a result of the CHST-FB Project, including the Early Work Variations represents a small fraction of the remaining highly suitable habitat within Fresno, Tulare, Kings, and Kern Counties (Cypher pers. comm. 2013).

Habitat loss and alteration may occur through degradation and placement of hardscape over suitable denning or foraging habitat as a result of the CHST-FB alignment component of the project. It is reasonably likely that construction activities will result in the destruction of dens. Highly suitable habitat that supports denning and breeding is essential for persistence of San Joaquin kit fox populations (Service 2010a; Cypher et al. 2013; Cypher et al. 2014). Approximately 768.94 acres of high quality habitat for the San Joaquin kit fox will be permanently lost as a result of the CHST-FB alignment project action area and the Early Work Variations. High quality habitat already is extensively fragmented throughout the CHST-FB alignment component of the project action area. Although the total habitat loss will be spread out over the length of the alignment, the permanent loss resulting from the 100-foot wide CHST-FB alignment footprint will decrease available resources for San Joaquin kit foxes utilizing those areas.

On page 88, under **Effects of the Proposed Action**, *Tipton kangaroo rat*, *Effects associated with construction activities*, **replace first two paragraphs with:**

Mortality or injury of Tipton kangaroo rats could occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. Tipton kangaroo rat burrows may be collapsed by required ground-disturbing CRM mitigation activities. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Tipton kangaroo rats may be injured during burrow excavation and subsequent hand capturing and holding, should an individual be unexpectedly encountered. Tipton kangaroo rats could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. This disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the Tipton kangaroo rat, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, inspecting burrows and trenches to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize these effects.

Construction of the CHST-FB Project will result in the permanent loss of between 367.18 and 468.02 acres of potential habitat for the Tipton kangaroo rat (Table 5). At the time of listing, habitat

loss associated with agricultural development was identified as the main factor contributing to the decline of the Tipton kangaroo rat (Service 1988). The *Recovery Plan for Upland Species of the San Joaquin Valley, California* also cited habitat loss as the main reason for the decline for the Tipton kangaroo rat (Service 1998). In addition, the Tipton kangaroo rat is threatened by further habitat loss and fragmentation as a result of infrastructure development (Service 2010b). Between 1997 and 2010, the total of permanent loss of habitat was estimated to be about 14,824 acres (Service 2010b).

On page 89 **replace third paragraph with:**

In the event that Tipton kangaroo rats are discovered within the project action area during pre-construction surveys or become accidentally trapped within the project action area, the FRA and the Authority will immediately contact the Service. The FRA and the Authority have agreed to prepare and implement a Service-approved small mammal trapping and relocation plan in general accordance with the survey protocols in the *California Valley Solar Ranch Project: Plan for Relocation of Giant Kangaroo Rats*. Tipton kangaroo rats may become disorientated during trapping, capture, handling, holding, transport, and after translocation, which can result in drastically increased vulnerability to mortality as a result of predation and competition with cohorts (Germano 2010). However, implementation of the Service-approved relocation plan will minimize effects of disorientation and the risk of mortality from translocation. In addition, translocation of Tipton kangaroo rats under a Service-approved relocation plan will minimize the risk of mortality as a result of construction activities and assist in expanding existing populations into unoccupied habitat.

On page 91, under **Effects of the Proposed Action**, *Tipton kangaroo rat*, *Conservation measures for the Tipton kangaroo rat*, **replace with:**

Implementation of the proposed conservation measures is expected to significantly reduce adverse effects to Tipton kangaroo rats during project construction, maintenance, and operational activities. However, some mortality of Tipton kangaroo rats may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 468.02 acres of habitat for the Tipton kangaroo rat (Table 5). The FRA and the Authority have proposed to mitigate for the final calculated permanent habitat loss for Tipton kangaroo rat through the acquisition of permittee-responsible mitigation sites within Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the Tipton kangaroo rat and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

On page 91, under **Effects of the Proposed Action**, **add** after TKR:

*Buena Vista Lake ornate shrew*

*Effects associated with construction activities*

Injury or mortality of BVLOS may occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. Ground-disturbing CRM mitigation activities may crush dense vegetative ground cover or other refugia used by BVLOS, rendering the areas inaccessible to the species. The crushing of vegetation and other refugia could expose individuals to predation or adverse environmental conditions. BVLOS could fall into trenches, pits, or other excavations, and may be directly killed or unable to

escape and be subjected to desiccation, entombment, or starvation. Shrews must eat often in order to maintain body temperature due to their extremely small size and surface to volume ratio. Shrews can starve to death in a relatively short period of time absent regular feedings. BVLOS could run across active construction sites and might be hand-captured, held and released. Disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways or in construction areas. However, implementation of conservation measures proposed specifically for the BVLOS, such as minimizing the total area disturbed by project activities, conducting pre-construction detection surveys, biological monitoring of construction activities (including daily clearance surveys), hand clearing and raking of vegetation within suitable habitat areas, inspecting burrows and trenches to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize mortality or injury.

#### *Effects associated with operation activities*

Operation of the Fresno to Bakersfield Section may result in injury or mortality to BVLOS within the right-of-way. Security fencing along at-grade tracks may prohibit shrews from accessing the right-of-way and at-grade tracks or track ballast. Dedicated wildlife crossing structures specifically designated for use by this species have not been proposed for the CHST-FB Project. However, BVLOS may gain access across the alignment through any dedicated wildlife crossings intended for San Joaquin kit fox, drainage culverts, or under bridges that may be located within their limited habitat. While dispersal and movement patterns of BVLOS are not well understood, the Service is aware of a one-day movement record of a *Sorex ornatus salarius* individual at the mouth of the Salinas River in Monterey County wherein a shrew was re-captured 600 feet from its previous night capture location (Maldonado pers. comm. 2017). While this record provides evidence that a subspecies of ornate shrew can travel relatively long distances during a 24-hour period, it does not speak specifically to the movement capabilities of BVLOS.

There is a high density of dedicated wildlife crossings, small drainage culverts, and several bridges proposed for the section of the FB HST alignment where this species is most likely to occur. Bridge structures are planned for most features that have been characterized as 'more mesic suitable habitat' such as at Poso Creek, the Tule River, and at the shoreline of Lake Alpaugh.

If crossing opportunities are inadequate, movement of BVLOS within the project action area may be permanently altered as a result of the construction of at-grade tracks with security fencing in areas where installation of potential crossing structures are not proposed. This may also result in the permanent subdivision of BVLOS populations, fragmentation of habitat, and preclude recolonization of currently unoccupied historic habitat. Loss of connectivity among metapopulations among habitats surrounding the project action area may result in increased demographic stochasticity, genetic isolation and inbreeding (Gilpin and Soule 1986; Soule and Mills 1998; Mills 2007). Restricted movement of BVLOS may limit or entirely prohibit access to suitable habitat, resources, and mates on either side of the HST track.

#### *Exposure to increased noise levels*

The FRA has established noise exposure limits for all wildlife at a sound exposure level (SEL) of 100 dBA from passing trains. Construction equipment, such as bulldozers, may produce noise in the range of 85 dBA (Burgland and Lindvall 1995). Assuming no intervening structures and maximum speeds of 220 mph, the FRA and the Authority have estimated that 100 dBA SEL will occur within 100 feet from the trackway centerline for at-grade alignments, and estimated 15 feet from the

centerline for elevated sections on structures. This noise level is comparable to a helicopter operating at the same distance (Service 2006b).

Some shrew species are known to possess keen hearing and are known to use high-pitched squeaks in echolocation (Schmidt 1994). Non-auditory communication is important for many mammalian species. Some small mammals (such as kangaroo rats) use vibration by drumming feet, teeth or heads or stamping feet to denote territorial advertisement, agonistic interactions, co-ordinate mating interactions, sub-ordination and unwillingness to interact, and alert their cohorts to potential danger (Randall and Lewis 1997; Randall 1997; Randall, 2001). The increased noise exposure may also interfere with auditory and non-auditory communication and disrupt feeding, breeding and other essential behaviors for this species. BVLOS may vacate habitats located adjacent to the HST in response to the increased exposure to noise and vibration resulting from operation of the HST or, this species may also become adapted to the increased noise exposure and vibration over time. However, there is insufficient information available to the Service at this time regarding the specific response of BVLOSs to exposure to increased noise disturbance and vibration. Therefore, it is difficult to anticipate the response of this species and potential for disruption of its natural behaviors such as feeding, breeding, burrowing, and communication among cohorts.

#### *Conservation measures for the Buena Vista Lake ornate shrew*

Implementation of the proposed conservation measures is expected to significantly reduce adverse effects to BVLOSs during project construction, maintenance, and operational activities. However, some mortality of BVLOS may still occur because they are cryptic and difficult for operators of maintenance equipment and vehicles to see. The CHST-FB Project will result in the permanent loss of up to 76.81 acres of suitable habitat (mesic and xeric) for the BVLOS (Table 5). In addition, the CHST-FB Project will result in the permanent loss of up to 51.18 acres of marginal habitat that may be used by BVLOS for movement and dispersal or in the absence of more suitable habitat. The FRA and the Authority have proposed to mitigate for the final calculated disturbance BVLOS suitable habitat (mesic and xeric) through the acquisition of permittee-responsible mitigation sites within Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the BVLOS and provide habitat for breeding, feeding, or sheltering commensurate to or better than habitat lost as a result of the proposed project.

On page 91, under **Effects of the Proposed Action**, *Central California tiger salamander*, *Effects associated with construction activities*, **replace first paragraph with:**

Mortality or injury of Central California tiger salamanders may occur from being crushed by project related equipment, vehicles, or construction debris within the action area during construction activities. These small, cryptic animals may be crushed if burrows used as refugia are collapsed by required ground-disturbing CRM mitigation activities. Central California tiger salamanders could be crushed or harmed during excavation of burrows, should an individual be unexpectedly encountered. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Central California tiger salamanders could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. Disturbance from construction activities may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways as animals move away from sources of disturbance. However, implementation of conservation measures proposed specifically for the Central California tiger salamander, such as minimizing the total area disturbed by project activities, conducting pre-

construction surveys, inspecting burrows and trenches to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize mortality or injury. Up to 18.7 acres of upland habitat and 18.3 acres of aquatic habitat for the Central California tiger salamander will be permanently lost as a result of construction of the CHST-FB Project.

On page 93, under **Effects of the Proposed Action**, *Central California tiger salamander*, *Conservation measures for the Central California tiger salamander* **replace the second paragraph with:**

The CHST-FB Project will result in the permanent loss of up to 18.7 acres of upland habitat and 18.3 acres of aquatic habitat for the Central California tiger salamander (Table 5). The FRA and the Authority have proposed to mitigate for the final calculated permanent habitat loss for Central California tiger salamander through the purchase of mitigation credits at an approved conservation bank or the acquisition of permittee-responsible mitigation sites within Fresno, Tulare, and Kings counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the Central California tiger salamander and provide habitat for breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

On page 94, under **Effects of the Proposed Action**, *Blunt-nosed leopard lizard*, *Effects associated with construction activities*, **replace first paragraph with:**

Mortality or injury of blunt-nosed leopard lizards may occur from being crushed by project related equipment or vehicles, or construction debris within the action area during construction activities. Small mammal burrows that may be used as refugia by blunt-nosed leopard lizards may be collapsed by required ground-disturbing CRM mitigation activities. The collapse of small mammal burrows could expose individuals to predation or adverse environmental conditions. Blunt-nosed leopard lizards could fall into trenches, pits, or other excavations, and may be directly killed or unable to escape and be subjected to desiccation, entombment, or starvation. Disturbance and displacement may increase the potential for predation, desiccation, competition for food and shelter, or strike by vehicles on roadways. However, implementation of conservation measures proposed specifically for the blunt-nosed leopard lizard, such as minimizing the total area disturbed by project activities, conducting pre-construction surveys, daily clearance surveys, and inspecting burrows and trenches to make sure individuals are not inadvertently crushed, providing escape ramps in trenches, and wildlife exclusion fencing will minimize mortality or injury.

On page 95, under **Effects of the Proposed Action**, *Blunt-nosed leopard lizard*, *Conservation measures for the Blunt-nosed leopard lizard*, **replace with:**

Implementation of the proposed conservation measures will significantly reduce adverse effects to blunt-nosed leopard lizards during project construction, maintenance, and operational activities. However, some mortality of blunt-nosed leopard lizards may still occur because they may be difficult for operators of maintenance equipment and vehicles to observe. The CHST-FB Project will result in the permanent loss of up to 108.47 acres of suitable habitat for blunt-nosed leopard lizards (Table 5). The FRA and the Authority have proposed to mitigate for the final calculated permanent habitat loss for blunt-nosed leopard lizard through the acquisition of permittee-responsible mitigation sites within Tulare, Kings, and Kern counties that will be protected in perpetuity through conservation easements. These lands will be protected and managed for the conservation of the blunt-nosed leopard lizard and provide habitat for

breeding, feeding, or sheltering commensurate with or better than habitat lost as a result of the proposed project.

On pages 97 and 98, under **Effects of the Proposed Action**, *Valley elderberry longhorn beetle*, *Effects associated with construction activities*, *Conservation measures for the Valley elderberry longhorn beetle*, **delete** all paragraphs, including Table 7 Summary of proposed compensation for permanent effects to suitable habitat for the Valley elderberry longhorn beetle.

On pages 98 and 99, under **Effects of the Proposed Action**, *California jewelflower*, *Hoover's spurge*, *Kern mallow*, and *San Joaquin woollythreads*, **replace with**:

Direct and indirect effects to California jewelflower, Hoover's spurge, Kern mallow, and San Joaquin woolly-threads will be presumed where suitable habitat occurs within the project action area. Effects to each of these listed plant species were calculated by summing the acreage of potentially suitable habitats within the project footprint that occur within the range of each species. The proposed project will result in the permanent loss of potentially suitable habitat for the California jewelflower (up to 15.00 acres), the Hoover's spurge (up to 6.11 acres), the Kern mallow (up to 217.93 acres), and the San Joaquin woolly-threads (up to 491.77 acres) (Table 5).

On page 101, under **Conclusion**, between TKR and CTS **add**:

*Buena Vista Lake ornate shrew*

After reviewing the current status of the BVLOS, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the CHST-FB Project, as proposed, is not likely to jeopardize the continued existence of this listed species. Based on the proposed project design and all of the conservation measures, loss of suitable habitat anticipated is small relative to the availability of those similar habitat features throughout the BVLOS's range. The protection of habitats within permittee-responsible mitigation sites will minimize the effect on the BVLOS from incidental take resulting from permanent habitat loss. Permanent protection of any such lands through conservation easements will provide beneficial effects for this species and contribute to its survival and recovery.

On pages 102 and 103, under **Conclusion**, *Valley elderberry longhorn beetle*, **delete** the paragraph.

## INCIDENTAL TAKE STATEMENT

On page 105, under **Amount or Extent of Take**, *San Joaquin kit fox*, **replace with**:

It is not possible to quantify the number of individual San Joaquin kit foxes that will be taken as a result of the proposed project because this species is relatively sparsely distributed and we believe that the number of individual foxes impacted will be relatively small. Therefore, the amount of habitat for this species that will be affected as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that any San Joaquin kit foxes that may be in the section of the action area undergoing construction at any given time, a total area of 11,941 acres (including the project footprint, areas within 200 feet of the project footprint, and the 405-acre FCMS) will be harassed by project activities in areas undergoing construction, operations, and maintenance activities which will result in the likelihood of injury by annoying foxes to such an extent as to significantly disrupt normal behavior patterns. In addition, the Service anticipates that 768.94 acres of highly suitable habitat will be directly impacted and permanently lost as a result of the CHST-FB Project alignment

resulting in harm to the species by significantly impairing essential behaviors, including breeding, foraging, and denning. Upon implementation of the Reasonable and Prudent Measures, incidental take associated with the CHST-FB Project in the form of harassment over 11,941 acres, and harm of the San Joaquin kit fox caused by the loss of 768.94 acres of highly suitable habitat, will become exempt from the prohibitions described under section 9 of the Act.

On page 105, under **Amount or Extent of Take**, *Tipton kangaroo rat*, **replace with:**

It is not possible to quantify the number of individual Tipton kangaroo rats that will be taken as a result of the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be affected as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that up to 468.02 acres of suitable habitat for the Tipton kangaroo rat will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the Tipton kangaroo rat caused by habitat loss, construction activities, capture, transport, handling and holding during relocation from the construction footprint, and any required ground-disturbing CRM mitigation and burrow excavation activities will become exempt from the prohibitions described under section 9 of the Act.

On page 105, **add** under **Amount or Extent of Take** between TKR and CTS:

*Buena Vista Lake ornate shrew*

It is not possible to quantify the number of individual BVLOS that will be taken as a result of the proposed project because it is small, cryptic, difficult to detect, limited survey efforts have been conducted, its current distribution across the landscape is not well known, and its life history is not well understood. Further, the specific habitat requirements of BVLOS are poorly defined, and the potential distribution of the species is difficult to delineate or predict (Cypher 2016). The amount of BVLOS suitable habitat (mesic and xeric) that will be impacted as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that 39.02 acres of more mesic and 37.79 acres of more xeric suitable habitat will be directly affected and permanently lost as a result of the CHST-FB Project alignment resulting in harm to the species by significantly impairing essential behaviors, including breeding, foraging, and sheltering. The Service further anticipates that an additional 51.18 acres of marginal habitat will be directly affected. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the BVLOS caused by habitat loss, construction activities, transport, handling and holding during relocation from the construction footprint, and any required CRM mitigation activities will become exempt from the prohibitions described under section 9 of the Act.

On page 106, under **Amount or Extent of Take**, *blunt-nosed leopard lizard*, **replace with:**

It is not possible to quantify the number of individual blunt-nosed leopard lizards that will be taken as a result of the proposed project because the number of individuals within the project action area is unknown. The anticipated loss of individuals of this species also may be difficult to quantify due to seasonal fluctuations in their numbers, random environmental events, changes in their habitat, or additional environmental disturbances. Therefore, the amount of habitat for this species that will be

affected as a result of the CHST-FB Project will be used as a surrogate for quantifying take. The Service anticipates that up to 108.47 acres of suitable habitat for the blunt-nosed leopard lizard will be permanently lost as a result of the CHST-FB Project. Upon implementation of the Reasonable and Prudent Measures, these levels of incidental take associated with the CHST-FB Project in the form of harm, harassment, capture, injury, and death of the blunt-nosed leopard lizard caused by habitat loss, construction activities, exclusion from active construction areas, and any required ground-disturbing CRM mitigation activities or burrow excavation activities will become exempt from the prohibitions described under section 9 of the Act.

On page 107, under **Amount or Extent of Take**, *Valley elderberry longhorn beetle*, delete the paragraph.

On page 107, under **Effect of Take**, replace with:

The Service has determined this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox, the Tipton kangaroo rat, the BVLOS, the Central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, and the vernal pool tadpole shrimp.

On page 107, under **Reasonable and Prudent Measure**, replace with:

The Service has determined that the following reasonable and prudent measure is necessary and appropriate to minimize and avoid effects of the CHST-FB Project on the San Joaquin kit fox, the Tipton kangaroo rat, the BVLOS, the Central California tiger salamander, the blunt-nosed leopard lizard, the vernal pool fairy shrimp, and the vernal pool tadpole shrimp.

All of the conservation measures as proposed by the FRA and the Authority in the biological assessments, and restated in the project description section of this biological opinion, must be fully implemented and adhered to.

On pages 107 and 108, under **Terms and Conditions**, replace 1 and 2 with:

- 1.a The FRA and the Authority will ensure that the FRA and the Authority and all of their contractors fully implement and adhere to the proposed conservation measures. All terms and conditions that apply to contractor activities will be conditioned in contracts for the work.a
- 2.a In order to monitor whether the amount or extent of incidental take anticipated from a implementation of the project is approached or exceeded, the FRA and the Authority will adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the FRA and the Authority must immediately reinstate formal consultation as per 50 CFR 402.16.a
  - a.a For those components of the action that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the FRA and the Authority will provide monthly updates to the Service with a precise accounting of the total acreage when the following habitats are impacted: (1) habitat for the San Joaquin kit fox (Table 4); (2) habitat for the Tipton kangaroo rat (Table 5); (3) habitat for the BVLOS (Table 5); (4) upland habitat for the California tiger salamander (Table 5); (5) habitat for the blunt-nosed leopard lizard (Table 5); and (6) vernal pool habitat for vernal pool species (Table 5).a Updates will also include any information about changes in project implementation that result in habitat disturbance not described in the *Description of the Proposed Action* and not analyzed in this biological opinion.a

- b.o ~~For those components of the action that may result in direct encounters between listed wildlife species and project workers and their equipment whereby incidental take in the form of harassment, harm, injury, or death is anticipated, within one day the FRA and Authority will contact the Service's SIWO at (916) 414-6643, to report the encounter. The FRA and the Authority will contact the Service's SIWO at (916) 414-6643 within one day to report direct encounters between listed wildlife species and project workers and their equipment whereby incidental take in the form of harm, injury, or death occurred. If the encounter occurs after normal working hours, the Service will be contacted at the earliest possible opportunity the next working day. This reporting will allow the Service and the FRA and Authority to evaluate those project components such that the potential for such direct encounters is minimized. If an encounter occurs after normal working hours, the FRA and the Authority will contact the SIWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the FRA and the Authority will follow the steps outlined in the *Salvage and Disposition of Individuals* section.~~
- c.o All pre-construction survey reports will be provided for the Service to review at least five days prior to the initiation of the proposed work.o
- d.o A post-construction report detailing compliance with the project design criteria and proposed conservation measures described under the *Description of the Proposed Action* section of this biological opinion will be provided to the Service within 30 calendar days of completion of the project. The report will include: (1) dates of project groundbreaking and completion; (2) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (3) an explanation of failure to meet such measures, if any; (4) known project effects on listed species, if any; (5) observed incidences of injury to or mortality of any listed species, if any; and, (6) any other pertinent information.o

On page 109, under **Salvage and Disposition of Individuals**, replace with:

In the case of an injured and/or dead federally listed wildlife species, the Service will be notified of events within one day and the animal will only be handled by a Service-approved biologist. Injured federally listed wildlife species will be cared for by a licensed veterinarian or other qualified person. In the case of a dead federally listed wildlife species, the animal will be preserved, as appropriate, and will be bagged and labeled (i.e. species type; who found or reported the incident; when the report was made; when and where the incident occurred; and if possible, cause of death). Carcasses will be held in a secure location, such as a freezer or cooler, until instructions are received from the Service regarding the disposition of the specimen or until the Service, or another appropriate agency or qualified person, takes custody of the specimen.

The FRA 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 Brian Arnold, Senior Fish and Wildlife Biologist, Sacramento Fish and Wildlife Office, at (916) 414-6643 and the Service's Law Enforcement Division at (916) 414-6660.o

## CONSERVATION RECOMENDATIONS

On page 109, under Conservation Recommendation 1, **replace with:**

The Service recommends the FRA develop and implement the appropriate conservation and restoration measures in areas designated in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998), and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Service 2005b).

On page 110, **add** Conservation Recommendation 4:

4. Use of cameras to detect BVLOS should be conducted to further knowledge of this species' habitat requirements. This information would be helpful for future California High Speed Rail Sections, including the Shafter to Bakersfield portion of the Fresno to Bakersfield Section, as well as the Bakersfield to Palmdale Section. Camera detection efforts should use the close-focus cameras recommended by the ESRP that are in the possession of the Design/Build teams for CP 2-3 and CP 4. The cameras should be placed for four consecutive nights, and should be baited with Tenebrionid larvae placed in a small dish in front of the camera to encourage any BVLOS to come into view. A biologist should replenish the Tenebrionid larvae after the second night, at a minimum. Camera detection efforts can be conducted anywhere along the alignment, preferably in areas that have not been previously accessible to BVLOS camera detection or live-trapping efforts.

## REINITIATION - CLOSING STATEMENT

This concludes reinitiation of formal consultation on the California High-Speed Train System: Fresno to Bakersfield Section Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required and will be requested by the federal agency or by the Service where discretionary federal agency involvement or control over the action has been retained or is authorized by law and:

- (a) If the amount or extent of taking specified in the incidental take statement is exceeded;
- (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;
- (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or
- (d) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this correspondence, please contact Brian Arnold, Senior Fish and Wildlife Biologist (brian\_arnold@fws.gov), or Catrina Martin, Chief, Infrastructure Division (catrina\_martin@fws.gov) at the letterhead address, (916) 414-6701, or by e-mail.

Sincerely,



Jennifer M. Norris  
Field Supervisor

cc:

Mark McLoughlin, California High-Speed Rail Authority, Sacramento, California  
Kathleen Dadey, U.S. Army Corps of Engineers, Sacramento, California  
Julie Vance, California Department of Fish and Wildlife, Fresno, California  
Clifton Meek, Environmental Protection Agency, San Francisco, California

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### *In Litteris*

Aardvark Biological Services LLC. 2017a. Buena Vista Lake Ornate Shrew Assessment at Orange Avenue, to Matthew Weekes from Steven Chen, 4 pages including photographs. 10 May.

Aardvark Biological Services LLC. 2017b. Buena Vista Lake Ornate Shrew Assessment at Avenue 24, to Matthew Weekes from Steven Chen, 5 pages including photographs. 10 May.

Aardvark Biological Services LLC. 2017c. Buena Vista Lake Ornate Shrew Assessment at 208 5th Avenue, to Matthew Weekes from Steven Chen, 3 pages including photograph. 31 May.

Aardvark Biological Services LLC. 2017d. Buena Vista Lake Ornate Shrew Assessment at Sweet Canal on FB-16-0316, to Matthew Weekes from Steven Chen, 3 pages including photograph. 9 July.

Aardvark Biological Services LLC. 2017e. Buena Vista Lake Ornate Shrew Assessment FB-54-0508, to Matthew Weekes from Steven Chen, 6 pages including photographs. 9 July.

Aardvark Biological Services LLC. 2017f. Buena Vista Lake Ornate Shrew Assessment Excelsior Avenue, to Matthew Weekes from Steven Chen, 3 pages including photograph. 13 July.

Aardvark Biological Services LLC. 2017g. Buena Vista Lake Ornate Shrew Assessment Jackson Avenue, to Matthew Weekes from Steven Chen, 4 pages including photographs. 13 July.

Aardvark Biological Services LLC. 2017h. Buena Vista Lake Ornate Shrew Assessment Cross Creek, to Matthew Weekes from Steven Chen, 8 pages including photographs. 13 July.

Aardvark Biological Services LLC. 2017i. Buena Vista Lake Ornate Shrew Assessment Tule River, to Matthew Weekes from Steven Chen, 10 pages including photographs. 13 July.

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#### **Personal Communications**

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- Cypher, B.L. 2017. Associate Director and Research Ecologist Endangered Species Recovery Program, California State University-Stanislaus, Bakersfield, California. Telephone conversations and email correspondence with Brian Arnold, U.S. Fish and Wildlife Service, Sacramento, California, regarding recent live-trapping and camera detection efforts, and appropriate habitat for the Buena Vista Lake ornate shrew.
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