FOR CONTRACT NO.: 06-353414

SUPPLEMENTAL INFORMATION HANDOUT

AGREEMENTS

UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
(Biological Opinion) DATED SEPTEMBER 22, 2003

UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE
(Amendment of the Biological Opinion) DATED APRIL 4, 2007

ROUTE: 06-Ker-46-0.0/11.8

CONTRACT NO. 06-353414
ADDED PER ADDENDUM NO. 3 DATED APRIL 8, 2010

United States Department of the Interior

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

IN REPLY REFER TO:
1-1-03-F-0208

September 22, 2003

Mr. Gary Hamby
Division Administrator
Federal Highways Administration
Department of Transportation
980 Ninth Street, Suite 400
Sacramento, California 95814-2724

Subject: Section 7 Formal Consultation on the Proposed State Route 46 4-Lane Widening Project from the San Luis Obispo County/Kern County line to post mile 37.5 in Kern County, California

Dear Mr. Hamby:

This is in response to your August 30, 2001, and May 9, 2002, requests for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act) on the proposed State Route 46 4-lane Widening Project from the San Luis Obispo County/Kern County line east to post mile 37.5 in Kern County, California. Your September 30, 2001, letter requesting the initiation of formal consultation on the State Route 46 project on the east side of Interstate 5 was received in our office on September 4, 2001; your May 9, 2002, letter requesting the initiation of formal consultation on the State Route 46 project on the west side of Interstate 5 was received in our office on or about May 11, 2002. In a letter dated May 14, 2003, that was received by the Service on May 15, 2003, the California Department of Transportation (Caltrans) requested that the 2 projects be combined in a single biological opinion. On September 15, 2003, the Service received an electronic mail message from Carrie Bowen of Caltrans, and a telephone message from her on September 18, 2003, in which she stressed Caltrans wants the biological opinion for this project issued as expeditiously as possible.

Your August 30, 2001, letter stated that the proposed project on the east side of Interstate 5 is likely to adversely affect the endangered San Joaquin kit fox (*Vulpes macrotis mutica*), endangered blunt-nosed leopard lizard (*Crotaphytus silus*), and the endangered tipton kangaroo rat (*Dipodomys nitroides nitroides*); your letter also requested concurrence that the proposed project is not likely to adversely affect the threatened Hoover's woolly-star (*Eriastrum hooveri*) and the endangered San Joaquin woolly-threads (*Lembertia congdonii*). Your May 9, 2002, letter stated that the proposed project on the west side of Interstate 5 is likely to adversely affect the endangered San Joaquin kit fox, and is not likely to adversely affect the endangered blunt-nosed leopard lizard, endangered tipton kangaroo rat, endangered giant kangaroo rat (*Dipodomys ingens*), endangered California jewelflower (*Caulanthus californicus*), threatened Hoover's woolly-star, and the endangered San Joaquin woolly-threads.

The Service has made concurrences and non-concurrences on the effects of this project on several listed species based on the information provided in the *California Department of Transportation Natural Environment Study and Biological Assessment State Route 46 Kern County, California EA 06-338300 PM 32.8/37.5*, dated June 7, 2001 (Biological Assessment 1), that was prepared by the California Department of Transportation (Caltrans); *California Department of Transportation Biological Assessment Location: Kern County, California Route 46 Post Miles 0.0/11.74, 11/74/53.91, 0.0/32.99 (Orchard Peak, Sawtooth Ridge, Emmigrant Hill, Shale Point, Blackwells Corner, Lost Hills Quadrangle Maps) Expenditure Authorizations: 0.6-35341, 06-44250, 06-35330)* dated April 2002 (Biological Assessment 2), that was prepared by Caltrans; *San Luis Obispo and Kern Counties State Route 46 4-Lane Widening Project Environmental Assessment/Initial Study State Route 46 through San Luis Obispo and Kern Counties 05-SLO-46 EA OC6500: From kilometer posts 88.67 to 97.9 (post miles 55.1 to 60.9) 06-KERN-46 EA 353410: From kilometer posts 0.00 to 11.75 (post miles 0.00 to 7.3) 06-KERN-46 EA 442500: From kilometer posts 11.75 to 53.9 (post miles 7.3 to 33.5)* dated January 2003 (EA) that was prepared by the Federal Highways Administration (FHWA) and Caltrans; a field visit to the project location on June 13, 2003, by Chris Nagano and Brian Peterson of the Service and David Armes and Terry Marshall of Caltrans; a field visit to the project site by Chris Nagano and Brian Peterson and a representative from the California Cattlemen's Association on August 21, 2003; and other information available to the Service.

We concur the proposed project is likely to adversely affect the San Joaquin kit fox, Tipton kangaroo rat, and the blunt-nosed leopard lizard; and we do not concur that the proposed project is not likely to adversely affect Hoover's woolly star, San Joaquin woolly-threads, endangered giant kangaroo rat, and the California jewelflower. The Service does not concur with the not likely to adversely affect determinations for several reasons. As discussed in the appropriate portions of *Status of the Species and Environmental Baseline* section of this biological opinion, suitable habitat for all of these listed species are found in and adjacent to the action area; although no observations of the species and/or their sign are reported in Biological Assessment 1 or 2, the surveys were either of unknown methodology, duration and extant, or they were not focused surveys approved by the Service or the California Department of Fish and Game; and as described under the appropriate *Effects of the Proposed Action* section of this biological opinion, Caltrans has proposed to mitigate for effects on these species resulting from the State Route 46 project (Biological Assessment 1; Biological Assessment 2). Under normal circumstances, the Service would recommend to Caltrans that additional information, including the results of focused or protocol surveys for these listed species, be provided for us to review prior to initiation of formal consultation as stated in the regulations at 50 CFR 402.14. However, the Service has assumed the presence of the giant kangaroo rat, Hoover's woolly-star, San Joaquin woolly-threads, and the California jewelflower in the action area of the State Route 46 project, given the biology and ecology of these animals and plants, the presence of suitable habitat in and adjacent to the project, as well as the observations of these listed species to the vicinity of the action area, but especially because of Caltrans' request for an expedited biological opinion, as described in the September 5 and 16, 2003, electronic mail messages from Carrie Bowen of Caltrans to the Service, and her September 18, 2003, telephone message to the Service (see *Consultation History* section of this biological opinion). In addition, Biological Assessment 1 stated the proposed State Route 46 project will result in no effect to the endangered Buena Vista Lake shrew (*Sorex ornatus relictus*) that there are no known occurrences of the species near the project, and the project is outside of the range of the then one known extant population. The Service does not concur with this determination because this listed animal has recently been documented to occur at the Kern National Wildlife Refuge, which is located approximately 7.3 miles north of project site, the biology and ecology of the animal, and the presence of suitable habitat in the action area.

This biological opinion is based on information provided in the following sources: 1) Biological Assessment 1; 2) Biological Assessment 2; 3) the EA; 4) a field meeting at the project between Chris Nagano, Brian Peterson, Terry Marshall, and David Armes on June 13, 2003; 5) a field meeting at the project site by Chris Nagano and Brian Peterson and a representative of the California Cattlemen's Association on August 21, 2003; 6) a meeting between Gary Hamby, his deputy, Maser Khalid, and Larry Vinzant of the FHWA, Gary Winters and Greg Erickson of Caltrans, and Wayne White, Susan Moore, Mike Hoover, and Chris Nagano of the Service on August 22, 2003; 7) a telephone conversation between Chris Nagano and Gary Winters on August 25, 2003; 8) electronic mail messages from Carrie Bowen of Caltrans to the Service dated September 5, 2003, and September 16, 2003; 9) an electronic mail message from Chris Nagano of the Service to Caltrans dated September 7, 2003; 10) several telephone calls between Service and Caltrans staff; 11) a number of electronic mail messages between Caltrans and the Service; and 12) aerial photographs of the project that were provided by Caltrans; and 13) other information contained in the Service's files.

Consultation History

September 4, 2001: The Service received a letter from FHWA dated August 30, 2001, requesting the initiation of formal consultation on the rehabilitation and widening of State Route 46 from Interstate 5 eastward for approximately 5 miles.

May 9, 2002: FHWA sent a letter to the Service dated May 9, 2002, requesting initiation of formal consultation on the widening of State Route 46 from Interstate 5 westward for 33.5 miles.

May 15, 2003: The Service received a letter from FHWA dated May 14, 2003, requesting that the work on the eastern and western sections of State Route 46 be combined into a single biological opinion.

June 13, 2003: Chris Nagano and Brian Peterson of the Service met with Terry Marshall and David Armes of Caltrans at the proposed project site. Caltrans emphasized the need to implement the proposed project due because of human health and safety. Caltrans advised the Service that they are proposing to acquire lands for the San Joaquin kit fox to compensate, in part, for adverse effects resulting from the State Route 46 project in the Buena Vista Valley, approximately 30 miles south of the action area. The Service advised Caltrans this likely would not adequately offset the adverse effects to the kit fox and its movement corridor caused by the project. The Service recommended Caltrans protect habitat along the State Route 46 corridor. Caltrans showed the Service where kit foxes had been observed during their surveys. Habitat that appeared to be suitable for listed species and other wildlife was observed north of State Route 46 adjacent to Interstate 5. Suitable habitat for the Buena Vista Lake shrew was observed between Interstate 5 and post mile 37.5. Caltrans stated that no surveys for the Buena Vista Lake shrew have been completed in the action area.

June 18, 2003: The Service and Caltrans discussed the State Route 46 project on the telephone. Caltrans stated they are interested in acquiring the undisturbed parcel that contains habitat that is located north of State Route 46 adjacent to the east side of Interstate 5. The Service suggested that due to Caltrans stated time constraints on initiating groundbreaking for the project, they assume the presence of the Buena Vista Lake shrew at the project site; Caltrans stated that they did not object. The Service and Caltrans discussed potential conservation measures for the shrew.

June 24, 2003: The Service sent Caltrans an electronic mail message inquiring about the status of the proposal to place 5-foot pipes under the highway to enable the San Joaquin kit foes to safely cross the road.

June 24, 2003: Caltrans sent the Service an electronic mail message stating they were working with their engineers to obtain information on all the existing and proposed culverts for the entire stretch of State Route 46. They had informed the engineers this was a priority.

June 24, 2003: The Service sent Caltrans an electronic mail message which stated that the movement corridor for the San Joaquin kit fox would be enhanced if the culverts could be combined with the acquisition lands. The Service asked Caltrans if they had investigated ways to "encourage" the foxes to use the culverts.

June 24, 2003: Caltrans sent the Service an electronic mail message regarding the use of fencing to funnel the San Joaquin kit foxes into the culverts, and they expressed concern if the animals did not use the corssing as frequently as planned or not all, and then the movement could be cut off due to the fencing. Caltrans stated they "...like the idea of acquiring mitigation lands adjacent to the culverts. This would always insure connectivity. We are attempting to research any available mitigation lands in the areas we discussed."

June 25, 2003: Chris Nagano sent Caltrans an electronic mail message describing the Service's involvement with the proposed use of the lands in Buena Vista Valley for the conservation of the

San Joaquin kit fox; and that the Service had not suggested it was suitable for the State Route 46 project. The Service reiterated the importance of maintaining a movement corridor for the kit fox across State Route 46, including the recommendation the use of 5' tall pipes or culverts under the highway to increase the conservation value of the movement corridor.

June 25, 2003: Caltrans sent the Service and electronic mail message stating they are looking into land around the State Route 46/Interstate 5 area and on State Route 46 between Highway 33 and Interstate 5 that is for sale. They stated they will propose that culverts be placed in the vicinity of the kit fox sightings, however, they indicated that roadway design and costs may be prohibitive.

June 25, 2003: The Service sent Caltrans an electronic mail message requesting they investigate other potential means of reducing vehicle-strike caused mortality of the San Joaquin kit fox.

June 27, 2003: Caltrans sent the Service an electronic mail message describing how they are investigating how to get the kit foxes into culverts, assuming culverts can be included in the project, as opposed to the animals going over the highway. They stated that the kit foxes may not use culverts if the elevation of the roadway is low and there is not some mechanism to force them into the culverts. Caltrans said overcrossings are not possible due to a lack of topography; undercrossings would be problematic due to ponding.

July 17, 2003: The Service and Caltrans discussed the State Route 46 project on the telephone. The Service reiterated its concerns regarding the potential adverse effects of the proposed project on the San Joaquin kit fox and its movement corridor. The Service inquired if Caltrans was proposing to place concrete dividers on State Route 46; Caltrans responding that concrete dividers will not be used on this highway. The Service inquired about the status of protecting lands east of Interstate 5; Caltrans responded that they had made calls to realtors in the Bakersfield area and they also had been checking the internet.

July 30, 2003: The Service sent Caltrans an electronic mail message inquiring about the status of protecting habitat east of Interstate 5.

August 1, 2003: Caltrans sent the Service an electronic mail message that they had contacted realtors in the area, but they had not received any responses. They stated they were going to visit the action area to check if there were any new "for sale" signs.

August 1, 2003: The Service sent Caltrans an electronic mail message stating that there was going to be a meeting with representatives of the California Cattlemen's Association to discuss the potential for conservation easements on ranch lands west of Interstate 5. The Service contacted the California Cattlemen's Association because of the apparent inability to locate suitable properties with willing sellers and Caltrans stated desire to the Service that they want to initiate groundbreaking on the project as soon as possible.

August 1, 2003: Caltrans sent the Service an electronic mail message that stated the Service should let them know if their participation was desired in any of the talks with the California Cattlemen's Association.

August 5, 2003: The Service sent Caltrans an electronic mail message requesting the attendance of Caltrans at the meeting with the representatives of the California Cattlemen's Association. The Service requested information on Caltrans' efforts to locate lands that could be protected east of Interstate 5, and if those lands were not available, if they had proposals for other suitable lands. The Service emphasized they were interested in ideas from Caltrans.

August 5, 2003: Caltrans sent the Service an electronic mail message that the other person who may be interested in attending the meeting with the California Cattlemen's Association was currently on vacation but would return on August 11, 2003. Caltrans stated they were going out to the site to check for any new opportunities for compensation lands.

August 5, 2003: The Service sent Caltrans an electronic mail message that the meeting with the representatives with the California Cattlemen's Association would be on August 21, 2003, and would start between 1030 a.m. and 1130 a.m. at a specific restaurant in the Town of Lost Hills.

August 21, 2003: The Service met with a representative of the California Cattlemen's Association at the project site. The biology and ecology of the San Joaquin kit fox was discussed, as well as the potential for the use of conservation easements on ranchlands. They stated that there are some ranchers in the area who had approached them about their interest in selling conservation easements.

August 22, 2003: Wayne White, Susan Moore, Mike Hoover, and Chris Nagano of the Service meet with Gary Winters, Chief of Caltrans' Environmental Analysis Division, and Greg Erickson of Caltrans, and Gary Hamby of the FHWA and his staff. Caltrans emphasized that all three agencies should try and use creative and innovative ways to compensate for adverse effects resulting from highway projects on listed species.

August 25, 2003: In a telephone conversation, Gary Winters and Chris Nagano discussed the potential use of conservation easements, especially on ranchlands, for listed species including the San Joaquin kit fox at the State Route 46 project. Mr. Winters stated there is considerable potential for the use of conservation easements to offset the effects of Caltrans projects on listed species

September 2, 2003: The Service sent Gary Winters an electronic mail requesting information on landownership along State Route 46.

September 2, 2003: Gary Winters sent an electronic mail message to Caltrans' Fresno Office requesting that they provide the Service with landownership on State Route 46, if possible.

September 2, 2003: The Service sent Gary Winters an electronic mail message regarding his September 2, 2003, electronic mail message to his Fresno office stating that "...This will help keep the formal consultation for 46 on track."

September 5, 2003: Carrie Bowen of Caltrans sent the Service an electronic mail message questioning how conservation easements are relevant to the completion of the biological opinion and she stated " ...mitigation funds for this project may not be available for several years..."

September 7, 2003: The Service sent Caltrans an electronic mail message that explained the use of conservation easements, the recent history of the State Route 46 project, and the Service's understanding that this is a priority project for Caltrans.

September 15, 2003: The Service received information from Caltrans regarding land ownership and aerial photographs of the State Route 46 corridor.

September 16, 2003: Carrie Bowen sent the Service an electronic mail message stating, in part, that Caltrans was concerned about delays in the consultation, and she wanted the biological opinion for the State Route 46 project as soon as possible.

September 18, 2003: Carrie Bowen left a telephone message for the Service that stated, in part, her concern about the formal consultation and that the Service would not be able to complete the biological opinion in an expeditious manner.

BIOLOGICAL OPINION

Description of the Proposed Action

State Route 46 beginning at State Route 1 near Cambria in San Luis Obispo County and extending to State Route 99 near Famosa in Kern County, was added to the State Highway System by legislative action in 1915. This highway, also known as the "Paso Robles Highway," is predominantly an east-west highway running through the central San Joaquin Valley. It is a Federal Aid Route on the National Highway System functionally classified as a principle arterial between the San Luis Obispo County Line and Interstate 5, and as a minor arterial between Interstate 5 and State Route 99. Truck traffic currently comprises nearly 40% of the average daily traffic volume. State Route 46 also is heavily used on weekends as a corridor for recreational vehicles traveling between the San Joaquin Valley and communities on the Central Coast.

According the Biological Assessment 1, Biological Assessment 2, and the EA, the Federal Highways Administration and Caltrans are proposing to rehabilitate and widen State Route 46 from the San Luis Obispo County/Kern County line east to post mile 37.7 (kilopost 60.35). Biological Assessment 1 and 2 describe a number of actions that will be completed including: asphalt concrete overlay of the roadbed; widening of the pavement to provide 7.0 feet (2.4 meter) shoulders with 3.3 feet (1.0 meter) backing in each direction of travel; widening of two bridges; and improvements to increase safety at 2 intersections; dig out and repair localized areas of severe failure on the existing roadbed; seal cracks larger than 5 millimeters on existing roadbed; overlay existing roadbed and bridges with asphalt concrete; cul-de-sac at McCombs Road with no access from the highway ; realignment of Corcoran Road; widening of Main Drain Canal Bridge and Goose Lake Canal Bridge; construct approach metal beam guard rail and upgrade existing bridge railing at Main Drain Canal and Goose Lake Canal; and relocation of fiber optic, water/petroleum, and power utilities. All of the work described in the two biological assessments will be done under Caltrans authority by a subcontractor. This contract is proposed to be awarded in April 2005 and the construction would be completed by March 2007

The second portion of this project extends from the San Luis Obispo County/Kern County line west to kilometer post 88.67 (post mile 55.1) in San Luis Obispo County. It is our understanding that Caltrans, through FHWA, has entered in formal consultation for this segment with the Service's Ventura Fish and Wildlife Office.

Proposed Conservation Measures

According to the Biological Assessment 1, Biological Assessment 2, the EA, and other sources of information available to the Service, the Federal Highways Administration and Caltrans propose to avoid, minimize, and compensate for effects to listed species through the following measures:

1. An employee education program regarding listed species will be included in the pre-construction meeting. A Caltrans biologist or other qualified biologist will conduct this portion of the meeting.

2. Pre-construction surveys will occur within 60 days prior to construction, if it is during the appropriate flowering period of the Hoover's woolly-star or the San Joaquin woolly-threads. Areas along the project length with the potential to support these two species will be surveyed on foot. If either plant is observed within the impact area, the Service will be immediately notified regarding the procedure for transplantation of the specimen.

3. As described in Biological Assessment 1, areas along the project length with the potential to support the Tipton kangaroo rat, bluntnosed leopard lizard, and the State threatened San Joaquin antelope squirrel (*Ammospermophilus nelsoni*) will be walked on foot within one month prior to construction. These pre-construction surveys will look for the presence or recent activity of these animals. If presence or recent activity is observed, special attention will be paid to that area by the biology construction monitor as described in the biological assessment.

4. As described in Biological Assessment 2, restoration and re-vegetation work will be completed for all areas of temporary disturbance. Plant material found in the habitat

specific to that of the disturbed area preferably local source, or material approved by the Caltrans biologist, will be utilized.

5. Project employees will be provided with training and written giudance governing vehicle use when commuting within listed species habitats. A 20-MPH speed limit would be strongly encouraged on unpaved roads within listed species habitats. Cross-country travel by vehicles would be prohibited, unless authorized by the Service or Caltrans biologist.

6. All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed at least once a week from the site.

7. No pets or firearms will be permitted at the construction site to avoid harassment or killing of listed species.

8. Use of rodenticides and herbicides in the project area during construction would be permitted only if it is part of a California Department of Fish and Game or Service approved management plan or unless such use is otherwise approved on a case-by-case basis.

9. All construction pipe, culverts, or similar structures with a diameter of 7.6 centimeters (3 inches) or greater that are stored at the construction site for more than one or more overnight periods will be thoroughly inspected for kit foxes, blunt-nosed leopard lizards, and kangaroo rats before the pipe is subsequently moved, buried, or capped. If during inspection one of these animals is discovered inside a pipe, that section of pipe would not be moved, or wopuld be moved once to remove it from the path of construction, until the animal had escaped.

10. All grindings and asphaltic-concrete waste would be stored within previously disturbed areas and no closer than 45.7 meters (150 feet) from any culvert, wash, pond, or stream crossing.

11. The resident engineer or the resident engineer's designee would be responsible for implementing a number of these mitigation measures and would be the contact for this project.

12. As described in Biological Assessment 2, the priorities in considering site selection for land acquisition for the 1108.59 acres of compensation lands for the adverse effects of the project between the San Luis Obispo County/Kern County line to Interstate 5 are: 1) the proposed mitigation site will be of equal or superior habitat to that of the disturbed habitat; 2) the proposed mitigation site will contain the aspects vital to the continued existence of San Joaquin kit foxes, giant kangaroo rats, Tipton kangaroo rats, blunt-nosed leopard lizards, and San Joaquin ground squirrels; 3) The proposed mitigation site will be of similar habitat type and will attempt to include salt bush scrub, valley and foothill

grasslands, and non-native grasslands; 4) The proposed mitigation site will maintain close geographical connection to disturbed areas. The proposed mitigation site will be natural lands in the vicinity of western Kern County or eastern San Luis Obispo County; 5) The proposed mitigation site will attempt to enhance movement corridors, link natural lands, and protect existing listed species habitat.

13. A Caltrans biologist or other qualified biologist will monitor the construction of the project. This individual will visit the site once each week to assure all construction personnel and activities are in compliance with the Service's biological opinion as well as other permits.

14. According to the EA, final mitigation measures on endangered and threatened species would be mitigated by implementation of the measures specified in each of biological opinions rendered by the Service and the California Department of Fish and Game.

15. According to Biological Assessment 1, impacts to special-status species habitat between Interstate Highway 5 and post mile 37.5 will be compensated for by acquiring land or conservation easements at a 3:1 ratio for permanent impacts and 1.1:1 ratio for temporary impacts. Land acquired will be in kind with the potential to support the special-status species discussed in Biological Assessment 1.

16. All pipe culverts to be extended or replaced will be done so with 24-36 inch pipe culverts. Additionally, Caltrans will evaluate the potential for installing several new culverts to help facilitate the safe crossing of wildlife.

17. As described in Biological Assessment 1, to address the potential cumulative impacts that this project could have on the natural environment, portions of the mitigation funds allotted for this project will go toward the effects of roads on San Joaquin kit foxes study currently being undertaken by Brian Cypher and Endangered Species Recovery Program.

Status of the Species and Environmental Baseline

San Joaquin Kit Fox

The San Joaquin kit fox was listed as endangered on March 11, 1967 (32 **FR** 4001) and listed by the State of California as a threatened species on June 27, 1971. The recovery of the animal is addressed in the recovery plan issued by the Service in 1998. The San Joaquin kit fox is a small canid, with an average body length of 20 inches and weighing about 5 pounds. They are lightly built, with long legs and large ears. Pelage color ranges from tan to buffy gray in the summer to silvery gray in the winter. The belly is whitish and the tail is black-tipped. Kit foxes are active year round, and are primarily nocturnal. The grizzled coloration and black-tipped tail aid in distinguishing the San Joaquin kit fox from the much larger (4-5 kilogram; 9-11 pound) red fox

(*Vulpes vulpes*). Gray foxes (*Urocyon cinereoargenteus*) are similar in coloration to the San Joaquin kit fox, but are heavier (about 3.6 kilograms; 8 pounds) and have a dark stripe running along the top of their tail (Grinnell *et al.* 1937).

In the San Joaquin Valley before 1930, the range of the San Joaquin kit fox extended from southern Kern County north to Tracy, San Joaquin County, on the west side, and near La Grange, Stanislaus County, on the east side (Grinnell *et al.* 1937; U.S. Fish and Wildlife Service 1998). Historically, the animal occurred in several San Joaquin Valley native plant communities. In the southernmost portion of the range, these communities included Valley Sink Scrub, Valley Saltbush Scrub, Upper Sonoran Subshrub Scrub, and Annual Grassland. San Joaquin kit foxes also exhibit a capacity to utilize habitats that have been altered by man. The animals are present in many oil fields, grazed pasture lands, and "wind farms" (Cypher 2000). Kit foxes can inhabit the margins and fallow lands near irrigated row crops, orchards, and vineyards, and may forage occasionally in these agricultural areas (U.S. Fish and Wildlife Service 19998). The San Joaquin kit fox seems to prefer more gentle terrain and decreases in abundance and terrain ruggedness increases (Grinnell *et al.* 1937; Morrell 1972; Warrick and Cypher 19998).

Dens are used by the fox for temperature regulation, shelter from adverse environmental conditions, and escape from predators. Kit foxes excavate their own dens, use those constructed by other animals, and use human-made structures (culverts, abandoned pipelines, and banks in sumps or roadbeds). Kit foxes often change dens and may use many dens throughout the year; however, evidence that a den is being used by kit foxes may be absent. San Joaquin kit fox dens have multiple dens within their home range and individual animals have been reported to use up to 70 different dens (Hall 1983). At the Naval Petroleum Reserve, individual kit foxes used an average of 11.8 dens per year (Koopman *et al.* 1998). Kit foxes are subject to competitive exclusion or predation by other species, such as the non-native red fox, coyote (*Canis latrans),* domestic dog (*Canis familiaris*), bobcat (*Felis rufus*), and large raptors. Den switching by the San Joaquin kit fox may be a function of predator avoidance, local food availability, or external parasite infestations (e.g., fleas) in dens (Egoscue 1956).

The diet of the San Joaquin kit fox varies geographically, seasonally, and annually, based on temporal and spatial variation in abundance of potential prey. In the southern portion of their range, kangaroo rats *(Dipodomys* spp.), pocket mice (*Perognathus* spp.), white-footed mice (*Peromyscus* spp.), and other nocturnal rodents comprise about one-third or more of their diets. Kit foxes also prey on California ground squirrels, black-tailed hares (*Lepus californicus),* San Joaquin antelope squirrels (*Ammospermophilus nelsoni),* desert cottontails (*Sylvilagus audubonii),* ground-nesting birds, and insects.

The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar. Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts, which are quite common in semi-arid, central California. Competition for resources between coyotes and kit foxes may result in kit fox mortalities. Coyote-related injuries accounted for 50-87 per cent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992; Standley *et al.* 1992).

San Joaquin kit foxes are primarily nocturnal, although individuals are occasionally observed resting or playing (mostly pups) near their dens during the day (Grinnell *et al.* 1937). Kit foxes occupy home ranges that vary in size from 4.3-11.6 square kilometers (1.7-4.5 square miles)(White and Ralls 1993). Each home range is usually occupied by a mated pair of kit foxes and their current litter of pups. Other adults, usually offspring from previous litters, also may be present (Koopman *et al.* 2000), but individuals often move independently within their home range (Cypher 2000). Average distances traveled each night range from 9.4-14.6 kilometers (5.8-9.1 miles) and are greatest during the breeding season (Cypher 2000).

Kit foxes maintain core home range areas that are exclusive to mated pairs and their offspring (White and Ralls 1993, Spiegel 1996, White and Garrott 1997). This territorial spacing behavior eventually limits the number of foxes that can inhabit an area owing to shortages of available space and/or per capita prey. Hence, as habitat is fragmented or destroyed, the carrying capacity of an area is reduced and a larger proportion of the population is forced to disperse. Increased dispersal generally leads to lower survival rates and, in turn, decreased abundance because greater 65 percent of dispersing juvenile foxes die within 10 days of leaving their natal range (Koopman *et al.* 2000).

San Joaquin kit foxes usually breed in December and January, and are primarily monogamous. After a gestation of 48-54 days, pups are born during late January-March (Zoellick *et al.* 1987). Mean litter sizes reported for San Joaquin kit foxes include 2.0 on the Carrizo Plain (White and Ralls 1993), 3.0 at Camp Roberts (Spencer *et al.* 1992), 3.7 in the Lokern area (Spiegel and Tom 1996), and 3.8 at the Naval petroleum reserve (Cypher *et al.* 2000). Pups being appearing above ground at about age 3-4 weeks, and are weaned at age 6-8 weeks. Reproductive rates, the proportion of females bearing young, of adult San Joaquin kit foxes vary annually with environmental conditions, particularly food availability. Annual rates range from 0-100%, and reported mean rates include 61% at the Naval Petroleum Reserve (Cypher *et al.* 2000), 64% in the Lokern area (Spiegel and Tom 1996), and 32% at Camp Roberts (Spencer *et al.* 1992). Although some yearling female kit foxes will produce young, most do not reproduce until age 2 years (Spencer et al. 1992; Spiegel and Tom 1996; Cypher *et al.* 2000). Some young of both sexes, but particularly females may delay dispersal, and may assist their parents in raising raisin the following year's litter of pups (Spiegel and Tom 1996)

Juvenile San Joaquin kit foxes begin dispersing as early as June with a peak dispersal occurring in July. The age at dispersal rages from 4-32 months (Cypher 2000). Among juvenile kit foxes surviving to July 1 at the Naval Petroleum Reserve, 49% of the males dispersed from natal home ranges while 24% of the females dispersed (Koopman *et al.* 2000). Among dispersing kit foxes, 87% did so during their first year of age. Most, 65.2%, of the dispersing juveniles at the Naval petroleum reserve died within 10 days of leaving their natal home den (Koopman *et al.* 2000). Some kit foxes delay dispersal and may inherit their natal home range. Dispersal distances of up to 123 kilometers (76.3 miles) have been documented for the San Joaquin kit fox (Scrivner *et al.* 1993).

Mean annual survival rates reported for adult San Joaquin kit foxes include 0.44 at the Naval Petroleum Reserve (Cypher *et al.* 2000), 0.53 at Camp Roberts (Standley *et al.* 1992), 0.56 at the Lokern area (Spiegel ad Disney 1996), and 0.60 on the Carrizo Plain (Ralls and White 1995). However, survival rates widely vary among years (Spiegel and Disney 1996; Cypher *et al.* 2000). Mean survival rates for juvenile San Joaquin kit foxes (<1 year old) are lower than rates for adults. Survival to age 1 year was 0.14 at the Naval Petroleum Reserve (Cypher *et al.* 2000), 0.20 at Camp Roberts (Standley *et al.* 1992), and 0.21 on the Carrizo Plain (Ralls and White 1995). For both adults and juveniles, survival rates of males and females are similar. San Joaquin kit foxes may live to ten years in captivity (McGrew 1979) and 8 years in the wild (Berry et al. 1987), but most kit foxes do not live past 2-3 years of age.

Several species prey upon the San Joaquin kit foxes. Other predators, such as coyotes, bobcats, non-native red foxes, badgers (*Taxidea taxus*), and golden eagles (*Aquila chrysaetos*) will kill kit foxes. Badgers, coyotes, and red foxes also may compete for den sites (U.S. Fish and Wildlife Service 1998).

Since the listing of the San Joaquin kit fox in 1967, several other threats that limit and/or regulate their populations have been identified. These threats are described in further detail in the following paragraphs:

1) Loss of the habitat of the San Joaquin kit fox: Less than 20 percent of the habitat within the historical range of the kit fox remained when the subspecies was listed as federally-endangered in 1967, and there has been a substantial net loss of habitat since that time. Historically, San Joaquin kit foxes occurred throughout California's Central Valley and adjacent foothills. Extensive land conversions in the Central Valley began as early as the mid-1800s with the Arkansas Reclamation Act. By the 1930's, the range of the kit fox had been reduced to the southern and western parts of the San Joaquin Valley (Grinnell *et al.* 1937). The primary factor contributing to this restricted distribution was the conversion of native habitat to irrigated cropland, industrial uses (e.g., hydrocarbon extraction), and urbanization (Laughrin 1970, Jensen 1972; Morrell 1972, 1975). Approximately one-half of the natural communities in the San Joaquin Valley were tilled or developed by 1958 (Service 1980a).

This rate of loss accelerated following the completion of the Central Valley Project and the State Water Project, which diverted and imported new water supplies for irrigated agriculture (Service in litt. 1995a). Approximately 1.97 million acres of habitat, or about 66,000 acres per year, were converted in the San Joaquin region between 1950 and 1980 (California Department of Forestry and Fire Protection 1988). The counties specifically noted as having the highest wildland conversion rates included Kern, Tulare, Kings and Fresno, all of which are occupied by kit foxes. From 1959 to 1969 alone, an estimated 34 percent of natural lands were lost within the then-known kit fox range (Laughrin 1970).

By 1979, only approximately 370,000 acres out of a total of approximately 8.5 million acres on the San Joaquin Valley floor remained as non-developed land (Williams 1985, Service 1980a). Data from the California Department of Fish and Game (1985) and Service file information indicate that between 1977 and 1988, essential habitat for the blunt-nosed leopard lizard (*Gambelia sila*), a species that occupies habitat that is also suitable for kit foxes, declined by about 80 percent – from 311,680 acres to 63,060 acres, an average of about 22,000 acres per year (Biological Opinion for the Interim Water Contract Renewal, Ref. No. 1-1-00-F-0056, February 29, 2000). Virtually all of the documented loss of essential habitat was the result of conversion to irrigated agriculture.

During 1990 to 1996, a gross total of approximately 71,500 acres of habitat were converted to farmland in 30 counties (total area 23.1 million acres) within the Conservation Program Focus area of the Central Valley Project. This figure includes 42,520 acres of grazing land and 28,854 acres of "other" land, which is predominantly comprised of native habitat. During this same time period, approximately 101,700 acres were converted to urban land use within the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998). This figure includes 49,705 acres of farmland, 20,476 acres of grazing land, and 31,366 acres of "other" land, which is predominantly comprised of native habitat. Because these assessments included a substantial portion of the Central Valley and adjacent foothills, they provide the best scientific and commercial information currently available regarding the patterns and trends of land conversion within the kit fox's geographic range. In summary, more than one million acres of suitable habitat for kit foxes have been converted to agricultural, municipal, or industrial uses since the listing of the kit fox. In contrast, less than 500,000 acres have been preserved and/or are subject to community-level conservation efforts designed, at least in part, to further the conservation of the kit fox (Service 1998).

Land conversions contribute to declines in kit fox abundance through direct and indirect mortalities, displacement, reduction of prey populations and denning sites, changes in the distribution and abundance of larger canids that compete with kit foxes for resources, and reductions in carrying capacity. Kit foxes may be buried in their dens during land conversion activities (Knapp and Chesemore 1987; C. Van Horn, Endangered Species Recovery Program, Bakersfield, pers. comm. to S. Jones, Fish and Wildlife Service, Sacramento), or permanently displaced from areas where structures are erected or the land is intensively irrigated (Jensen 1972, Morrell 1975). Furthermore, even moderate fragmentation or loss of habitat may significantly impact the abundance and distribution of kit foxes. Capture rates of kit foxes at the Naval Petroleum Reserve in Elk Hills were negatively associated with the extent of oil-field development after 1987 (Warrick and Cypher 1998). Likewise, the California Energy Commission found that the relative abundance of kit foxes was lower in oil-developed habitat than in nearby undeveloped habitat on the Lokern (Spiegel 1996). Researchers from both studies inferred that the most significant effect of oil development was the lowered carrying capacity for populations of both foxes and their prey species owing to the changes in habitat characteristics or the loss and fragmentation of habitat (Spiegel 1996, Warrick and Cypher 1998).

Dens are essential for the survival and reproduction of kit foxes which use them year-round for shelter and escape, and in the spring for rearing young. Hence, kit foxes generally have dozens of dens scattered throughout their territories. However, land conversion reduces the number of typical, earthen dens available to kit foxes. For example, the average density of typical, earthen kit fox dens at the Naval Hills Petroleum Reserve was negatively correlated with the intensity of petroleum development (Zoellick *et al.* 1987), and almost 20 percent of the dens in developed areas were found to be in well casings, culverts, abandoned pipelines, oil well cellars, or in the banks of sumps or roads (O'Farrell 1983). These results are important because the California Energy Commission found that, even though kit foxes frequently used pipes and culverts as dens in oil-developed areas of western Kern County, only earthen dens were used to birth and wean pups (Spiegel 1996). Similarly, kit foxes in Bakersfield use atypical dens, but have only been found to rear pups in earthen dens (P. Kelly, Endangered Species Recovery Program, Fresno, pers. comm. to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Hence, the fragmentation of habitat and destruction of earthen dens could adversely impact the reproductive success of kit foxes. Furthermore, the destruction of earthen dens may also affect kit fox survival by reducing the number and distribution of escape refuges from predators.

Land conversions and associated human activities can lead to widespread changes in the availability and composition of mammalian prey for kit foxes. For example, oil field disturbances in western Kern County have resulted in shifts in the small mammal community from the primarily granivorous species (e.g., *Dipodomys*) that are the staple prey of kit foxes (Spiegel 1996; Cypher *et al.*, in press), to species adapted to early successional stages and disturbed areas (e.g., California ground squirrels (Spiegel 1996; Cypher *et al.*, in press). Because more than 70 percent of the diets of kit foxes usually consist of abundant leporids (*Lepus*, *Sylvilagus*) and rodents (e. g., *Dipodomys spp.*), and kit foxes often continue to feed on their staple prey during ephemeral periods of prey scarcity, such changes in the availability and/or selection of foraging sites by kit foxes could influence their reproductive rates, which are strongly influenced by food supply and decrease during periods of prey scarcity (White and Garrott 1997, 1999).

Extensive habitat destruction and fragmentation have contributed to smaller, more-isolated populations of kit foxes. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (i.e., random) events such as high variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande, 1988; Frankham and Ralls, 1998; Saccheri *et al.*, 1998). Similarly, isolated populations are more susceptible to extirpation by accidental or natural catastrophes because their recolonization has been hampered. These chance events can adversely affect small, isolated populations with devastating results, as evidenced by the decimation of the sole colony of black-footed ferrets (*Mustela nigripes*) following its infection with canine distemper (May 1986). Extirpation can even occur when the members of a small population are healthy, because whether the population increases or decreases in size is less dependent on the age-specific probabilities of survival and reproduction than on raw chance (sampling probabilities). Owing to the probabilistic nature of extinction, many small populations will eventually lose out and go extinct when faced with these stochastic risks (Caughley and Gunn 1996).

Oil fields in the southern half of the San Joaquin Valley also continue to be an area of expansion and development activity (Sunrise Cogeneration and Power Project Biological Assessment, June 23, 1999). This expansion is reasonably certain to increase in the near future owing to market-driven increases in the price of oil. The cumulative and long-term effects of oil extraction activities on kit fox populations are not fully known, but recent studies indicate that moderate- to high-density oil fields may contribute to a decrease in carrying capacity for kit foxes owing to habitat loss or changes in habitat characteristics (Spiegel 1996, Warrick and Cypher 1998).

In summary, the new infrastructure and increased reserve capacity necessary for continued population growth and development within the Central Valley is currently being provided. There are no limiting factors or regulations that are likely to retard this development or force it to other areas which are already served. Hence, it is reasonably certain that development will continue to destroy and fragment kit fox habitat into the foreseeable future.

2) Competitive Interactions with Other Canids: The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar (White *et al.* 1995, Cypher and Spencer 1998). Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts (which are quite common in semi-arid, central California). Land conversions and associated human activities have led to changes in the distribution and abundance of coyotes, which compete with kit foxes for resources. Coyotes occur in most areas with abundant populations of kit foxes and, during the past few decades, coyote abundance has increased in many areas owing to a decrease in ranching operations, favorable landscape changes, and reduced control efforts (Orloff *et al.* 1986, Cypher and Scrivner 1992, White and Ralls 1993, White *et al.* 1995). Coyotes may attempt to lessen resource competition with kit foxes by killing them. Coyote-related injuries accounted for 50-87 percent of the mortalities of radio-collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992, Standley *et al.* 1992, Ralls and White 1995, Spiegel 1996). Coyote-related deaths of adult foxes appear to be largely additive (i. e., in addition to deaths caused by other mortality factors such as disease and starvation) rather than compensatory (i. e., tending to replace deaths due to other mortality factors; White and Garrott 1997). Hence, the survival rates of adult foxes decrease significantly as the proportion of mortalities caused by coyotes increase (Cypher and Spencer 1998, White and Garrott 1997), and increases in coyote abundance may contribute to significant declines in kit fox abundance (Cypher and Scrivner 1992, Ralls and White 1995; White *et al.* 1996). There is some evidence that the proportion of juvenile foxes killed by coyotes increases as fox density increases (White and Garrott 1999). This density-dependent relationship would provide a feedback mechanism that reduces the amplitude of kit fox population dynamics and keeps foxes at lower densities than they might otherwise attain. In other words, coyote-related mortalities may dampen or prevent fox population growth, and/or accentuate, hasten, or prolong population declines.

Land-use changes also contributed to the expansion of nonnative red foxes into areas inhabited by kit foxes. Historically, the geographic range of the red fox did not overlap with that of the San Joaquin kit fox. By the 1970's, however, introduced and escaped red foxes had established breeding populations in many areas inhabited by San Joaquin kit foxes (Lewis *et al.* 1993). The larger and more aggressive red foxes are known to kill kit foxes (Ralls and White 1995), and could displace them, as has been observed in the arctic when red foxes expanded into the ranges of smaller arctic foxes (Hersteinsson and Macdonald 1992). The increased abundance and distribution of nonnative red foxes will also likely adversely impact the status of kit foxes because they are closer morphologically and taxonomically, and would likely have higher dietary overlap than coyotes; potentially resulting in more intense competition for resources. Two documented deaths of kit foxes due to red foxes have been reported (Ralls and White 1995), and red foxes appear to be displacing kit foxes in the northwestern part of their range (Lewis *et al.* 1993). At Camp Roberts, red foxes have usurped several dens that were used by kit foxes during previous years (California Army National Guard, Camp Roberts Environmental Office, unpubl. data). In fact, opportunistic observations of red foxes in the cantonment area of Camp Roberts have increased 5-fold since 1993, and no kit foxes have been sighted or captured in this area since October 1997. Also, a telemetry study of sympatric red foxes and kit foxes in the Lost Hills area has detected spatial segregation between these species, suggesting that kit foxes may avoid or be excluded from red fox-inhabited areas (P. Kelly, Endangered Species Recovery Program, Fresno, pers. comm. to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Such avoidance would limit the resources available to local populations of kit foxes and possibly result in decreased fox abundance and distribution.

3) Disease: Wildlife diseases do not appear to be a primary mortality factor that consistently limits kit fox populations throughout their range (McCue and O'Farrell, 1988, Standley and McCue 1992, Miller *et al.* 1998). However, central California has a high incidence of wildlife rabies cases (Schultz and Barrett 1991), and high seroprevalences of canine distemper virus and canine parvovirus indicate that kit fox populations have been exposed to these diseases (McCue and O'Farrell, 1988; Standley and McCue 1992, Miller *et al.* 1998). Hence, disease outbreaks could potentially cause substantial mortality or contribute to reduced fertility in seropositive females, as was noted in closely-related swift foxes (*Vulpes velox*)(Miller *et al.* 1998). For example, there are some indications that rabies virus may have contributed to a catastrophic decrease in kit fox abundance at Camp Roberts, San Luis Obispo County, California, during the early 1990's. San Luis Obispo County had the highest incidence of wildlife rabies cases in California during 1989 to 1991, and striped skunks (*Mephitis mephitis*) were the primary vector (Barrett 1990, Schultz and Barrett 1991, Reilly and Mangiamele 1992). A rabid skunk was trapped at Camp Roberts during 1989 and two foxes were found dead due to rabies in 1990 (Standley *et al.* 1992). Captures of kit foxes during annual livetrapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. Captures of kit foxes were positively correlated with captures of skunks during 1988 to 1997; suggesting that some factor(s) such as rabies virus was contributing to concurrent decreases in the abundances of these species. Also, captures of kit foxes at Camp Roberts were negatively correlated with the proportion of skunks that were rabid when trapped by County Public Health Department personnel two years

previously. These data suggest that a rabies outbreak may have occurred in the skunk population and spread into the fox population. A similar time lag in disease transmission and subsequent population reductions was observed in Ontario, Canada, although in this instance the transmission was from red foxes to striped skunks (Macdonald and Voigt 1985).

4) Pesticides and rodenticides: Pesticides and rodenticides pose a threat to kit foxes through direct or secondary poisoning. Kit foxes may be killed if they ingest rodenticide in a bait application, or if they eat a rodent that has consumed the bait. Even sublethal doses of rodenticides may lead to the death of these animals by impairing their ability to escape predators or find food. Pesticides and rodenticides may also indirectly affect the survival of kit foxes by reducing the abundances of their staple prey species. For example, the California ground squirrel (*Spermophilus beecheyi*), which is the staple prey of kit foxes in the northern portion of their range, was thought to have been eliminated from Contra Costa County in 1975, after extensive rodent eradication programs. Field observations indicated that the long-term use of ground squirrel poisons in this county severely reduced kit fox abundance through secondary poisoning and the suppression of populations of its staple prey (Orloff *et al.* 1986).

Kit foxes occupying habitats adjacent to agricultural lands are also likely to come into contact with insecticides applied to crops owing to runoff or aerial drift. Kit foxes could be affected through direct contact with sprays and treated soils, or through consumption of contaminated prey. Data from the California Department of Pesticide Regulation indicate that acephate, aldicarb, azinphos methyl, bendiocarb, carbofuran, chlorpyrifos, endosulfan, s-fenvalerate, naled, parathion, permethrin, phorate, and trifluralin are used within one mile of kit fox habitat. A wide variety of crops (alfalfa, almonds, apples, apricots, asparagus, avocados, barley, beans, beets, bok choy, broccoli, cantaloupe, carrots, cauliflower, celery, cherries, chestnuts, chicory, Chinese cabbage, Chinese greens, Chinese radish, collards, corn, cotton, cucumbers, eggplants, endive, figs, garlic, grapefruit, grapes, hay, kale, kiwi fruit, kohlrabi, leeks, lemons, lettuce, melons, mustard, nectarines, oats, okra, olives, onions, oranges, parsley, parsnips, peaches, peanuts, pears, peas, pecans, peppers, persimmons, pimentos, pistachios, plums, pomegranates, potatoes, prunes, pumpkins, quinces, radishes, raspberries, rice, safflower, sorghum, spinach, squash, strawberries, sugar beets, sweet potatoes, Swiss chard, tomatoes, walnuts, watermelons, and wheat), as well as buildings, Christmas tree plantations, commercial/industrial areas, greenhouses, nurseries, landscape maintenance, ornamental turf, rangeland, rights of way, and uncultivated agricultural and non-agricultural land, occur in close proximity to San Joaquin kit fox habitat.

Efforts have been underway to reduce the risk of rodenticides to kit foxes (Service in litt. 1993). The Federal government began controlling the use of rodenticides in 1972 with a ban of Compound 1080 on Federal lands pursuant to Executive Order. Above-ground application of strychnine within the geographic ranges of listed species was prohibited in 1988. A July 28, 1992, biological opinion regarding the Animal Damage Control (now known as Wildlife Services) Program by the U.S. Department of Agriculture found that this program was likely to jeopardize the continued existence of the kit fox owing to the potential for rodent control activities to take the fox. As a result, several reasonable and prudent measures were implemented, including a ban on the use of M-44 devices, toxicants, and fumigants within the recognized occupied range of the kit fox. Also, the only chemical authorized for use by Wildlife Services within the occupied range of the kit fox was zinc phosphide, a compound known to be minimally toxic to kit foxes (Service 1992).

Despite these efforts, the use of other pesticides and rodenticides still pose a significant threat to the kit fox, as evidenced by the death of 2 kit foxes at Camp Roberts in 1992 owing to secondary poisoning from chlorophacinone applied as a rodenticide, (Berry *et al.* 1992, Standley *et al.* 1992). Also, the livers of 3 foxes that were recovered in the City of Bakersfield during 1999 were found to contain detectable residues of the anticoagulant rodenticides chlorophacinone, brodifacoum, and bromadiolone (California Department of Fish and Game 1999).

To date, no specific research has been conducted on the effects of different pesticide or rodent control programs on the kit fox (Service 1998). This lack of information is problematic because Williams (in litt., 1989) documented widespread pesticide use in known kit fox and Fresno kangaroo rat (*Dipodomys nitratoides exilis*) habitat adjoining agricultural lands in Madera County. In a separate report, Williams (in litt., 1989) documented another case of pesticide use near Raisin City, Fresno County, where treated grain was placed within an active Fresno kangaroo rat precinct. Also, farmers have been allowed to place bait on Reclamation property to maximize the potential for killing rodents before they entered adjoining fields (Biological Opinion for the Interim Water Contract Renewal, Ref. No. 1-1-00-F-0056, February 29, 2000). A September 22, 1993, biological opinion with Environmental Protection Agency ("EPA") regarding the regulation of pesticide use (31 registered chemicals) through administration of the Federal Insecticide, Fungicide, and Rodenticide Act found that use of the following chemicals would likely jeopardize the continued existence of the kit fox: 1) aluminum and magnesium phosphide fumigants, 2) chlorophacinone anticoagulants, 3) diphacinone anticoagulants, 4) pival anticoagulants, 5) potassium nitrate and sodium nitrate gas cartridges, and 6) sodium cyanide capsules (Service 1993). Reasonable and prudent alternatives to avoid jeopardy included restricting the use of aluminum/magnesium phosphide, potassium/sodium nitrate within the geographic range of the kit fox to qualified individuals, and prohibiting the use of chlorophacinone, diphacinone, pival, and sodium cyanide within the geographic range of the kit fox, with certain exceptions (e.g., agricultural areas that are greater than 1 mile from any kit fox habitat). (1999 National Pesticide Consultation with EPA) However, the EPA's position on the use of rodenticides within the geographic range of the kit fox is that rodent control compounds will have no adverse effects on the kit fox provided that EPA registered compounds are applied with strict observance of EPA approved label restrictions (April 11, 2000, personal communication from L. Turner, EPA, Washington, D.C., to V. Campbell, Service, Sacramento, California). Even the minimal evidence provided above tends to refute this position.

5) <u>Section 9 Violations and Noncompliance with the Terms and Conditions of Existing Biological Opinions</u>: The intentional or unintentional destruction of areas occupied by kit foxes is an issue of serious concern. Section 9 of the Act prohibits the "take" (e.g., harm, harass, pursue, injure, kill) of federally-listed wildlife species. "Harm" (i.e., "take") is further defined to

include habitat modification or degradation that kills or injures wildlife by impairing essential behavioral patterns including breeding, feeding, or sheltering. Congress established two provisions (sections 7 and 10) that allow for the "incidental take" of listed species of wildlife by Federal agencies, non-Federal government agencies, and private interests. Incidental take is defined as "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." Such take requires a permit from the Secretary of the Interior that anticipates a specific level of take for each listed species. If no permit is obtained for the incidental take of listed species, the individuals or entities responsible for these actions could be liable under the enforcement provisions of section 9 of the Act if any unauthorized take occurs. There are numerous examples of potential section 9 violations and noncompliance with the terms and conditions of existing biological opinions.

6) Risk of Chance Extinction Owing to Small Population Size, Isolation, and High Natural Fluctuations in Abundance: Historically, kit foxes may have existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Today's populations exist in an environment drastically different from the historic one, however, and extensive habitat fragmentation will result in geographic isolation (e.g. loss of movement corridors), smaller population sizes, and reduced genetic exchange among populations; all of which increase the vulnerability of kit fox populations to extirpation. Populations of kit foxes are extremely susceptible to the risks associated with small population size and isolation because they are characterized by marked instability in population density. For example, the relative abundance of kit foxes at the Naval Petroleum Reserves, California, decreased 10-fold during 1981 to 1983, increased 7-fold during 1991 to 1994, and then decreased 2-fold during 1995 (Cypher and Scrivner 1992, Cypher and Spencer 1998).

Many populations of kit fox are at risk of chance extinction owing to small population size and isolation. This risk has been prominently illustrated during recent, drastic declines in the populations of kit foxes at Camp Roberts and Fort Hunter Liggett. Captures of kit foxes during annual livetrapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. This decrease continued through 1997 when only three kit foxes were captured (White *et al.* 2000). A similar decrease in kit fox abundance occurred at nearby (approximately 20 km) Fort Hunter Liggett, and only 2 kit foxes have been observed on this installation since 1995 (L. Clark, Wildlife Biologist, Fort Hunter Liggett, pers. comm. to P. White, Fish and Wildlife Service, Sacramento, February 15, 2000). It is unlikely that the current low abundances of kit foxes at Camp Roberts and Fort Hunter Liggett will increase substantially in the near future owing to the limited potential for recruitment. The chance of substantial immigration is low because the nearest core population on the Carrizo Plain is distant (greater than 80 km) and separated from these installations by barriers to fox movement such as roads, developments, and irrigated agricultural areas. Also, there is a relatively high abundance of sympatric predators and competitors on these installations that contribute to low survival rates for kit foxes and, as a result, may limit population growth (White *et al.* 2000). Hence, these populations may be on the verge of extinction.

The destruction and fragmentation of habitat could also eventually lead to reduced genetic variation in populations of kit foxes that are small and geographically isolated. Historically, kit foxes likely existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Preliminary genetic assessments indicate that historic gene flow among populations was quite high, with effective dispersal rates of at least one to 4 dispersers per generation (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. White, Fish and Wildlife Service, Sacramento, California). This level of genetic dispersal should allow for local adaptation while preventing the loss of any rare alleles. Based on these results, it is likely that northern populations of kit foxes were once panmictic (i.e., randomly mating in a genetic sense), or nearly so, with southern populations. In other words, there were no major barriers to dispersal among populations. Current levels of gene flow also appear to be adequate, however, extensive habitat loss and fragmentation continues to form more or less geographically distinct populations of foxes, which could potentially reduce genetic exchange among them. An increase in inbreeding and the loss of genetic variation could increase the extinction risk for small, isolated populations of kit foxes by interacting with demography to reduce fecundity, juvenile survival, and lifespan (Lande 1988, Frankham and Ralls 1998, Saccheri *et al.* 1998). One area of particular concern is Santa Nella in western Merced County where pending development plans threaten to eliminate the little suitable habitat that remains and provides a dispersal corridor for kit foxes between the northern and southern portions of their range. Preliminary estimates of expected heterozygosity from foxes in this area indicate that this population may already have reduced genetic variation. Other populations that may be showing the initial signs of genetic isolation are the Lost Hills area and populations in the Salinas-Pajaro River watershed (i.e., Camp Roberts and Fort Hunter Liggett). Preliminary estimates of the mean number of alleles per locus from foxes in these populations indicate that allelic diversity is lower than expected. Although these results may, in part, be due to the small number of foxes sampled in these areas, they may also be indicative of an increase in the amount of inbreeding due to population subdivision (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. J. White, Fish and Wildlife Service, Sacramento, California). Further sampling and analyses are necessary to adequately assess the effects of these potential genetic bottlenecks.

Arid systems are characterized by unpredictable fluctuations in precipitation, which lead to high frequency, high amplitude fluctuations in the abundance of mammalian prey for kit foxes (Williams and Germano 1992, Goldingay *et al.* 1997, White and Garrott 1999, Cypher *et al.* 1992). Because the reproductive and neonatal survival rates of kit foxes are strongly depressed at low prey densities (White and Ralls 1993; White and Garrott 1997, 1999), periods of prey scarcity owing to drought or excessive rain events can contribute to population crashes and marked instability in the abundance and distribution of kit foxes (White and Garrott 1999). In other words, unpredictable, short-term fluctuations in precipitation and, in turn, prey abundance can generate frequent, rapid decreases in kit fox density that increase the extinction risk for small, isolated populations.

There are several recent sightings of San Joaquin kit foxes within 1 mile of the project site (CNDDB 2003). Twenty-one individuals were observed along State Route 46 between the Kern

County/San Luis Obispo County line and the State Route 33/State Route 46 interchange during the surveys that were conducted by a Caltrans biologist between July 24, 2000 and August 3, 2000 (Biological Assessment 2; David Armes, pers. comm. to C. Nagano and Brian Petersen, June 13, 2003). In addition, San Joaquin kit foxes may move 9 miles or more in a single night (Service 1998). Suitable habitat is found in and adjacent to the proposed project. Areas of suitable habitat exist within the project footprint in the form of scrub, ruderal grasslands and agricultural lands. Therefore, the Service believes that the San Joaquin kit fox is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the project, as well as the recent observations of this listed species.

Giant Kangaroo Rat

The giant kangaroo rat was listed as endangered by the Service in 1987 (Federal Register 52:283-288) and by the State of California in 1980. In 1998 a recovery plan for San Joaquin Valley arid upland and riparian terrestrial species was issued that includes the giant kangaroo rat (Service 1998). The giant kangaroo rat is distinguishable from the sympatric San Joaquin kangaroo rat (*Dipodomys nitrtoides*) by size and the number of toes on the hind feet. The hind feet of adult giant kangaroo rats each have five toes and are longer than 47 millimeters (1.85 inches) (Best 1993). The giant kangaroo rat is the largest of more than 20 species in the genus (Best 1993; Grinnell 1922; Hall 1981).

Up to the 1950s colonies of the giant kangaroo rat were spread over hundreds of thousands of acres of continuous habitat in the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley (Grinnell 1932a; Shaw 1934; Hawbecker 1944, 1951). The historical distribution of giant kangaroo rats encompassed a narrow band of gently sloping ground along the western edge of the San Joaquin Valley from the base of the Tehachapi Mountains in the south to a point 16 kilometers (10 miles) south of Los Banos in Merced County in the north (Service 1998). Within this geographic range that was about 701,916 to 755,844 hectares (1,734,465 to 1,867,723 acres), which included different estimates of the amount of nonhabitat depending on various assumptions. The most liberal estimate of historical habitat is 631,724 hectares (1,561,017 acres)(Williams 1992).

The giant kangaroo rat is currently fragmented into six major geographic units: 1) the Panoches region in western Fresno and eastern San Benito counties; 2) Kettleman Hills in Kings County; 3) San Juan Creek Valley in San Luis Obispo County; 4) the Lokern, Elk Hills, McKittrick, Taft and Maricopa areas in western Kern County; 5) Carrizo Plain Natural Area in eastern San Luis Obispo County; and 6) Cuyama Valley in Santa Barbara and San Luis Obispo counties (Williams 1980; O'Farrell *et al.* 1987a; Williams *et al.* 1995). The major units are fragmented into more than 100 smaller populations, many of whom are isolated by several miles of barriers such as steep terrain, with plant communities that are unsuitable as habitat, agriculture, industrial, or urban lands. Extant habitat is estimated to be 11,145 hectares (27,540 acres), which is about 1.8 percent of historical habitat (Williams 1992).

Historically, giant kangaroo rats were believed to inhabit annual grassland communities with few or no shrubs, well-drained sandy loam soils located on gentle slopes (less than 11 percent) in areas with about 16 centimeters (6.3 inches) or less of annual precipitation, and free from flooding in winter (Grinnell 1932a; Shgaw 1934; Hawbecker 1951). However, more recent studies in the remaining fragments of historical habitat found that the species inhabits both grassland and shrub communities on a variety of soil types, on slopes up to about 22 percent, and up to 868 meters (2,850 feet) above sea level. This broader concept of habitat requirements probably reflects the fact that most remaining populations are on poorer and marginal habitats com pared to the habitats of the large, historical populations that existed in areas that are now no longer suitable for the animals. Yet, these studies demonstrate that the preferred habitat of the giant kangaroo rat still was annual grassland communities on gentle slopes of generally less than 10 percent, with friable, sandy-loam soils. Few plots in flat areas were inhabited, probably because of periodic flooding during heavy rainfall (Williams 1992; Williams *et al.* 1995).

Below 400 meters (1,300 feet) at Panoche Creek in western Fresno County and in the Lokern, Buena Vista Valley, and Elk Hills regions of the southern San Joaquin Valley, giant kangaroo rats are found in annual grassland and saltbrush scrub. Scattered common saltbush (*Atriplex polycara*) and spiny saltbush (*Atriplex spinifera*) characterize areas where giant kangaroo rats are associated with shrubs. The most common herbaceous plants are red brome (*Bromus madritensis* ssp. *rubens*), annual fescue (*Vulpia microstachys*), and red-stemmed filaree(Erodium cicutarium) (Williams 1992).

Upper Sonoran subscrub associations support relatively large populations of giant kangaroo rats at elevations above about 400 meters. In the southern portion of the extant geographic range of giant kangaroo rats, these communities are characterised by open stands of the dominant shrub, California ephredra (*Ephedra californica*). Annual grasses and forbs, particularly red-stemmed filaree, peppergrass (*Lepidium nitidium*), and Arabian grass (*Schismus arabicus*) dominate areas between shrubs. Giant kangaroo rats are most numerous where annual grasses and forbs predominate, with scattered California ephedra and fewer shrubs, such as Anderson desert thorn (*Lysium andersonii*) eastwoodia (*Eastwoodia elegans*), and pale-leaf goldenbush (*Isocoma acradenia* var. *bracteosa*) (Williams 1992).

Within the area currently occupied by the giant kangaroo rat, populations of the animal have expanded and declined with changing weather patterns since 1979. At their peak in 1992 to 1993, there probably were about 6 to 10 times more individuals than there were at their low point in the spring of 1991 when a majority of the 11,145 hectares (27,540 acres) probably was uninhabited by the animals and most of the rest of the range was inhabited by less than 10 percent of peak numbers (Williams 1992; Williams *et al.* 1993b, 1995) .

Giant kangarro rats are primarily seed eaters, but they also feed on green plants and insects. They cut the ripening heads of grasses and forbs and then cure them in small surface pits located on the area over their burrow system (Shaw 1934; Williams *et al.* 1993b). They also gather individual seeds scattered over the ground's surface and mixed in the upper layer of the soil. Surface pits are uniform in diameter and depth (about 2.5 centimeters, or 1 inch), placed vertically in form soil, and filled with seed pods. After placing seeds and seed heads in pits, the animal covers them with a layer of loose, dry dirt. Pits are filled with the contents of the cheek pouches after a single trip to harvest seeds. Before being moved undergroun, the seeds, including filaree and peppergrass, are sun-dried which prevents molding (Shaw 1934).

Giant kangaroo rats forage on the surface from around sunset to near sunrise, though most activity takes place in the first 2 hours after dark. Foraging activity is greatest in the spring as the seeds of annual plants are ripening. Typically, plants, such as peppergrass, ripen first, early caches, mostly in pits instead of stacks, consist of pieces of the seed-bearing stalks of this and other early-ripening species. The ability to transport large quantities of seeds and other food in cheek pouches and their highly developed caching behaviors, coupled with relatively high longevity of adults with established burrow systems, probably allow giant kangaroo rats to survive severe droughts for 1 or 2 years without substantial risk of extirpation (Williams *et al.* 1993b).

Results of studies conducted between 1987 and 1995 in colonies on the Elkhorn Plain and Carrizo Plain indicate that giant kangaroo rats have an adaptable reproductive pattern that is affected by both population density and availability of food. During times of high density, females have a short, winter reproductive season with only one litter produced and there is no breeding by young-of-the-year. This occurred in years of high plant productivity and drought. In contrast, populations at low densities continued to breed into summer during drought. In 1990, a year of severe drought and no seed production, most females appeared to not reproduce; the few that bred apparently failed to successfully raise young. In most years, females were reproductive between December and March or April, but in colonies with low densities, reproduction extended into August or September (Williams *et al.* 1993b).

Estimated home range size range of the giant kangaroo rat from about 60 to 350 square meters (71.8 to 418.6 square yards). There is no significant differences in size of home range between sexes. The core area of the territory, located over the burrow system, or precinct, is the most intensely used location in the home range (Braun 1985). Grinnell (1932a) and Shaw (1934) suggested that territories were occupied by a single animal. More recent studies indicated that multiple individuals may live in precincts. These appeared to be family groups of females and offspring of different ages (Randall 1997).

Estimates of density, employing both trapping and counts of preceincts ranged from 1 animal to 110 animals per hectare (1 to 44 animals per acre)(Grinnell 1932a; Braun 1985; Williams 1992). Changes in density generally coincide with the amount of rainfall and herbaceous plant productivity, though numbers in populations studied in 1989 remained high despite drought and low plant productivity. Large seed caches made in spring 1988 probably carried individuals through 1989 and 1990 during drought (Williams *et al.* 1993b).

The partial results of on-going studies of the population genetics of giant kangaroo rats indicate that northern populations of the species in Fresno and San Benito counties are highly differentiated genetically from the southern populations on the Carrizo Plain. The San Joaquin Valley population is genetically closer the Carrizo Plain population than any of the semi-isolated northern populations. The genetic structure of giant kangaroo rat populations shows that the effective dispersal distanc of the species (e.g. dispersal of genes) is much greater than predicted on the basis of capture-mark-recapture and behavioral studies. Results from trapping show most movements are less than 100 meters (330 feet) and rarely as much as 1 kilometer (0.62 mile)(Jones 1988, 1989). However, the genetic data suggest that effective distances are several times greater than 1 kilometer. There are too few data, and analyses are currently incomplete to make a precise estimate, but they do suggest that effective dispersal over several kilometers and through highly inhospitable habitat.

Since the giant kangaroo rats was listed as an endangered species in 1987, conversion of the animal's habitat has substantially slowed, because most tillable land had already been cultivated and due to a lack of water for irrigation. However, urban and industrial developments, petroleum and mineral exploration and extraction, new energy and water conveyance facilities, construction of communication facilities, and highway construction continues to destroy habitat for the giant kangaroo rat, and increase the threats to the species by reducing and further fragmenting populations. Though some of these recent and future losses will be mitigated for by protecting habitat located elsewhere, they still result in habitat loss for this imperilled rodent.

There are a number of records of the giant kangaroo rat to the north of the action area in Kings County, and south of the action area in the San Juan Creek Valley and west of Lokern (Service 1998). Suitable habitat is found in and adjacent to the action area in the form of annual grassland and scrub plant communities. No giant kangaroo rats were observed by Caltrans during surveys that were conducted at unknown date(s) and time(s) and whose specific methodology also was not described in the documents they have provided to the Service, however, they have proposed to mitigate for effects on the species resulting from the State Route 46 project (Biological Assessment 1). Under normal circumstances, the Service would recommend to Caltrans that additional information, including the results of specific surveys for this species, be provided for us to review prior to initiation of formal consultation as stated in the regulations at 50 CFR 402.14. However, the Service has assumed the presence of the giant kangaroo rat in the action area of the State Route 46 project given the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the project, as well as the observations of this listed species to the north and south of the action area. but especially because of Caltrans' request for an expedited biological opinion, as described in their September 5 and 16, 2003, electronic mail messages to the Service, and their September 18, 2003, telephone message to the Service.

<u>Tipton Kangaroo Rat</u>

The Tipton kangaroo rat was listed as endangered by the Service in 1988 (53 **FR** 25608) and by the State of California in 1989. In 1998 a recovery plan for San Joaquin Valley arid upland and riparian terrestrial species was drafted which includes the Tipton kangaroo rat (Service 1998). The Tipton kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat; it is morphologically distinguished by being larger than the Fresno kangaroo rat (*Dipodomys nitratoides exilis*) and smaller than the short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*).

The historic geographic distribution of the Tipton kangaroo rat was estimated to cover approximately 695,174 hectares (1,716,480 acres)(Williams 1985). Tipton kangaroo rats were distributed within an area on the floor of the Tulare Basin, extending from approximately the southern margins of Tulare Lake on the north, eastward and southward approximately along the eastern edge of the Valley floor in Tulare and Kern counties, and the southern and western extent of their range was the foothills of the Tehachapi Mountains and the marshes and open waters of Kern and Buena Vista lakes, and along the Buena Vista Slough of the Kern River channel into Goose Lake. The approximate line on the northwest is marked by the Town of Lost Hills in Kern County, Kettlemen City in Kings County, and Westhaven in Fresno County. Prior to the development of Water-diversion and irrigation systems over the pat several decades, this area bounded three large lakes, Tulare, Kern, and Buena Vista, together with marshlands that were unsuitable habitat for the Tipton kangaroo rat (Boolootian 1954; Hoffman 1974; Hafner 1979; Williams *et al.* 1993; Williams 1985).

By July 1985, the area inhabited by the Tipton kangaroo rat had been reduced, primarily by cultivation and urbanization, to about 25,000 hectares (63,000 acres), only about 3.7 percent of its historical range. Additional small parcels not surveyed by Williams (1985) have been since found to be inhabited. Tipton kangaroo rats also have reinhabited several hundred to a few thousand acres that were in crop production in 1985, but have since been retired because of drainage problems, lack of water, or acquired by State and Federal agencies for threatened and endangered species conservation.

Current occurrences are limited to scattered, isolated areas clustered west of Tipton, Pixley, and Earlimart, around Pixley National Wildlife Refuge, Allensworth Ecological Reserve, and Allensworth State Historical Park, in Tulare County; between the Kern National Wildlife Refuge, Delano, and in natural land surrounding Lamont (southeast of Bakerfield), Coles Levee Ecosystem Preserve; Lost Hills area, and other scattered areas in Kern County (Service 1998).

Tipton kangaroo rats collect and carry seeds in fur-lined cheek pouches. Seeds are a staple in their diet, but they also eat small amounts of green, herbaceous vegetation and insects. Known foods include seeds of annual and perennial grasses, particularly wild oats, red brome grass, ripgut (*Bromus diandrus*), soft chess grass (*Bromus hordeaceus*), wild barley (*Hordeum* species), mouse-tail fescue, alkali sacaton, saltgrass; seeds of annual forbs, including filaree, peppergrass, common spikeweed (*Hemizonia pungens*) and shepherd's purse (*Capsella bursa-pastoris*) (Service 1998). Seeds of the woody and semiwoody shrubs, such as iodine bush (*Allenrolfea occidentalis*) and seepweed (*Sueda moquinii*) also are eaten by Tipton kangaroo rat (Service 1998). Most kangaroo rats gather seeds when they are available and cache them for consumption later. Typically, caches are made in small pits that hold the contents of the two cheek pouches. Caches are located on the surface of the soil and are often scattered over the home range of the individual.

Most female Tipton kangaroo rats appear to have only a single litter, though some adult females have two or more, and females born early in the year also may breed. Eisenberg (1963) and Eisenberg and Issac (1963) described mating behavior and care of young in a captive colony of short-nosed kangaroo rats. Mating probably takes place on the surface within the territory of the female. Young are born in the burrow, probably within a nest of shredded, dry vegetation. Young remain continuously in the burrow until they are fully furred and able to easily move about. Culbertson (1946) believed that young Fresno kangaroo rats were not found out of the burrow and foraging for themselves until about 6 weeks old. This is consistent with estimates for the Tipton kangaroo rat (Service 1998).

Tipton kangaroo rat burrow systems are located in open areas; only in areas of dense shrub cover are burrows usually located beneath shrubs. Burrows are typically simple, but may include interconnecting tunnels. Most burrows are less than 10 inches deep. Burrows of Tipton kangaroo rats are commonly located in slightly elevated mounds, the berms of roads, canal embankments, railroad beds, and bases of shrubs and fences where wind-blown soils accumulate above the level of surrounding terrain. Areas with standing water during portions of winter and spring (vernal pools) become alkaline playas when the water has evaporated allowing Tipton kangaroo rats to recolonize these areas, even though alkaline water lies close to the surface of the soil during the entire year. Presumably, during flooding, individuals are either drowned or captured by predators after being forced from burrows, or escape to higher ground (Williams 1985).

Although Tipton kangaroo rats occur in terrace grasslands devoid of woody shrubs, sparse to moderate shrub cover is associated with populations of high density. Typically, however, burrow systems are located in open areas; only in areas of dense cover are burrows usually located beneath shrubs. Terrain not subject to flooding is important for permanent occupancy by Tipton kangaroo rats. Burrows of Tipton kangaroo rats are commonly located in slightly elevated mounds, the berms of roads, canal embankments, railroad beds, and bases of shrubs and fences where windblown soils accumulate above the level of surrounding terrain. Soft soils such as fine sands and sandy loams, and powdery soils of finer texture and of higher salinity are generally associated with greater densities of Tipton kangaroo rats than are less saline and alkaline, sandy - loam, loam, and clay-loam soils of portions of the eastern margins of their geographic range, supporting terrace grasslands. This may relate to how crumbly the soils are, the type of plant communities they support, or both (Williams 1985).

Tipton kangaroo rats are nocturnal and active year round. They do not hibernate and can not recover unaided from hypothermia. Tappe (1941) reported seeing Tipton kangaroo rats emerge from their burrows and begin above-ground activities as early as seven minutes before sunset in early spring. Other kangaroo rats in the San Joaquin Valley are sometimes seen above ground by day in March and April (Service 1998), but this is considered to be rare and a deviation from the typical nocturnal activity.

Density estimates range from 2.8 to 3.6 animals per acre. Habitat type and climatic conditions appear to play a role in density. After the end of a 5.5 year drought in April 1991, populations irrupted, peaking in January 1993. In April 1995, following a higher than average rainfall year, the populations declined. During and following the 1994-1995 winter, biologists noted a decline in abundance of kangaroo rats in the southern San Joaquin Valley. Lower than expected trapping results, and decreased sign of activity were observed at several dispersed sites. Dramatic declines were noted for short-nosed, Tipton, and Heermann's kangaroo rats (*Dipodomys heermani*), although only modest reductions were noted for giant kangaroo rat populations on the valley floor (Single et al. 1996).

The construction of dams and canals that made a dependable supply of water available, which allowed the cultivation of the alkaline soils of the saltbush and valley sink scrub and relictual dune communities, was principally responsible for the decline and endangerment of the Tipton kangaroo rat. Widespread, unrestricted use of rodenticides to control California ground squirrels probably contributed to the decline or extirpation of small populations. Urban and industrial development and petroleum extraction all have contributed to habitat destruction. Except for small, isolated populations, predation is unlikely to threaten Tipton kangaroo rats. The increasing fragmentation of the range of Tipton kangaroo rats, however, increases the vulnerability of small populations to predation. Current threats of habitat destruction or modifications come from industrial and agriculturally-related developments, cultivation, and urbanization, and secondarily from flooding.

There are a number of records of the Tipton kangaroo rat in the immediate vicinity of State Route 46 from the Lost Hills area to approximately 10 miles east of Interstate 5 (Biological Assessment 1; Service 1998). Suitable habitat is found in and adjacent to the action area. Areas of suitable habitat exist within the project footprint. Therefore, the Service believes that the Tipton kangaroo is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the project, as well as the observations of this listed species.

<u>Buena Vista Lake Shrew</u>

The Buena Vista Lake shrew is one of nine subspecies of ornate shrew, eight of which are known to occur in California (Hall 1981; Owen and Hoffmann 1983; Maldonado 1992; Wilson and Reeder 1993). Shrews are primarily insectivorous mammals about the size of a mouse. The Buena Vista Lake shrew's back is predominantly black with a buffy-brown speckling pattern, its sides are more buffy-brown than the upper surface, and its underside is smoke-gray (Grinnell 1932). The tail is faintly bicolor and blackens toward the end. The Buena Vista Lake shrew weighs approximately 4 grams (0.14 ounces) and has a total length ranging from 98 to 105 millimeters (mm) (3.85 to 4.13 inches (in)) with a tail length of 35 to 39 mm (1.38 to 1.54 in) (Grinnell 1932).

Shrews are active during the day and night but are rarely seen due to their small size and cryptic behavior. A few species of shrews can enter a daily state of inactivity (torpor) under extreme environmental conditions (Ingles 1965; Churchfield 1990), such as very low ambient temperatures. Shrews do not hibernate. Shrews have a high rate of metabolism because of their small size (Newman and Rudd 1978; McNab 1991). They lose heat rapidly from the surface of their small bodies, and are continually faced with the problem of getting enough food to maintain their body temperatures, especially in cold conditions (Aitchison 1987; Genoud 1988). 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). They are also known to consume spiders, centipedes, slugs, snails, and earthworms (Jamerson and Peeters 1988) on a seasonally available basis (Aitchison 1987).

Little is known about the reproduction or longevity of Buena Vista Lake shrews. Shrews, on the average, rarely live more than 12 months, and each generation is largely replaced annually (Rudd 1955b). For Buena Vista Lake shrews, the breeding season begins in February or March, and ends with the onset of the dry season in May or June, or may extend later in the year, based on habitat quality and availability of water. It is likely that this subspecies, like other long-tailed shrews, can give birth to two litters of four to six young each per year; the number of litters is usually dependent on how early or late in the year the young are born, and how soon they become sexually active (Rudd 1955b; Owen and Hoffmann 1983).

Buena Vista Lake shrews prefer moist habitat that has a diversity of terrestrial and aquatic insect prey (Kirkland 1991; Ma and Talmage 2001). During surveys conducted in 1988 and 1990 on the Kern Preserve, Freas (1990) found that shrews were more abundant in moderately mesic habitats versus xeric (drier) habitats, with 25 animals being captured in the moister environments and none in the drier habitat. Maldonado (1992) also found shrews at the Kern Preserve to be closely associated with dense, riparian understories that provide food, cover, and moisture. Capture of two Buena Vista Lake shrews at the Kern National Wildlife Refuge occurred in a 0.46-hectare (ha) (1.13-acre (ac)) area that contained the most undisturbed moist riparian habitat, with a mature tree overstory, abundant invertebrates, and ground cover totaling about 90-95 percent (Maldonado *et al.* 1998; J. Maldonado in litt.1998).

Due to the scarcity of Buena Vista Lake shrews, data about their home range size, breeding territory size, and population densities are lacking. Except for the breeding season, shrews in general are solitary. As juveniles, they establish their home range, which is a small area in which they nest, forage, and explore, and where they remain for most of their life (Churchfield 1990). Accurate estimation of home range size based on mark and recapture techniques requires that a minimal number of recaptures be made (Hawes 1977). Ingles (1961) was able to calculate an average home range size in a closely related species, the vagrant shrew (*Sorex vagrans*), found in the Sierra Nevada of California. The average home range size was approximately 372 square meters (m^2) (4,000 square feet (ft^2)), with breeding males occupying larger territories than breeding females (Hawes 1977). The distribution, and size, of a shrew's territory varies, and is primarily influenced by the availability of food (Ma and Talmage 2001). In a study on population densities of vagrant shrews in western Washington, Newman (1976) calculated densities of 25.8 shrews/ ha (10.1/ac) in the fall and winter, and 50.2 shrews/ha (20.32/ac) at the height of summer.

The Buena Vista Lake shrew formerly occurred in wetlands around Buena Vista Lake, and presumably throughout the Tulare Basin (Grinnell 1932, 1933; Hall 1981; Williams and Kilburn 1984; Williams 1986; Service 1998). The animals were likely distributed throughout the swampy margins of Kern, Buena Vista, Goose, and Tulare lakes. By the time the first Buena Vista Lake shrews were collected and described, these lakes had already been drained and mostly cultivated with only sparse remnants of the original flora and fauna (Grinnell 1932; Mercer and Morgan 1991; Griggs 1992; Service 1998). Nearly all of the valley floor in the Tulare Basin is cultivated, and most of the lakes and marshes have been drained and cultivated (Williams 1986; Werschkull *et al.* 1992; Williams and Kilburn 1992; Williams and Harpster 2001). The great expansion and conversion of natural lands and pasture to irrigated orchards, vegetable crops, cotton, and dairies was made possible by large increases in ground water pumping and the Central Valley Project's delivery of northern California water to the San Joaquin Valley (Mercer and Morgan 1991). The Buena Vista Lake shrew is now known from four isolated locations along an approximately 113-kilometer (km) (70-mile (mi)) stretch on the west side of the Tulare Basin. The four locations are the former Kern Lake Preserve (Kern Preserve) on the old Kern Lake bed, the Kern Fan recharge area, Cole Levee Ecological Preserve (Cole Levee), and the Kern National Wildlife Refuge.

Buena Vista Lake shrews were trapped on the south side of the Kern National Wildlife Refuge in September 1998 (Maldonado *et al.* 1998). Due to the low amount of morphological variation in ornate shrews, and the potential for the introgression with the southern California ornate shrew, genetic analysis of the potential Buena Vista Lake shrew specimens was completed. Tissue samples taken from shrews from the Kern Preserve and the Kern National Wildlife Refuge were genetically analyzed and found distinct from other ornate shrew populations from California and Baja California. These specimens were determined to be Buena Vista Lake shrews (Maldonado *et al.* 2001).

In February and March of 1999, the Endangered Species Recovery Program surveyed six locations within the historic range of the subspecies (Williams and Harpster 2001). They reported capturing five shrews at the Kern National Wildlife Refuge along levee roads less than 1.2 km (0.5 mi) from the location where shrews were captured in 1998 (Endangered Species Recovery Program 1999a). In March 1999, the Endangered Species Recovery Program found nine more shrews along the banks of an artificial pond adjacent to the nature center at the Cole Levee, and five more at the Kern County's water recharge area along the Kern Fan (Endangered Species Recovery Program 1999b; Williams and Harpster 2001).

Before the 1998 and 1999 surveys, staff of the Kern National Wildlife Refuge reported Buena Vista Lake shrews three other times. In 1992, 1994, and 1998/99, nine live shrews and one dead shrew were found at the Kern National Wildlife Refuge (Service 2002). Seven of the shrews were captured around a 323-ha (800-ac) marsh with emergent vegetation and an overstory of willows and cottonwoods (Maldonado *et al.*, 1998; Endangered Species Recovery Program 1999a).

Over the last 20 years, a number of surveys have taken place in other fresh water marshes and moist riparian areas on private and public lands throughout the range of the subspecies and were all unsuccessful in capturing any Buena Vista Lake shrews. These surveys include: The Nature Conservancy's Paine Wildflower Preserve and the Voice of America site west of Delano (Clark *et al.* 1982); along the Kern River Parkway in 1987 (Beedy *et al.* 1992); the Tule Elk State Reserve (Maldonado 1992); the Goose Lake Slough area of the Semitropic ground water banking project, Kern Water District, Kern County (Germano and Tabor 1993); Pixley National Wildlife Refuge in Tulare County (Williams and Harpster 2001); Lake Woollomes in Kern County; and Buena Vista Lake Aquatic Recreation area at the northern portion of the former Buena Vista Lake bed, Kern County (Endangered Species Recovery Program 1999c; Williams and Harpster 2001).

Other remnant patches of wetland and riparian communities within the Tulare Basin that have not been surveyed and may support the Buena Vista Lake shrew, including the City of Bakersfield's water recharge area near the terminus of the Kern River at Buena Vista Lake (Service 1998; Williams and Harpster 2001); Goose Lake and Jerry Slough, overflow channels of the Kern River, located 10 miles south of Kern National Wildlife Refuge, owned and managed by the Semitropic Water District as a ground water recharge basin (Germano and Tabor 1993); and the privately owned Crighton Ranch, located near the eastern shore of historical Tulare Lake in Tulare County (Williams and Harpster 2001). Privately owned lands that may support Buena Vista Lake shrews are located around Sand Ridge flood basin, Buena Vista Slough, Goose Lake and Goose Lake Slough, Creighton Ranch, and along the Kern River west of Bakersfield, California (Service 1998, 2002; Williams and Harpster 2001).

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 Buena Vista Lake shrew habitat (Service 1986). 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 (Service 1986; 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 production of food, fiber, and fuel (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 open for cultivation (Griggs *et al.* 1992).

Although no cases of disease related to Buena Vista Lake shrews have been documented, the possibility of disease and associated threats exists. The small population size and restricted distribution increases their vulnerability to epidemic diseases. Buena Vista Lake shrews, like most small mammals, are host to numerous internal and external parasites, such as round worms, mites, ticks, and fleas, that may infest individuals and local populations in varying degrees with varying adverse effects (Churchfield 1990; J. Maldonado, pers. comm., 1998). However, the significance of the threat of disease and parasites to the Buena Vista Lake shrew is not known.

Most vertebrate carnivores of the Tulare Basin, such as coyotes, foxes, long-tailed weasels (*Mustela frenata*), raccoons, feral cats (*Felis cattus*), 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 Buena Vista Lake shrews (J. Maldonado, pers. comm., 1998). The overall impact that predation may have on the number of individuals and densities of Buena Vista Lake shrews remains unknown.

Selenium toxicity represents a serious threat to the continued existence and recovery of the Buena Vista Lake shrew, not only at the two known locations at the Kern Preserve and the Kern National Wildlife Refuge , 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). The EPA's water quality criterion for the protection of aquatic species is currently 5 micrograms/liter (µg/L) but is being reevaluated by that agency (65 FR 31681). The selenium standard to protect wetlands in the grassland area of the San Joaquin Valley is 2 µg/L.

Some of the highest selenium levels in the western United States (greater than 1,100 µg/L) have been measured from groundwater within the southern San Joaquin Valley, and greater than 200 µg/L have been measured in drainwater evaporation ponds servicing the agricultural lands immediately surrounding the only known populations of Buena Vista Lake shrews in the Tulare Basin (California Regional Water Quality Control Board (RWQCB) 1996; DWR 1997; Seiler et al. 1999).

Buena Vista Lake shrews 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. Buena Vista Lake shrews 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 Buena Vista Lake shrews could be directly caused by pesticides through grooming, and secondarily from feeding on contaminated insects (Sheffield and Lochmiller 2001). Buena Vista Lake shrews 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 (Stehn et al. 1976; Schauber *et al.* 1997; Sheffield and Lochmiller 2001). Fresno, Kern, and Tulare counties are the three highest users of pesticides in California with 16,773,126 kilograms (kg) (36,978,444 pounds (lb); 10,985,201 kg (24,218,242 lb); and 7,562,064 kg (16,671,512 lb) of pesticide active ingredients used respectively in 1999 (Pesticide Board 2000).

The only known populations of Buena Vista Lake shrews 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 (Terbough 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).

The Buena Vista Lake shrew has been documented to inhabit the Kern National Wildlife Refuge, which is located immediately to the north of the project site on the east site of Interstate 5. Suitable habitat was observed on the east side of Interstate 5 in and adjacent to the action area. Areas of suitable habitat exists within the project footprint at the West Side Kern River Canal located immediately east of Interstate 5. No surveys by Caltrans apparently have been conducted for the Buena Vista Lake shrew in the action area of the State Route 46 project. Under normal circumstances, the Service would recommend to Caltrans that additional information, including the results of focused surveys for this species, be provided to us for review prior to initiation of formal consultation as stated in the regulations at 50 CFR 402.14. However, the Service has assumed the presence of the Buena Vista Lake shrew in the action area of the State Route 46 project given the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the project, as well as the observations of this listed species to the north of the action area, and especially because of Caltrans' request for an expedited biological opinion, as described in their September 5 and 16, 2003, electronic mail messages to the Service, and their September 18, 2003, telephone message to the Service.

Blunt-Nosed Leopard Lizard

The blunt-nosed leopard lizard was listed as endangered by the State of California in 1971. The lizard was listed as an endangered species federally in 1967 (**Federal Register** 32:4001). A recovery plan was first prepared in 1980 and revised in 1985 (Service 1985). In 1998, a recovery plan for San Joaquin Valley upland terrestrial species was issued that includes the blunt-nosed leopard lizard (Service 1998).

The blunt-nosed leopard lizard was described and named by Stejneger (1890) as *Crotaphytus silus*, from a specimen collected in Fresno, California. Cope (1900), however, considered the blunt-nosed leopard lizard to be a subspecies of the long-nosed leopard lizard (*C. wislizenii*), and listed it as *C. w. silus*. Smith (1946) separated the collared from the leopard lizards, placing the latter in the genus *Gambelia*. Montanucci, et al. (1975) again separated *Gambelia* from *Crotaphytus*, resulting in the name *Gambelia silus* (Jennings 1987). Frost and Collins (1988), Collins (1990), and Germano and Williams (1993) used the spelling *sila* to properly agree in gender with the genus *Gambelia*.

The blunt-nosed leopard lizard is a relatively large lizard of the family Iguanidae, with a long, regenerative tail; long, powerful hind limbs; and a short, blunt snout (Smith 1946, Stebbins 1954, 1985). Males are larger than females, ranging in size from 87 to 120 millimeters (3.4 to 4.7 inches) snout-vent length (Tollestrup 1982). From snout to vent, females are 86 to 111 millimeters long. Adult males weigh between 31.8 and 37.4 grams, and adult females weigh between 20.6 and 29.3 grams. Males are distinguished from females by their enlarged postanal scales, femoral pores (visible pores on the underside of the thigh), temporal and mandibular muscles (muscles on the skull that close the jaws), and tail base (Montanucci 1965). Although blunt-nosed leopard lizards are darker than other leopard lizards, they exhibit tremendous variation in color and pattern on the back (Tanner and Banta 1963, Montanucci 1965, 1970). Background color ranges from yellowish or light gray-brown to dark brown depending on the surrounding soil color and vegetation association (Smith 1946, Montanucci 1965, 1970, Stebbins 1985). The color pattern on the back consists of longitudinal rows of dark spots interrupted by a series of from 7 to 10 white, cream-colored, or yellow transverse bands. Except for the throat, undersides are uniformly white to yellow in immature lizards and prenuptial females. Nuptial females have bright red-orange markings on the sides of the head and body and the undersides of the thighs and tail. This color fades to pink or light orange by late July. Males in many populations develop a nuptial color during the breeding season that spreads over the entire undersides of the body and limbs.

The blunt-nosed leopard lizard is endemic to the San Joaquin Valley of central California. Although the boundaries of its original distribution are uncertain, blunt-nosed leopard lizards probably occurred from Stanislaus County in the north, southward to the Tehachapi Mountains in Kern County. Except where their range extends into the Carrizo Plain and Cuyama Valley west of the southwestern end of the San Joaquin Valley, the foothills of the Sierra Nevada and Coast Range Mountains, respectively, define the eastern and western boundaries of its distribution. The blunt-nosed leopard lizard is not found above 792 meters (2,600 feet) in elevation.

The blunt-nosed leopard lizard was distributed historically throughout the San Joaquin Valley and adjacent interior foothills and plains, extending from central Stanislaus County south to extreme northeastern Santa Barbara County. Today its distribution is limited to scattered parcels of undeveloped land, with the greatest concentrations occurring on the west side of the valley floor and in the foothills of the Transverse Range. Blunt-nosed leopard lizards inhabit open, sparsely vegetated areas of low relief on the San Joaquin Valley floor and in the surrounding foothills (Smith 1946, Montanucci 1965). On the Valley floor, they are most commonly found in the Nonnative Grassland and Valley Sink Scrub natural communities described by Holland (1986). Valley Needlegrass Grassland, Nonnative (Annual) Grassland, and Alkali Playa (Holland 1986) also provide suitable habitat for the lizard on the Valley floor. Blunt-nosed leopard lizards also inhabit Valley Saltbush Scrub, which is a low shrubland, with an annual grassland understory, that occurs on the gently sloping alluvial fans of the foothills of the southern San Joaquin Valley and adjacent Carrizo Plain.

While the blunt-nosed leopard lizard can occupy grassland used for grazing it prefers lands with scattered shrubs and sparse grass/forb cover. Leopard lizards use small rodent burrows for shelter from predators and temperature extremes (Tollestrup 1979*b*). Burrows are usually abandoned ground squirrel tunnels, or occupied or abandoned kangaroo rat tunnels. Each lizard uses several burrows without preference, but will avoid those occupied by predators or other leopard lizards. In areas of low mammal burrow density, lizards will construct shallow, simple tunnels in earth berms or under rocks. Potential predators are numerous and include snakes, predatory birds, and most carnivorous mammals (Montanucci 1965).

Adult lizards often seek safety in burrows, while immature lizards use rock piles, trash piles, and brush. The lizards use burrows constructed by mammals, such as kangaroo rats, for overwintering and estivation. Adult lizards hibernate during the colder months of winter, and are less active in the hotter months of late summer. Adults are active above ground from about March or April through September. Hatchlings are active until mid-October or November, depending on weather (Service 1998).

Blunt-nosed leopard lizards feed primarily on insects (mostly grasshoppers, crickets, and moths) (95.5%) and other lizards (4.5%), although some plant material is rarely eaten or, perhaps, unintentionally consumed with animal prey Kato, *et al.,* 1987a). They appear to feed opportunistically on animals, eating whatever is available in the size range they can overcome and swallow. Lizard species taken as prey include: side-blotched lizards (*Uta stansburiana*), coast horned lizards (*Phrynosoma coronatum*), California whiptails (*Cnemidophorus tigris*), and spiny lizards (*Sceloporus* spp.).

Breeding activity begins within a month of emergence from dormancy and lasts from the end of April through the beginning of June, and in some years to near the end of June. During this period, and for a month or more afterward, the adults often are seen in pairs and frequently occupy the same burrow systems. Two to six eggs averaging 15.6 by 25.8 millimeters (0.6 by 1.0 inch) are laid in June and July, and their numbers are correlated with the size of the female (Montanucci 1967). Sexual maturity is reached in from 9 to 21 months, depending on the sex and environmental conditions (USFWS 1985a).

Social behavior is more highly developed in the blunt-nosed leopard lizard than in the long-nosed leopard lizard. For example, territorial defense and related behavioral activity are completely absent in the long-nosed leopard lizard, whereas blunt-nosed leopard lizards are highly combative in establishing and maintaining territories in a typically iguanid fashion.

Seasonal above-ground activity is correlated with weather conditions, primarily temperature. Optimal activity occurs when ground temperatures are between 22 degrees and 36 degrees Celsius (72 and 97 degrees Fahrenheit) or slightly higher (USFWS 1985a,). Smaller lizards and young have a wider activity range than the adults (Montanucci 1965). This results in the smaller, subadult lizards emerging from hibernation earlier than adults, remaining active later in the year, and being active during the day earlier and later than adults (Montanucci 1965).

There are no current overall population size estimates for the species. Uptain et al. (1985) reported densities ranging from 0.3 to 10.8 lizards per hectare (0.1 to 4.2 per acre) for a population on the Pixley National Wildlife Refuge in Tulare County. In a previous study of this population, Tollestrup (1979) estimated an average density of 3.3 lizards per hectare (1.3 per acre). In 1991, after three previous years of severe drought, two 8.1-hectare (20-acre) plots had estimated densities of 6.7 and 7.0 lizards per hectare (2.7 and 2.8 per acre) on Pixley National Wildlife Refuge (Williams and Germano, 1991). On the Elkhorn Plain, estimated population size on two 8.1-hectare plots of adult and subadult blunt-nosed leopard lizards in June (period of peak above-ground activity) varied between 0 in 1990 to more than 170 in 1993 (but see below).

Lizard habitat has been significantly reduced, degraded, and fragmented by agricultural development, urban development, petroleum and mineral extraction, livestock grazing, pesticide application, and off-road vehicle use (Service 1998). Habitat disturbance, destruction, and fragmentation continue as the greatest threats to blunt-nosed leopard lizard populations. Disturbances and modifications of habitats within areas of mineral and petroleum development pose lesser, but continuing threats as they degrade the habitat. Direct mortality occurs when animals are killed in their burrows during construction, killed by vehicle traffic, drowned in oil, or fall into excavated areas from which they are unable to escape. Displaced lizards may be unable to survive in adjacent habitat if it is already occupied or unsuitable for colonization.

Livestock grazing can result in removal of herbaceous vegetation and shrub cover and destruction of rodent burrows used by lizards for shelter. Unlike cultivation of row crops, which precludes use by leopard lizards, light or moderate grazing may be beneficial. The use of pesticides may directly and indirectly affect blunt-nosed leopard lizards. The insecticide Malathion has been used since 1969 to control the beet leafhopper, and its use may reduce insect prey populations. Fumigants such as methyl bromide are used to control ground squirrels. Because leopard lizards often inhabit ground squirrel burrows, they may be inadvertently poisoned.

By 1979, only approximately 370,000 acres out of a total of approximately 8.5 million acres on the San Joaquin Valley floor remained as non-developed land (Williams 1985, Service 1980a). Data from the California Department of Fish and Game (1985) and Service file information indicate that between 1977 and 1988, essential habitat for the blunt-nosed leopard lizard (*Gambelia sila*) declined by about 80 percent – from 311,680 acres to 63,060 acres, an average of about 22,000 acres per year (Biological Opinion for the Interim Water Contract Renewal, Ref. No. 1-1-00-F-0056, February 29, 2000). Virtually all of the documented loss of essential habitat was the result of conversion to irrigated agriculture.

The currently occupied range of the blunt-nosed leopard lizard is in scattered parcels of undeveloped land on the Valley floor, and in the foothills of the Coast Range. Surveys in the northern part of the San Joaquin Valley documented the occurrence of the blunt-nosed leopard lizard in the Firebaugh and Madera Essential Habitat areas. Essential Habitat Areas were defined in previous recovery plan editions for this species as undeveloped wildlands containing suitable habitat for the blunt-nosed leopard lizard and essential to the continued survival of the species (USFWS 1980a 1985). Within the last decade, at least 2800 acres of leopard lizard habitat in western Madera County has been lost through agricultural conversions (P. Kelly, pers. comm.). More recently, the population in the Madera Ranch area is believed to be extirpated (P. Kelly, pers. comm.), and populations in the Lokern and Elkhorn areas are also believed to be severely depressed or extirpated (D. Germano, pers comm.).

In the southern San Joaquin Valley, extant populations are known to occur on the Pixley National Wildlife Refuge, Liberty Farms, Allensworth State Park, Kern National Wildlife Refuge, Antelope Plain, Buttonwillow, Elk Hills, and Tupman Essential Habitat areas, on the Carrizo and Elkhorn Plains, north of Bakersfield around Poso Creek, and in western Kern County in the area around the towns of Maricopa, McKittrick, and Taft (Byrne 1987, R.L. Anderson pers. comm., L.K. Spiegel pers. comm.). Remaining undeveloped lands farther north that support blunt-nosed leopard lizard populations include the Ciervo, Tumey, and Panoche Hills, Anticline Ridge, Pleasant Valley, and the Lone Tree, Sandy Mush Road, Whitesbridge, Horse Pasture, and Kettleman Hills Essential Habitat areas (CDFG 1985). The species is presumed to be present still in the upper Cuyama Valley, though no recent inventory is known for that area.

The blunt-nosed leopard lizard has been documented to inhabit the action area (CNDDB 2003; Service 1998, Biological Assessment 1). Suitable habitat exists within and adjacent to the project footprint from the San Luis Obispo County/Kern County line east to post mile 37.5. Therefore, the Service believes that the blunt-nosed leopard lizard is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the project, as well as the observations of this listed species.

Hoover's Woolly-star

Hoover's woolly-star was federally listed as threatened in July 19, 1990 (55 **FR** 29361). It has not been listed by the State as either threatened or endangered. The multi-species Valley Recovery Plan issued by the Service in 1998 addresses Hoover's woolly-star.

Prior to 1986, Hoover's woolly-star was known from 19 sites in 4 counties (Service 1998). The majority of occurrences were on the San Joaquin Valley and Cuyama Valley floors. and others were from the low mountains at the west side of the San Joaquin Valley. In Kern County, Hoover's woolly-star was known from the vicinities of Lokern, Oildale, Semitrophic, Shaffter, and the Tremblor Range. In Fresno County, known occurrences were concentrated near Kerman, Mendota, and Raisin City, except for one site each in the Jacalitos and Panoche Hills. The Cuyama Valley records consisted of one collection each from Santa Barbara and San Luis Obispo counties (Taylor and Davilla 1986).

Since 1986, Hoover's woolly-star has been located in Kings and San Benito counties, and at numerous additional sites in Santa Barbara, San Luis Obispo, Kern, and Fresno counties (Service 1998). Most of the occurrences are concentrated in 4 metapopulations. In descending order by estimated number of individuals, these metapopulations are: 1) Kettleman Hills in Fresno and Kings counties, 2) Carrizo Plain-Elkhorn Plain-Tremblor Range-Caliente Mountains-Cuyama

Valley-Sierra Madre in San Luis Obispo, Santa Barbara, and extreme western Kern counties, 3) Lokern-Elk Hills-Buena Vista Hills-Coles Levee-Taft-Maricopa in Kern County, and 4) Antelope Plain-Lost Hills-Semitrophic in Kern County. Small isolated populations occur in scattered areas including the Alkalini Sink Reserve and the Guijarral, Jacalitos, Panoche, and Tumey Hills in Fresno Count; Buttonwillow, Devil's Den, Lamont, Midway Valley, and Rosedale in Kern County; and the Panoche Hills in San Benito County (Lewis 1992, 1994; California Department of Fish and Game 1995; Holmstead 1993; Danielson *et al.* 1994; EG&G Energy Measurements 1995a, 19995b). According to Skinner and Pavlik (1994), Hoover's woolly-star also occurs in Tulare County.

Hoover's woolly-star is an annual, but the seeds germinate later in the gorwing season than do those of many of the associated annual plants. Seedlings may emerge from January or February until mid-April (Taylor and Davilla 1986). The typical flowering period for Hoover's woolly-star extends from March into June (Munz and Keck 1959; Skinner and Pavlik 1994; Lewis 1992).

Populations of this plant are found in alkalini sinks, washes, on both north- and south-facing slopes, and on ridgetops. It occurs in a wide variety of plant communities. Hoover's woolly-star seems to be much more adaptable than other endemic plants in the San Joaquin Valley. Optimal habitat for this species are characterized by stabilized silty to sandy soils, and the presence of cryptogamic crusts. However, Hoover's woolly-star has been found on loamy soils, in areas of dense vegetation, and in areas lacking cryptogamic crusts. Hoover's woolly-star may recolonize disturbed soils surfaces such as well pads and dirt roads within one year after the disturbance ceases if seed sources are found in the vicinity.

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San Joaquin Valley floor populations of Hoover's woolly-star have been destroyed primarily by farming operations and secondarily by urban development. In 1986, an estimated 92 percent of the known extant populations of Hoover's woolly-star were threatened by future conversions to agricultural use, groundwater recharge basins, and oil and gas development (Taylor and Davilla 1986). Hoover's woolly-star exists on some remnants of native habitat in western Kern County. Although some sites contain substantial populations (5,000-40,000 individuals), most of the remaining sites on the valley floor are at risk because they are isolated from one another, range in size from approximately 1 acre to less than 400 acres, and contain fewer than 1,000 individuals (55 **FR** 29361). Occurrences of the plant in the Bakersfield metropolitan area are threatened by development. Conversion of land from native habitat or grazing to row crops continues to threaten Hoover's woolly-star populations in western Kern County (Service 1998).

Hoover's woolly-star has been documented to inhabit the action area (CNDDB 2003; Service 1998, Biological Assessment 1). Suitable habitat exists within and adjacent to the project footprint from the San Luis Obispo County/Kern County line east to post mile 37.5. Hoover's woolly-star was not observed by Caltrans during surveys on the west side of the project between the San Luis Obispo County/Kern County line and Interstate 5 that were conducted at unknown date(s) and time(s) and whose specific methodology also is not described in the documents they have provided to the Service, however, they have proposed to mitigate for effects on the species resulting from the State Route 46 project (Biological Assessment 1); the listed plant was not observed during surveys for dominant plant species from Intersate 5 east to post mile 37.5 that was conducted on May 11, 1999, and on April 10, 2000, and Caltrans stated that pre-construction surveys would be conducted for the species and the Service would be contacted if it was located by them (Biological Assessment 2). Under normal circumstances, the Service would have recommended to Caltrans that additional information be provided to us, including the results of focused protocol surveys for this species, prior to initiation of formal consultation as stated in the regulations 50 CFR 402.14. However, the Service has assumed the presence of Hoover's woolly-star in the action area of the State Route 46 project given the biology and ecology of the plant, the presence of suitable habitat in and adjacent to the project, as well as the records of this listed species in the action area. and especially because of Caltrans' request for an expedited biological opinion, as described in their September 5 and 16, 2003, electronic mail messages to the Service, and their September 18, 2003, telephone message to the Service.

San Joaquin Woolly-Threads

San Joaquin woolly-threads, a member of the sunflower family (Asteraceae), was listed as an endangered species in 1990 (**FR** 55:29361-29370). It is an annual herb with tiny yellow flower heads clustered at the tips of erect to trailing stems covered with tangled hairs. It occurs on neutral to subalkaline soils that were deposited in geologic times by flowing water. On the San Joaquin Valley floor, it typically is found on sandy or sandy loam soils, whereas in the Carrizo Plain it occurs on silty soils (USFWS 1997). San Joaquin woolly-threads occupies microhabitats in non-native grassland, valley saltbush scrub, interior Coast Range saltbush scrub, and upper sonoran subshrub communities with less than 10% shrub cover but in either sparse or dense herbaceous cover. It has been reported from elevations ranging from 200 to 850 feet on the San Joaquin Valley floor, and from 2,000 to 2,600 feet in San Luis Obispo and Santa Barbara Counties (Service 1997).

The seeds of San Joaquin woolly-threads may germinate as early as November, but usually germinate in December and January. Flowering generally occurs between late February and early April, and may continue into May (Service 1997). Seed production depends on plant size and number of flower heads (Service 1997). In contrast to the more persistent skeletons of Hoover's woolly-star, all trace of San Joaquin woolly-threads plants disappears rapidly after seeds are shed in April or May. Seed dispersal agents are unknown, but may possibly include wind, water, and animals (Service 1997). Seed-dormancy mechanisms are thought to allow the formation of a substantial seed bank in the soil (Service 1997).

San Joaquin woolly-threads currently exists as four metapopulations and several small, isolated populations (Service 1997). The largest metapopulation occurs on the Carrizo Plain, where occupied habitat has been observed to vary from a high of 2,800 acres in a favorable year, to much less in years of lower rainfall (Service 1997). Much smaller metapopulations occur in Kern County near Lost Hills, in the Kettleman Hills of Fresno and Kings counties, and in the

Jacalitos Hills of Fresno County. Isolated occurrences are known from the Panoche Hills in Fresno and San Benito counties, near the city of Bakersfield, and the Cuyama Valley (Service 1997).

Potential threats to one or more sites or metapopulations of San Joaquin woolly-threads include commercial development, conversion of natural habitat to agriculture, increased petroleum production, competition from non-native plants, and either complete removal or grazing or uncontrolled grazing.

San Joaquin woolly-threads has been documented to inhabit the action area (CNDDB 2003; Service 1998, Biological Assessment 1). Suitable habitat exists within and adjacent to the project footprint from the San Luis Obispo County/Kern County line east to post mile 37.5. San Joaquin woolly-threads has been documented to inhabit the action area (CNDDB 2003; Service 1998, Biological Assessment 1). Suitable habitat exists within and adjacent to the project footprint from the San Luis Obispo County/Kern County line east to post mile 37.5. This listed plant was not observed by Caltrans during surveys on the west side of the project between the San Luis Obispo County/Kern County line and Interstate 5 that were conducted at unknown date(s) and time(s) and whose specific methodology also is not described in the documents they have provided to the Service, however, they have proposed to mitigate for effects on the species resulting from the State Route 46 project (Biological Assessment 1); the listed plant was not observed during surveys for dominant plant species from Interstate 5 east to post mile 37.5 that was conducted on May 11, 1999, and on April 10, 2000, and Caltrans stated that pre-construction surveys would be conducted for the species and the Service would be contacted if it was located by them (Biological Assessment 2). Under normal circumstances, the Service would have recommended to Caltrans that additional information be provided to us, including the results of focused protocol surveys for this species, prior to initiation of formal consultation as stated in the regulations at 402.14. However, the Service has assumed the presence of San Joaquin woolly-threads in the action area of the State Route 46 project given the biology and ecology of the plant, the presence of suitable habitat in and adjacent to the project, as well as the records of this listed species in the action area, and especially because of Caltrans' request for an expedited biological opinion, as described in their September 5 and 16, 2003, electronic mail messages to the Service, and their September 18, 2003, telephone message to the Service.

California Jewelflower

California jewelflower was listed as an endangered species in 1990 (**FR** 55:29361-29370). California jewelflower, an annual herb belonging to the mustard family (Brassicaceae), has flattened, sword-shaped fruits. Known populations of California jewelflower occur in non-native grassland, upper sonoran subshrub scrub, and cismontane juniper woodland and scrub communities (Service 1997). Historical records suggest that it also occurred in the valley saltbush scrub community in the past (Service 1997). Populations of California jewelflower have been reported from subalkaline, sandy loam soils at elevations of approximately 240 to 2,950 feet (Service 1997). Potential threats to one or more of the remaining populations of California jewelflower include competition from non-native plants, pesticide effects on pollinators, and small population size, in addition to development on private land in the Santa Barbara Canyon area, and potentially cattle grazing on private land populations of California jewelflower, if grazing occurs between the rosette stage and seed set (Service 1997).

The naturally-occurring populations known to exist today are distributed in three centers of concentration: (1) Santa Barbara Canyon, (2) the Carrizo Plain, and (3) the Kreyenhagen Hills in Fresno County (Service 1997). The Santa Barbara Canyon metapopulation occurs on the terraces just west of the Cuyama River and includes approximately 30 acres of occupied habitat (Service 1997). The Carrizo Plain metapopulation is confined to the western side of the Carrizo Plain and encompasses approximately 10 acres of occupied habitat (Service 1997). The Kreyenhagen Hills metapopulation includes 4 small colonies within a small area of rolling hills (Service 1997).

Seeds of California jewelflower begin to germinate in the fall, and seedlings may continue to emerge for several months. The seedlings develop into rosettes of leaves during the winter months, after which stems elongate and flower buds appear in February or March. Flowering and seed set may continue as late as May in years of favorable rainfall and temperatures (Service 1997). It is thought that California jewelflower forms a persistent seed bank, but seeds appear to germinate only when exposed to conditions simulating prolonged weathering (Service 1997). Seed dispersal agents are unknown, but may include gravity, seed-eating animals such as giant kangaroo rats, wind, and water (Service 1997).

California jewelflower is considered to be palatable to livestock and vulnerable to direct grazing effects during active growth. Grazing prescriptions that allow successful growth, reproduction, and recovery of this species likely can be developed, but further study is needed. In the meantime, moderate livestock grazing between seed-shatter and germination, or no grazing at all, are recommended unless conducted under controlled experimental conditions.

California jewelflower has been documented to inhabit the action area (CNDDB 2003; Service 1998). Suitable habitat exists within and adjacent to the project footprint from the San Luis Obispo County/Kern County line east to post mile 37.5. Suitable habitat exists within and adjacent to the project footprint from the San Luis Obispo County/Kern County line east to post mile 37.5. This listed plant was not observed by Caltrans during surveys on the west side of the project between the San Luis Obispo County/Kern County line and Interstate 5 that were conducted at unknown date(s) and time(s) and whose specific methodology also is not described in the documents they have provided to the Service, however, they have proposed to mitigate for effects on the species resulting from the State Route 46 project (Biological Assessment 1); the listed plant was not observed during surveys for dominant plant species from Interstate 5 east to post mile 37.5 that was conducted on May 11, 1999, and on April 10, 2000, and Caltrans stated that pre-construction surveys would be conducted for the species and the Service would be contacted if it was located by them (Biological Assessment 2). Under normal circumstances, the Service would have recommended to Caltrans that additional information be provided to us, including focused protocol surveys for this species, prior to initiation of formal consultation as stated in the regulations at 402.14. However, the Service has assumed the presence of the California jewelflower in the action area of the State Route 46 project given the biology and ecology of the plant, the presence of suitable habitat in and adjacent to the project, as well as the records of this listed species in the action area, and especially because of Caltrans' request for an expedited biological opinion, as described in their September 5 and 16, 2003, electronic mail messages to the Service, and their September 18, 2003, telephone message to the Service

Effects of the Proposed Action

There will be 20.34 acres of temporary effects to listed species and their habitats and 41.8 acres of effects to listed species and permanent loss of their habitats between Interstate 5 and post mile 37.5; there will be 189.9 acres of temporary effects to listed species and their habitats and 299.9 acres of effects to listed species and permanent loss of their habitats between the Kern County/San Luis Obispo County line to Interstate 5 (Biological Assessment 1; Biological Assessment 2). and

San Joaquin kit fox

The proposed State Route 46 project likely will result in be a number of adverse effects to the San Joaquin kit fox. There is a likelihood of direct mortality to the animal from either crushing or entombment in dens due to construction activities, vehicle strikes, falling into trenches or pits, being shot, being buried after becoming trapped in pipes, injured or killed by pet cats or dogs owned by construction related personnel, poisoned by rodenticides or other pesticides, injured or killed by predators attracted to construction-related food or trash at the site, harassment from noise and vibration. San Joaquin kit foxes may be adversely affected by construction activities temporarily blocking travel corridors in grassland and agricultural areas, or by evening construction activities disturbing night time foraging. San Joaquin kit foxes inhabiting the project site and surrounding vicinity (for purposes of this biological opinion the surrounding vicinity is described as 300 meters [approximately 1000 feet] outside and adjacent to the project footprint) are likely to be subject to indirect effects including loss of its movement corridor caused by deaths due to vehicle strikes, loss of habitat, competitors, and a reduction in natural food sources as a result of habitat disturbance and loss.

Construction and widening of the State Route 46 project will result in the loss, fragmentation, and degradation of habitat currently utilized by the San Joaquin kit fox for foraging, breeding, and other essential behaviors. Habitat loss, fragmentation, and degradation can cause San Joaquin kit foxes to be displaced resulting in disrupted social behavior, adverse effects to feeding success, and mortality. These habitat effects also can block movement corridors and prevent dispersal and genetic exchange. Range-wide habitat loss, fragmentation, and degradation from multiple factors is the primary threat to the San Joaquin kit fox (Service 1998). Both Biological Assessment 1 and Biological Assessment 2 note that the State Route 46 project could result in adverse effects to the San Joaquin kit fox in the form of mortality, morbidity, displacement, disrupted social ecology, reduced productivity, displacement, altered space use, loss or destruction of habitat, noise disturbance, disruption of breeding cycle, blocked movement corridors, reduced genetic exchange, genetic damage, and decreased carrying capacity.

Approximately 95% of native habitat for kit fox habitat in the San Joaquin Valley has been destroyed by agricultural, industrial, and urban development (Service 1998). Loss of natural lands continues to occur further reducing the habitat available for the animal. The amount of historical and current habitat loss directly attributable to road has not been calculated. Estimates of the area occupied by roads under the jurisdiction of Caltrans includes 239 hectares (591 acres) for Kings County,431 hectares (1065 acres) for Merced County, 817 hectares (2019 acres) for Fresno County, and 1485 hectares (3669 acres) for Kern County (Cypher 2000). These estimates are based on a standard lane width of 3.6 meters (11.8 feet), and not all of this area is in kit fox habitat. However, the estimates do not include road shoulders, medians, or associated developments (e.g. Interchanges, signs), and also do not include the area occupied by county and city roads.

The effect of habitat fragmentation on the San Joaquin kit fox is potentially significant. Fragmentation can have affect the kit fox by: (1) reduction in access to habitat as well as habitat suitability, and (2) disruption or elimination of movement corridors, dispersal, and gene flow. The construction of roads through kit fox habitat may restrict or block access to the remaining habitat patches. The likelihood of this increase with larger road size, higher traffic volume, and the presence of fences or median barriers. Knapp (1978) monitored movements of radio-collared San Joaquin kit foxes in the vicinity of Interstate 5 in Kern County. Many of the foxes used areas within 3 kilometers (2 miles) of the highway, and most exhibited movement and home range patterns that parallel the highway, but did not cross it. Only on 2 occasions were animals located on the opposite side of the highway from their primary area of use. Interstate 5 has an effect on kit fox use patterns and restricts movements by the San Joaquin kit fox between habitat blocks.

In addition to limiting access to habitat patches, roads also may reduce the suitability of habitat for San Joaquin kit foxes by fragmentation into patches too small for effective use by the animals. As a habitat patch decreases in size, the number of San Joaquin kit foxes the patch can support also decreases. This increases the probability that the animals will be extirpated from each patch. The possibility for recolonization will depend upon the nature of the factors, e.g., roads, canals, development, etc., that are causing the fragmentation. Estimates of home range size for the San Joaquin kit fox vary from from 4.3 square kilometers (1.7 square miles) to 11.6 square kilometers (4.5 square miles)(White and Ralls 1993). Typically, a mated pair will share a home range. If a habitat fragment is too small to support a home range, it may be abandoned by the animals. Whether or not the patch can be used as part of a it fox home range will depend upon the nature of the factors causing the fragmentation.

Fragmentation factors that effectively isolate patches and limit access also constitute barriers to San Joaquin kit fox movements, dispersal, and gene flow. Movements and dispersal corridors are critical to kit fox population dynamics, particularly because the animals currently persist as metapopulations with multiple disjunct population centers. Movement and dispersal corridors are

important for alleviating over-crowding and intraspecific competition during years when San Joaquin kit fox abundance is high, and also they are important for facilitating the recolonization of areas where the animal has been extirpated. Movement between population centers maintains gene flow and reduced genetic isolation. Genetically isolated populations are at greater risk of deleterious genetic effects such as inbreeding, genetic drift, and founder effects.
Roads have been documented as barriers to movements by a diversity of species, and this effect varies with road size and traffic volume. Bobcats in Wisconsin readily crossed dirt roads, but were reluctant to cross paved roads (Lovallo and Anderson 1996). Lynx also exhibit a reluctance to cross roads (Barnum 1999) as do mountain lions (*Felis concolor*)(Van Dyke *et al.* 1986). In a study in North Carolina, the number of road crossings by black bears (*Ursus americanus*) was inversely related to traffic volume, and bears almost never crossed an interstate highway (Brody and Pelton 1989). Endangered Sonoran pronghorn (*Antilocarpa americana*) in Mexico are reluctant to cross a 2-lane highway, and the planned expansion of the road could further restrict movements (Castillo-Sanchez 1999). Many rodents are reluctant to cross roads (Oxley *et al.* 974).

The inhibition of animal movements caused by roads produces a significant effect by fragmenting habitats and populations (Joly and Morand 1997). Roads were found to be significant barriers to gene flow among common frogs (*Rana temporaria*) in Germany and this has resulted in genetic differentiation among populations separated by roads (Reh and Seitz 1990). Similarly, significant genetic subdivision was detected in bank voles (*Clethrionomys glarelous*) populations separated by a 50-meter (164 foot) wide highway in Germany (Gerlach and Musolf 2000). In California, local extinctions of mountain lions has occurred when roads and other developments fragmented habitat in small patches and blocked movement corridors thereby isolating the patches and preventing recolonization (Beier 1993).

San Joaquin kit fox mortality and injury occurs when the animals attempt to cross roads and are hit by cars, trucks, or motorcycles. The majority of strikes likely occur at night when the animals are most active. Driver visibility also is lower at night increasing the potential for strikes. Such strikes are usually fatal for an animal the size of a kit fox. Thus, vehicle strikes are a direct source of mortality for the San Joaquin kit fox. If vehicle strikes are sufficiently frequent in a given locality, they could result in reduced kit fox abundance. The death of kit foxes during the November-January breeding season could result in reduced reproductive success. Death of females during gestation or prior to pup weaning could result in the loss of an entire litter of young, and therefore, reduced recruitment of new individuals into the population.

Occurrences of vehicle strikes involving San Joaquin kit foxes have been well documented, and such strikes occur throughout the range of the species. Sources of kit fox mortality were examined during 1980-1995 at the Naval Petroleum Reserves in California in western Kern County (Cypher *et al.* 2000). During this period, 341 adult San Joaquin kit foxes were monitored using radio telemetry, and 225 of these animals were recovered dead. Of these, 20 were struck by vehicles; 9% of adult kit fox mortalities were attributed to vehicles, and 6% of all monitored adults were killed by vehicles. During this same period, 184 juvenile (<1 year old) kit foxes were monitored. Of these, 142 were recovered dead and 11 were killed by vehicles; 8% of juvenile kit fox mortalities were attributed to vehicles and 6% of all monitored juveniles were killed by vehicles. For both adults and juveniles, vehicle strikes accounted for less than 10% of all San Joaquin kit fox deaths in most years. However, in some years, vehicles accounted for about 20% of deaths. Predators, primarily coyotes and bobcats, were the primary source of mortality at the Naval Petroleum Reserves. In addition, 70 kit foxes, both radio collared and non-collared, were found dead on roads in and around the Naval Petroleum Reserves during 1980-1991 (U.S. Department of Energy 1993). Of these, 34 were hit by vehicles on the approximately 1,600 kilometers (990 miles) of roads at the Reserve, and 36 were struck on the approximately 80 kilometers (50 miles) of State and County roads (e.g., State Route 119, Elk Hills Road), where traffic volumes and average vehicle speeds were higher.

In other areas of western Kern County, 49 kit foxes were radio-collared in the highly developed Midway-Sunset oil field, and 54 kit foxes were radio-collared in the Lokern Natural Area, a nearby undeveloped area, during 1989-1993 (Spiegel and Disney 1996). Of these animals, 60 were recovered dead; 1 (2%) was killed by a vehicle, and it was found in an undeveloped area along the access road adjacent to the California aqueduct. However, 6 non-collared kit foxes were killed by vehicles on the access road. Predators, primarily coyotes, bobcats, and feral dogs were responsible for most deaths in this study. Forty-one San Joaquin kit foxes were radio-collared and monitored during 1989-1991 on the Carrizo Plain Natural Area in eastern San Luis Obispo County (Ralls and White 1995). Twenty-two were found dead; 1 (5%) were attributed to a vehicle strike. At the Camp Roberts National Guard Training Facility in Monterey and San Luis Obispo counties, 94 San Joaquin kit foxes were radio-collared during 1988-1992 (Standley *et al.* 1992). Forty-nine were found dead and 2 were attributed to vehicle strikes; 4% of the deaths were caused by vehicles and 2% of all monitored kit foxes were killed by vehicles. In western Merced County, 28 San Joaquin kit foxes were radio-collared during 1985-1987 (Briden *et al.* 1992). Seventeen were found dead and 2 (12%) of these deaths were attributed to vehicles.

In the City of Bakersfield, 113 San Joaquin kit foxes were radio-collared and monitored during 1997-2000 (Cypher 2000). Thirty-five were recovered dead (123 adults and 12 pups); 9 adults (39%) and 6 pups (50%) were attributed to vehicle strikes. At this urban site, coyotes and bobcats are rare, and vehicles are the primary source of kit fox mortality. However, survival rates are higher than rates among kit foxes in non-urban areas, and vehicles do not appear to be limiting the population size.

Vehicles constitute a consistent source of mortality for the animal, based on the frequency with which vehicle strikes occur. However, the precise effect of vehicle strikes on the San Joaquin kit fox has not been adequately investigated. According to Morrell (1970), "The automobile is by far the major cause of reported San Joaquin kit fox deaths - 128 of 152 deaths reported were caused by automobiles." Morrell acknowledged that the numbers were based on non-radio-collared kit foxes and therefore were biased because road-killed foxes are conspicuous and easily observed compared to animals dying from other causes. Predators such as coyotes, bobcats, non-native red foxes, and domestic dogs likely constitute a higher source of mortality than vehicle strikes (Service 1998; Cypher 2000).

The local and range-wide effects of vehicle strikes on San Joaquin kit foxes have not been adequately assessed. Vehicle strikes appear to occur most frequently where roads transverse areas where kit foxes are abundant. However, the linear quantity of roads in a given area may not be directly related to the number of vehicle strikes in a given area, as exemplified by the situation at the Naval Petroleum Reserve. The type of road (e.g., number of lanes) traffic volume, and average speed of vehicles likely all influence the number of San Joaquin kit fox/vehicle strikes. The number of strikes likely increases with road size, traffic volume, and average speed (Clevenger and Waltho 1999). Another factor influencing the number of vehicles striking San Joaquin kit foxes, but for which little data is available, is the frequency with which the animals cross roads and are therefore at risk. The proportion of successful road crossings by these animals likely declines with increasing road size, traffic volume and density, and vehicle speeds. The proportion of San Joaquin kit foxes successfully crossing roads may increase in areas where they obtain more experience crossing roads, such as in and near urban areas.

Based on a study of another kit fox subspecies, Egoscue (1962) reported that 8 tagged foxes (*Vulpes macrotis nevadensis*) in Utah were killed by vehicles, and 5 of these were pups. Pups appeared to be more vulnerable to vehicle strikes. Many of the foxes killed were residents that were using dens located near roads. O'Neal *et al* (1987) examined 23 dead kit foxes in western Utah in 1983. None were killed by vehicles, possibly due to the remoteness of the study site. Swift foxes (*Vulpes velox*) are closely related to the San Joaquin kit fox, and are listed as an endangered in Canada. They show numerous ecological similarities with the San Joaquin kit fox. Hines (1980) reported that roads were a major source of swift fox mortality in Nebraska. In Alberta, where the swift fox was extirpated and recently reintroduced, vehicles were responsible for 5 of 89 (6%) of the foxes found dead (Cabyn *et al* 1994). Pups appeared to be especially vulnerable, particularly if the natal dens were located near roads (Cabyn 1998). In western Kansas, 41 adults and 24 juvenile swift foxes were radio collared and monitored during 1996-97 on 2 study sites (Sovada *et al* 1998). Among the adults, 18 were found dead, but none were killed by vehicles. Among the juveniles, 14 were found dead and 4 (29%) of these had been struck by vehicles. All 7 of the juveniles killed by vehicles were found on the same study site. This study site had 90% more roads compared to the other study site where no foxes were killed by vehicles (125 kilometers vs. 66 km; 78 miles vs. 41 mil). At a remote site in Colorado with few roads and restricted public access, swift foxes were rarely struck by vehicles (Covell 1992; Kitchen *et al.* 1999).

Vehicle-related mortality has significantly affected other listed or rare species. Vehicles caused 49% of the mortality documented among endangered Florida panthers (*Felis concolor coryi*) (Maehr *et al.* 1991). With a remaining population of 20-30 animals, the loss of any to vehicles likely constitutes a significant population effect. Similarly, at least 15% of the remaining 250-300 key deer (*Odocileus virginianus clavium*) are killed annually by vehicles (Tubak 1999), and this mortality is considered to be a limiting factor for this endangered species (U.S. Fish and Wildlife

Service 1985). Mortality from vehicles was the primary source of mortality for endangered ocelots (*Felis pardalis*) in Texas (Tubak 1999), and also contributed to the failure of a lynx (*Lynx lynx*) reintroduction project in New York (Aubrey *et al.* 1999). Rudolph *et al.* (1999) estimated that road-associated mortality may have depressed populations of Louisiana pine snakes (*Pituophis ruthveni*) and timber rattlesnakes (*Crotalus horridus*) by over 50% in eastern Texas, and this mortality may be a primary factor in local extirpations of timber rattlesnakes (Rudolph *et al.* 1998). Mortality from vehicles also is contributing to the reduction in the status of the prairie garter snake (*Thamnophis radix radix*) in Ohio (Dalrymple and Reichenbach 1984), and was a limiting factor in the recovery of the endangered American crocodile (*Crocodylus acutus*) in Florida (Kushland 1998). In Florida, threatened Florida scrub-jays (*Aphelocoma coerulescens*) suffered higher mortality in territories near roads, as well as reduced productivity due to vehicle strikes of both breeding adults and young (Mumme et al. 1999).

Construction, maintenance, and operational activities associated with roads may result in a disturbance effect on nearby San Joaquin kit foxes. Disturbance can result from noise, vibration, odors, or human activity. Disturbance may affect the kit foxes by interfering with sensory perception which could interfere with their ability to locate prey, pups, or mates, or detect approaching predators. Disturbance could induce stress which may affect physiological parameters or behavior. The resulting effects could include increase energetic requirements, decrease reproductive output, decrease immunological functions, altered space use patterns, displacement, or possibly death. Observations from a variety of sources and situations suggest that San Joaquin kit foxes may not be significantly affected by disturbance, even when the source is prolonged or continuous (Cypher 2000). However, individual animals may be more affected than others, and it is unknown whether disturbance may result in reduced local abundance.

An increase in the ambient noise level is not, in itself, likely to cause direct harm to kit foxes. No specific research has been performed on this species but a "safe, short-term level" for humans has been determined to be 75 decibels (dBA) (NIH 1990; Burglund and Lindvall 1995). The mechanisms leading to permanent hearing damage are the same for all mammals (NIH 1990). However, the enlarged pinna and reduced tragi of kit foxes indicate that hearing is more acute than in humans (Jameson and Peeters 1988). Hearing loss in humans has been correlated with cognitive dysfunction (NIH 1990). However, variation in response to intense noise has been found to vary, in humans, by as much as 30 to 50 dBA between individuals (NIH 1990). Similar variation has been found in animal studies as well (NIH 1990). Hearing loss was greater in male than in female humans; however, this may be caused by environmental factors (NIH 1990). Also, younger animals have been shown to be more susceptible to noise-induced hearing loss (NIH 1990). The ability to habituate to noise appears to vary widely between species (NPS 1990). Typical construction machinery produces noise in the range of 75 dBA (arc-welder) to 85 dBA (bulldozer) (Burglund and Lindvall 1995). Long-term noise levels of 85 dBA are recognized to cause permanent hearing damage in humans (NIH 1990). Noise at the 85 dBA level has been correlated with hypertension in Rhesus monkeys (*Macaca fasicularis*) (Cornman 2001). Increased reproductive failure in laboratory mice (*Mus musculus*) was found to occur after a level of 82-85 dBA for one week (Cornman 2001). However, measurable loss of hearing was found to occur in chinchillas (*Chinchilla laniger*) at a sustained level of 70 dBA (Peters 1965). Hearing loss from motorcycle traffic has been documented for the kangaroo rat (*Dipodomys* species) (Bondello and Brattstrom 1979) and desert kangaroo rats (*Dipodomys deserti*) showed a significant reduction in reaction distance to the sidewinder (*Crotalus cerastes*) after exposure to 95 dBA (Cornman 2001). Other desert mammals appear to sustain the same impacts from noise (Bondello and Brattstrom 1979). Aircraft noise has produced accelerated heart-rates in pronghorn, bighorn sheep (*Ovis canadensis*), and elk (*Cervus elaphus*) (MacArthur 1976; Workman *et al.* 1992; all in U.S. National park Service (NPS) 1994).

Hearing loss is correlated with distance from the source of the noise. At a level of 110 dBA, guinea pigs (*Cavia porcellus*) suffered long-term hearing loss at distances of 25 and 50 meters, temporary loss at a distance of 100 meters, and no measurable loss at 1,500 meters (Gonzales *et al.* 1970). Over water, noise is reduced at a rate of 5 dBA for each doubling of the distance to the source (Komanoff & Shaw 2000). For instance, a noise that measured 20 dBA at 20 meters registers 10 dBA at 40 meters. This is computed as

$$\text{(noise at) } D = D_1 - 16.61 \left[\log (D/D_{water}) \right],$$

where D is the distance from source, D_1 is the noise level at source, and D_{water} is the distance over water. Over clear (i.e. unobstructed) land, sound diminishes slightly more quickly at 6 dBA per doubling of distance:

$$\text{(noise at) } D = D_1 - 19.93 \left[\log (D/D_{land}) \right],$$

(Komanoff & Shaw 2000). The effects of cumulative noise (α) are computed as the sum of the log of each component, multiplied by a magnitude of 10:

$$\alpha = 10 \left[\Sigma \left(\log A + \log B + \log C...... \right) \right],$$

where A, B, C, etc. are individual components of the total ambient noise. Thus, the total synergistic impact from noise will be greater than the sum of the individual components (Komanoff & Shaw 2000).

Harassment from long-term noise may cause kit foxes and kangaroo rats to eventually vacate the project site and adjacent areas. California condors (*Gymnogyps californianus*) have been shown to abandon nesting sites in response to vehicle noise (Shaw 1970). Grizzly bears (*Ursus arctos*), mountain goats (*Oreamnos canadensis*), caribou (*Rangifer* species), and bighorn sheep (*Ovis* spp.) have all been found to abandon foraging or calving areas in response to aircraft noise (Chadwick 1973; McCourt *et al.* 1974; Ballard 1975; Krausman and Hervert 1983; Gunn *et al.* 1985; Bleich 1990; all in NPS 1994).

Project effects on San Joaquin kit foxes are expected to be greater during the den selection, pregnancy, and early pup dependency periods of the breeding cycle (December through July) than at other times of the year. San Joaquin kit foxes may exhibit increased sensitivity to disturbance during this period and therefore, ideally, surface-disturbing activities should occur between August and November. Where this is possible, it is anticipated that surface-disturbing activities and other actions likely to result in harassment will be minimized in the vicinity of San Joaquin kit fox natal dens. Habitat compensation measures are anticipated to minimize habitat impacts due to project implementation.

The presence of roads in an area could result in the introduction of chemical contaminants to the site. Contaminants could be introduced in several ways. Substances used in road building materials or to recondition roads can leach out or wash off roads adjacent habitat. Vehicle exhaust emissions can include hazardous substances which may concentrate in soils along roads. Heavy metals such as lead, aluminum, iron, cadmium, copper, manganese, titanium, nickel, zinc, and boron are all emitted in vehicle exhaust (Trombulak and Frissell 2000). Concentrations of organic pollutants (e.. Dioxins, polychlorinated biphenyls) are higher in soils along roads (Benfenati *et al.* 1992). Ozone levels are higher in the air near roads (Trombulak and Frissell 2000). Vehicles may leak hazardous substances such as motor oil and antifreeze. Although the quantity leaked by a given vehicle may be minute, these substances can accumulate on roads and then get washed into the adjacent environment by runoff during rain storms. An immense variety of substances could be introduced during accidental spills of materials. Such spills can result from small containers falling off passing vehicles, or from accidents resulting in whole loads being spilled. Large spills may be partially or completely mitigated by clean-up efforts, depending on the substance.

San Joaquin kit foxes using areas adjacent to roads could be exposed to any contaminants that are present at the site. Exposure pathways could include inhalation, dermal contact, direct ingestion, ingestion of contaminated soil or plants, or consumption of contaminated prey. Exposure to contaminants could cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. Carcinogenic substances could cause genetic damage resulting in sterility, reduced productivity, or reduced fitness among progeny. Contaminants also may have the same effect on kit fox prey species. This could result in reduced prey abundance and diminished local carrying capacity for the kit fox.

Little information is available on the effects of contaminants on the San Joaquin kit fox. The effects may be difficult to detect. Morbidity or mortality likely would occur after the animals had left the contaminated site, and more subtle effects such as genetic damage could only be detected through intensive study and monitoring. However, effects have been detected on some occasions. At the Naval Petroleum Reserve, 3 kit foxes are known to have been killed by drowning in spills of crude oil (Cypher *et al.* 2000). Spiegel and Disney (1996) reported that a kit fox was found covered with crude oil at the Midway-Sunset oil field, and this individual died despite treatment. Other animals, some of which were prey species for the kit fox, were found drowned in crude oil at the Naval petroleum reserve (U.S. Department of Energy 1993). Such spills potentially can cause local reductions in the abundance of kit foxes and their prey.

Construction of roads can facilitate the invasion and establishment by species not native to the area. Disturbance and alteration of habitat adjacent to roads may create favorable conditions for non-native plants and animals. Can spread along roadsides and then into adjacent habitat. Son-native animals may use modified habitats adjacent to road to disperse into kit fox habitat. These exotic animals could compete with kit foxes for resources such as food or dens, or directly injure or kill kit foxes. Non-native plants and animals may reduce habitat quality for kit foxes or their prey, ad reduce the productivity or the local carrying capacity for the kit fox. Introductions of non-native species could cause kit foxes to alter behavioral patterns by avoiding or abandoning areas near road (Cypher 2000).

Disturbed areas adjacent to roads provide favorable habitat conditions for a number of non-native plant species. Some of these taxa are aggressively invasive and they can alter natural communities and potentially affect habitat quality. A problematic species within the range of the San Joaquin kit fox is yellow star thistle (*Centaurea melitensis*). Dense stands of this plant can form along roadsides and then spread into adjacent habitat. This plant displaces native vegetation, compete with native plants for resources, does not appear to be used by kit fox prey, dense growth, and may be difficult for kit foxes to move through due its large size (up to 1 meter or 3.3 feet tall), and numerous sharp spines (Cypher 2000). Other species that may disperse along roads and invade adjacent habitat include mustards (*Brassica* species) and Russian thistle (*Salsola tragus*) (Tellman 1997).

Disturbed soils and reduced competition from native plants are some of the conditions that facilitate invasion along roads by non-native plant species. Nitrogen from vehicle exhaust is deposited in habitats adjacent to roads, and the resulting enhanced nitrogen levels appear to promote growth of non-native species, particularly exotic grasses (Weiss 1999). These grasses, such as red brome create dense ground cover in the San Joaquin Valley, and this dense cover appears to reduce habitat quality for various small mammal species, such as kangaroo rats, which are an important prey for kit foxes (Goldingay *et al.* 1997; Cypher 2000).

Roads may serve as travel corridors for non-native red foxes. Red foxes can kill San Joaquin kit foxes (Ralls and White 1995; Service 1998), and likely compete with kit foxes for food and dens. Red foxes are considered a threat to the sift fox in Canada (Carbyn 1999). Red foxes are infrequently observed in large blocks of undisturbed habitat within the range of the San Joaquin kit fox, possibly due to the absence of permanent water or the presence of coyotes which prey upon red foxes. Along roads, water availability may be higher due to pooling of precipitation runoff or anthropogenic development, and coyotes may be less abundant due to the presence of humans. Roads may facilitate movements of red foxes and increase access to kit fox habitat. Non-native red foxes and feral cats are reported to use roads as movement corridors in Australia (Bennett 1991).

Negative effects to wildlife populations from roads may extend some distance from the actual road. The phenomenon can result from any of the effects already described in this biological opinion (e.g. vehicle-related mortality, habitat degradation, invasive exotic species, etc.). Forman and Deblinger (1998) described the area affected as the "road effect" zone. Along a 4-lane road in Massachusetts, they determined that this zone extend for an average of approximately 300 meters (980 feet) to either side of the road for an average total zone width of approximately 600 meters (1970 feet). However, in places they detected an effect >1 kilometer (0.6 mile) from the road. Rudolph *et al* (1999) detected reduced snake abundance up to 850 meters (2790 feet) from roads in Texas. They estimated snake abundance out to 850 meters (2790 feet), so the effect may have been greater. Extrapolating to a landscape sale, they concluded the effect of roads on snake populations in Texas likely was significant, given that approximately 79% of the land area of the Lone Star State is within 500 meters (1640 feet) of a road. The "road-zone" effects can be subtle. Van der Zandt *et al.* (1980) reported that lapwings (*Vanellus vanellus*) and black-tailed godwits (*Limosa limosa*) feeding at 480-2000 meters (1575-6560 feet) from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep (*Ovis canadensis*) increases near roads (MacArthur *et al.* 1979). Trombulak and Frossell (2000) described another type of "road-zone' effect. Heavy metal concentrations from vehicle exhaust were greatest within 20 meters (66 feet) of roads, by elevated levels of metals in both soil and plants were detected at ≥200 meters (660 feet of roads. The "road-zone" apparently varies with habitat type and traffic volume. Based on responses by birds, Forman (2000) estimated the effect sone along primary roads of 305 meters (1000 feet) in woodlands, 365 meters (1197 feet) in grasslands, and 810 meters (2657feet) in natural lands near urban areas. Along secondary roads with lower traffic volumes, the effect zone was 200 meters (656 feet). The "road zone" and the San Joaquin kit fox has not been adequately investigated; however, it is possible it exists given the effects of roads on the animal.

<u>Tipton Kangaroo Rat and Giant Kangaroo Rat</u>

The proposed State Route 46 project likely will result in be a number of adverse effects to the Tipton kangaroo rat and giant kangaroo rat. There is a likelihood of direct mortality to the animals from either crushing or entombment in burrows due to construction activities, vehicle strikes, falling into trenches or pits, being shot, being buried after becoming trapped in pipes, injured or killed by pet cats or dogs owned by construction related personnel, poisoned by rodenticides or other pesticides, injured or killed by predators attracted to construction-related food or trash at the site, harassment from noise and vibration. Giant kangaroo rats and Tipton kangaroo rats may be adversely affected by construction activities temporarily blocking travel corridors in grassland and agricultural areas, or by evening construction activities disturbing night time foraging. Tipton kangaroo rats and giant kangaroo rat may be adversely affected by construction activities temporarily blocking travel corridors in grassland and agricultural areas, or by evening construction activities disturbing night time foraging. The animals are likely to be subject to indirect effects including loss of their movement corridor caused by deaths due to vehicle strikes, loss of habitat, competitors, and a reduction in natural food sources as a result of habitat disturbance and loss. Tipton kangaroo rats and giant kangaroo rats inhabiting the project site and surrounding vicinity (for purposes of this biological opinion the surrounding vicinity is described as 300 meters [approximately 1000 feet] outside and adjacent to the project footprint) are likely to be subject to indirect effects including loss of their movement corridor caused by deaths due to vehicle strikes, loss of habitat, exotic predators, competitors, introduced non-native plants eliminating or reducing habitat, and a reduction in natural food sources as a result of habitat disturbance and loss.

Noise and vibration generated from vehicles, construction activities, and work crews could disrupt normal behavior of the Tipton kangaroo rat and giant kangaroo rat. This includes, but is not limited to foraging, reproduction, and ability to detect or avoid predators. The net effects of the project may result in temporal impacts on fecundity and behavior. The potential for harassment will be minimized by measures such as employee training and the presence of biological monitors. However, harassment to individuals from noise and vibration is inherent in this activity and unavoidable. Project vehicles may encounter Tipton kangaroo rats and giant kangaroo rats. Vehicle movement, and construction activities may cause these mammals to become confused or disoriented, thus exposing them to harm. Considering the small size and cryptic coloration of the Tipton kangaroo rat and giant kangaroo rat, it is likely that they could be crushed by vehicles driving in their habitat. Workers may trample Tipton kangaroo rats or giant kangaroo rats. Additionally, individuals of both of these listed animals who fall into holes and trenches can be injured or killed.

Various other work activities associated with the proposed project may also adversely affect the giant kangaroo rat and the Tipton kangaroo rat. Trash left during or after project activities could attract predators to work sites, which could subsequently harass or prey on the animals. For example, coyotes and raccoons are attracted to trash and also prey opportunistically on these rodents. The temporary disturbance of habitat could result in the spread or establishment on non-native invasive plant species which could eliminate habitat and food for these listed animals. Implementation of certain types of erosion control materials, such as plastic netting, could result in the entanglement and death of Tipton kangaroo rats and giant kangaroo rats within these material (Stuart *et al.* 2001). Increased levels of vehicles and increased vehicle speeds likely will lead to increase mortality level for the giant kangaroo rat and Tipton kangaroo rat in the action area. The State Route 46 project could potentially result in habitat fragmentation. The results of fragmentation are inhibition of genetic exchange between populations and impediments to recolonization of habitats from which populations have been extirpated. Small, isolated populations are substantially more vulnerable to stochastic events (e.g., aberrant weather patterns, fluctuations in availability of food) and may exhibit reduced adaptability to environmental (natural or anthropogenic) changes.

<u>Blunt-nosed Leopard Lizard</u>

The proposed State Route 46 project likely will result in be a number of adverse effects to the blunt-nosed leopard lizard. There is a likelihood of direct mortality to the animal from either crushing or entombment in burrows due to construction activities. The animals also may be adversely affected by vehicle strikes, and harassment from noise and vibration. Blunt-nosed leopard lizrads may be adversely affected by construction activities temporarily blocking travel corridors in grassland and agricultural areas, or by evening construction activities disturbing night time resting. Blunt-nosed leopard lizards inhabiting the project site and surrounding vicinity (for purposes of this biological opinion the surrounding vicinity is described as 300 meters [approximately 1000 feet] outside and adjacent to the project footprint) are likely to be subject to indirect effects including loss of its movement corridor caused by deaths due to vehicle strikes, loss of habitat, exotic predators, introduced competitors, and a reduction in natural food sources as a result of habitat disturbance and loss.

Noise and vibration generated from vehicles, construction activities, and work crews could disrupt normal behavior of the blunt-nosed leopard lizard. This includes, but is not limited to foraging, reproduction, and ability to detect or avoid predators. The net effects of the project may result in temporal impacts on fecundity and behavior. The potential for harassment will be minimized by measures such as employee training and the presence of biological monitors. However, harassment to individuals from noise and vibration is inherent in this activity and unavoidable. Project vehicles may encounter blunt-nosed leopard lizards. Vehicle movement, and construction activities may cause these animals to become confused or disoriented, thus exposing them to harm. Considering the relatively small size and cryptic coloration of the blunt-nosed leopard lizard, it is likely that it could be crushed by vehicles driving in their habitat. Workers may trample torpid blunt-nosed leopard lizards. Additionally, individuals of this listed animal who fall into holes and trenches can be injured or killed.

Various other work activities associated with the proposed project may also adversely affect the blunt-nosed leopard lizard. Trash left during or after project activities could attract predators to work sites, which could subsequently harass or prey on the animals. For example, coyotes and raccoons are attracted to trash and also could prey opportunistically on these listed reptiles. The temporary disturbance of habitat could result in the spread or establishment on non-native invasive plant species, which could eliminate habitat for the animal. Implementation of certain types of erosion control materials, such as plastic netting, could result in the entanglement and death of blunt-nosed leopard lizards within these material (Stuart *et al.* 2001). Increased levels of vehicles and increased vehicle speeds likely will lead to increase mortality level for the blunt-nosed leopard lizard in the action area. The State Route 46 project could potentially result in habitat fragmentation. The results of fragmentation are inhibition of genetic exchange between populations and impediments to recolonization of habitats from which populations have been extirpated. Small, isolated populations are substantially more vulnerable to stochastic events (e.g., aberrant weather patterns, fluctuations in availability of food) and may exhibit reduced adaptability to environmental (natural or anthropogenic) changes.

<u>Buena Vista Lake Shrew</u>

The proposed State Route 46 project likely will result in be a number of adverse effects to the Buena Vista Lake shrew. There is a likelihood of direct mortality to the animals from either crushing or being buried due to construction activities, vehicle strikes, falling into trenches or pits, being shot, being buried after becoming trapped in pipes, injured or killed by pet cats or dogs owned by construction related personnel, poisoned by rodenticides or other pesticides, injured or killed by predators attracted to construction-related food or trash at the site, harassment from noise and vibration. Buena Vista Lake shrews inhabiting the West Side Kern River Canal or other wetted areas in the action area are likely to be subject to indirect effects including deaths due to vehicle strikes, loss of habitat, exotic predators, introduced competitors, introduction of non-native plants that eliminate its habitat, and a reduction in natural food sources as a result of habitat disturbance and loss. Construction activities including vegetation removal and noise and vibrations may cause the shrews to flee, thus exposing them to a greater risk of predation.

Noise and vibration generated from vehicles, construction activities, and work crews could disrupt normal essential behavior of the Buena Vista Lake shrew. This includes, but is not limited to foraging, reproduction, and ability to detect or avoid predators. The net effects of the project may result in temporal impacts on fecundity and behavior. The potential for harassment will be minimized by measures such as employee training and the presence of biological monitors. However, harassment to individuals from noise and vibration is inherent in this activity and unavoidable. Project vehicle movement, and construction activities may cause these animals to become confused or disoriented, thus exposing them to harm. Considering the small size and cryptic coloration of the Buena Vista Lake shrew, it is likely that it could be crushed by vehicles driving in their habitat. Workers may trample Buena Vista Lake shrews.

Various other work activities associated with the proposed project may also adversely affect the Buena Vista Lake shrew. Trash left during or after project activities could attract predators to work sites, which could subsequently harass or prey on the animals. For example, coyotes and raccoons are attracted to trash and also could prey opportunistically on these soricids. The temporary disturbance of habitat could result in the spread or establishment on non-native invasive plant species, which could eliminate habitat for the animal. Implementation of certain types of erosion control materials, such as plastic netting, could result in the entanglement and death of Buena Vista Lake shrews within these materials (Stuart *et al.* 2001). Increased levels of vehicles and increased vehicle speeds could lead to increase mortality levels for the Buena Vista Lake shrew in the action area. The State Route 46 project could potentially result in habitat fragmentation. The results of fragmentation are inhibition of genetic exchange between populations and impediments to recolonization of habitats from which populations have been extirpated. Small, isolated populations are substantially more vulnerable to stochastic events (e.g., aberrant weather patterns, fluctuations in availability of food) and may exhibit reduced adaptability to environmental (natural or anthropogenic) changes.

Hoover's Woolly-star, San Joaquin wooly-threads, and California jewel-flower

Project-related vehicular traffic, grading of shoulders, excavation for culverts and utilities, and wildfires, should they inadvertently be started during project activities, could negatively affect local populations of the listed plant species addressed in this biological opinion. Except for the possibility of wildfires, these hazards will be greatest in the immediate vicinities of road shoulders, utility line corridors, and along cross-country travel routes if such routes are used. Actions related to construction, such as grading, excavation, clearing for equipment storage areas, and other ground-disturbing activities, may cause direct loss of plants and loss of occupied and potential habitat. In addition, these activities will increase the opportunities for introduction and dominance of aggressive, non-native plant species that are competitive with the listed and proposed plants. Construction through occupied habitat fragments populations and may restrict gene flow, thereby reducing the species' ability to survive.

Potential effects to listed plants include direct mortality from earth grading or excavation or crushing by vehicles. Adverse effects also could result from soil erosion resulting in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful as both current and future generations would be adversely affected.

Indirect effects of project activities on the listed plant species include loss of soil structure, fertility, water holding capacity, and cryptogamic crusts, which seem to be an essential microhabitat feature for some rare plant species. Fragmentation essentially isolates locations of plants from other locations so that cross-pollination between locations becomes unlikely. This isolation can result in distinct genetic populations and the ultimate decline in some species because of the lack of genetic variability within populations. Road improvements increase vehicular traffic and afford access for off-road vehicle use, which can fragment populations, and contribute to additional habitat damage

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. According to the EA, no new development besides the State Route 46 project is proposed in the project area. The EA stated that the project conforms to the San Luis Obispo County and Kern County General Plans. According to the EA, construction of the State Route 46 project is not expected to shift growth from one area to another. The EA stated that the proposed improvements would accommodate planned and existing growth in the study area; no growth inducing impacts are expected from the project. The EA claimed that due to existing constraints created by endangered species, land use policies and underlying zoning and the lack of adequate infrastructure, such as water and sewer lines to undeveloped properties, the State Route project is not expected to measurably accelerate growth in the study area.

Except for the Town of Lost Hills and the immediate vicinity, the area surrounding State Route 46 in the action area consists of ranchlands, croplands, and orchards. The planting of orchards, such as pistachio, will continue to reduce the amount of habitat for listed species, as well as the likely reduction or elimination of movement corridors for the San Joaquin kit fox.

Numerous non-Federal activities continue to eliminate habitat for the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, Buena Vista Lake shrew, Hoover's woolly-star, San Joaquin woolly-threads, and California jewelflower in the action area. Loss and degradation of habitat affecting both animals and plants continue as a result of urbanization; road and utility right-of-way management; flood control projects; overgrazing by livestock; and continuing agricultural expansion that may not be funded, permitted, or constructed by a Federal agency. Listed animal species are also affected by poisoning, shooting, increased predation associated with human development, ground squirrel reduction efforts, and reduction of food sources. Extirpation of several remaining populations of some of these species appears likely, due to chance fluctuation of small populations, unusual climatic events, or to the loss of genetic fitness commonly associated with very small population sizes. Upland, wetland, and riparian habitats used by the San Joaquin kit fox, Buena Vista Lake shrew, giant kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, Hoover's woolly-star, San Joaquin woolly-threads, and California jewelflower may be degraded or destroyed by a variety of development and maintenance activities conducted by private organizations, State, or local governments. These include levee maintenance and dredging, and dumping of waste material into sensitive habitats. Increased urban development has also increased problems associated with non-native predators, freshwater urban run-off, sedimentation, contaminants, and disturbance of breeding and foraging behavior. The cumulative effects of these known actions pose a significant threat to the eventual recovery of these species.

Conclusion

After reviewing the current status of the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista shrew, California jewelflower, San Joaquin woolly-star, and the Hoover's woolly-star, the environmental baseline for the action area, the effects of the proposed State Route 46 project from the San Luis Obispo County/Kern County line to post mile 37.5, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of these 8 listed species. Critical habitat for these listed species has not been designated or proposed; therefore none will be adversely modified or destroyed.

INCIDENTAL TAKE STATEMENT

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act, which refer to terms and conditions and exemptions on taking listed fish and wildlife species, do not apply to listed plant species. However, section 9(a)(2) of the Act prohibits removal, reduction to possession, and malicious damage or destruction of listed plant species on lands under Federal jurisdiction and the removal, cutting, digging up, or damaging or destroying such species in knowing violation of any State law or regulation, including State criminal trespass law. Actions funded, authorized or implemented by a Federal agency that could incidentally result in the damage or destruction of such species on Federal lands are not a violation of the Act, provided the Service determines in a biological opinion that the actions are not likely to jeopardize the continued existence of the species. However, the Service recommends that FHWA implement the actions listed under the *Conservation Recommendations* of this biological opinion for the State Route 46 project in order to fulfill, in part, their responsibilities under section 7(a)(1) of the Act.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the FHWA, as appropriate, in order for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service expects that incidental take of the San Joaquin kit fox, Tipton kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew will be difficult to detect or quantify for the following reasons: The nature of the organisms, and in the relatively small body sizes in the case of the Tipton kangaroo rat, giant kangaroo rat, Buena Vista Lake shrew, and blunt-nosed leopard lizard, make the finding of a dead specimen unlikely, losses may be masked by seasonal fluctuations in numbers or other causes, and the species occur in habitat that makes them difficult to detect. Due to the difficulty in quantifying the number of San Joaquin kit foxes, Tipton kangaroo rats, giant kangaroo rat, Buena Vista Lake Shrew, and blunt-nosed leopard lizards that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as all of these species inhabiting 489.8 acres (189.9 acres of temporary disturbance and 299.9 acres of permanent habitat loss) between the San Luis Obispo County/Kern County line and Interstate 5, as described in Biological Assessment 2, and the project description of this biological opinion; and 62.14 acres (20.34 acres of temporary habitat disturbance and 41.8 acres of permanent habitat loss) between Interstate 5 and post mile 37.5 as described in Biological Assessment 1, and the project description of this biological opinion. Due to the difficulty in quantifying take of the Buena Vista Lake shrews that will be taken as a result of the proposed action, the Service is quantifying incidental take as all individuals of the Buena Vista Lake shrews inhabiting 0.176 acre at the West Side Kern River Canal (first drainage with vegetation east of Interstate 5) that will be adversely affected by the widening of the State Route 46 bridge. Upon implementation of the following reasonable and prudent measures incidental take associated with State Route 46 project in the form of harm and harassment of San Joaquin kit fox from habitat loss and construction activities will become exempt from the prohibitions described under section 9 of the Act; death, injury, and harm of the Tipton kangaroo rat, giant kangaroo rat, and Buena Vista Lake shrew from habitat loss and construction activities; and harrassment of the blunt-nosed leopard lizard.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew; no critical habitat has been proposed or designated for any of these species, therefore, none will be adversely modified or destroyed.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effect of the State Route 46 project on the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew:

1. The FHWA and Caltrans will implement the project as described in the Biological Assessment and this biological opinion.

2. Reduce effects to the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew:

   A. Minimize the potential for harm, harassment, injury, or death through training, surveys, and specific protective measures.

   B. Minimize the potential for effects on the species due to loss of on-site habitat.

3. Ensure compliance with this biological opinion by Caltrans.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the FHWA shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):

a. The FHWA and Caltrans shall minimize the potential for harm, harassment, or killing of federally listed wildlife species resulting from project related activities by implementation of the project, including the conservation measures as described in Biological Assessment 1 and Biological Assessment 2, and appearing in the project description of this biological opinion.

b. Caltrans shall make the terms and conditions in this biological opinion a required term in all contracts for the project that are issued by Caltrans to all contractors. Caltrans shall provide the Chief of Endangered Species (Central Valley) at the Sacramento Fish and Wildlife Office with a hardcopy of the contract for this project at least ten (10) working days before Caltrans accepts or awards it.

2. The following Terms and Conditions implement Reasonable and Prudent Measure two (2):

a. To the maximum extent practicable, Caltrans shall incorporate adequately sized culverts under the road, overpasses, or other measures, to assist San Joaquin kit foxes in safely crossing the widened State Route 46. Caltrans shall provide the Service with an adequate report on which of these measures they will implement or the reasons why they will not be implemented within 60 calendar days of the issuance of the date of this biological opinion.

b. Permanent and temporary construction disturbances and other types of project-related disturbance to habitats of the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew shall be minimized to the maximum extent practicable. To minimize temporary disturbances, all project-related vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas also should be included in preconstruction surveys and, to the maximum extent possible, should be established in locations disturbed by previous activities to prevent further adverse effects.

c. Project-related vehicles shall observe a 20-mph speed limit within construction areas, except on County roads, and State and Federal highways; this is particularly important at night when the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, and Buena Vista Lake Shrew are most active. To the maximum extent possible, night-time construction should be minimized. Off-road traffic outside of designated project areas shall be prohibited.

d. To prevent inadvertent entrapment of San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew during the construction phase of a project, all excavated, steep-walled holes or trenches more than 0.61 m (2 ft) deep shall be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks. Before such holes or trenches are filled, they must be thoroughly inspected for trapped animals. If at any time a trapped listed animal is discovered, the on-site biologist should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the Service and/or California Department of Fish and Game shall be contacted by telephone for guidance. The Service shall be notified of the incident by telephone and electronic mail within one (1) working day.

e. San Joaquin kit foxes are attracted to den-like structures such as pipes and may enter stored pipe becoming trapped or injured. All construction pipes, culverts, or similar structures with a diameter of 10.16 centimeters (4 inches) or greater that are stored at a construction site for one or more overnight periods must be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If a kit fox is discovered inside a pipe, that section of pipe shall not be moved until the Service has been consulted by telephone. If necessary, and under the direct supervision of the on-site biologist, the pipe may be moved once to remove it from the path of construction activity, until the fox has escaped.

f. To eliminate an attraction to predators of the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and/or Buena Vista Lake shrew all food-related trash items such as wrappers, cans, bottles, and food scraps must be disposed of in closed containers and removed at least once every two (2) days from the entire project site.

g. To avoid injury or death of the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and/or Buena Vista Lake shrew except for authorized security personnel, or local, State, or Federal law enforcement officials, no firearms shall be allowed on the project site.

h. To prevent harassment, injury or mortality of San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and/or the Buena Vista Lake shrew, or destruction of their dens or burrows by dogs or cats, no canine or feline pets shall be permitted on the project site.

i. Plastic mono-filament netting (erosion control matting) or similar material shall not be used at the project because Tipton kangaroo rats, giant kangaroo rats, blunt-nosed leopard lizards, or Buena Vista Lake shrews may become entangled or trapped in it. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds

j. Use of rodenticides and herbicides at the project site shall be utilized in such a manner to prevent primary or secondary poisoning of Tipton kangaroo rats, giant kangaroo rats, Buena Vista Lake shrews, San Joaquin kit foxes, and the depletion of prey populations on which they depend. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other appropriate State and Federal regulations, as well as additional project-related restrictions deemed necessary by the Service or the California Department of Fish and Game.

k. A qualified biologist shall be on-site during all activities that may result in the take of the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rats, blunt-nosed leopard lizard, and/or the Buena Vista Lake shrew. The qualifications of the biologist must be presented to the Service for review and written approval prior to ground-breaking at the project site. The biologist shall be given the authority to stop any work that may result in take of these listed animal species. If the biologist(s) exercises this authority, the Service and the California Department of Fish and Game shall be notified by telephone and electronic mail within one (1) working day. The Service contact the Chief of Endangered Species Division at the Sacramento Fish and Wildlife Office at telephone 916/414-6600.

l. An employee education program on the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew must be conducted before groundbreaking for the State Route 46 project. The program should consist of a brief presentation by the on-site biologist, and legislative protection to explain endangered species concerns to all contractors, their employees, and agency personnel involved in the project. The program should include a description of the San Joaquin kit fox, Tipton kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew, and their habitat needs; an explanation of the status of these species and their protection under the Endangered Species Act; and a description of the measures being taken to reduce effects to these species during project construction and implementation. Caltrans shall submit written proof of the training to the Chief of the Endangered Species Division (Central Valley) at the Sacramento Fish and Wildlife Office within ten (1) working days of the completion of the training.

m. Upon completion of the project, all San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew habitat subject to temporary ground disturbances, including storage and staging areas, temporary roads, et cetera must be re-contoured, if appropriate, and revegetated with locally collected (e.g., within 10 miles of the project site) seeds and/or cuttings of appropriate native plant species to promote restoration of the area to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated. Caltrans shall ensure the methods and plant species used to revegetate using locally collected seeds or cuttings of appropriate native plant species have been approved by the Service. The on-site biologist shall ensure that areas subject to temporary disturbance have been adequately restored, and this information is included under the final reports described in 3.d. of the *Terms and Conditions* of this biological opinion.

n. The Service and the California Department of Fish and Game must be notified within one (1) working day of the death or injury to a San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and/or the Buena Vista Lake shrew that occurs due to project related activities or is observed at the project site. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. The Service contacts are the Chief of the Division of Endangered Species (Central Valley) at the Sacramento Fish and Wildlife Office, and the Resident Agent-in-Charge (Law Enforcement Division) at 916/414-6660. The California Department of Fish and Game contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, (916) 654-4262.

o. As described in Biological Assessment 2, fee title or conservation easements for 1108.59 acres of habitat for the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, and blunt-nosed leopard lizard for the portion of the project located between Interstate 5 and the Kern County/San Luis Obispo County line and Interstate Highway 5 within 4.5 miles of the centerline of State Route 46 shall be acquired in a location that would be reasonably be expected to maintain a north-south corridor for these species, especially the San Joaquin kit fox, as delineated as Figure 1 of this biological opinion. Caltrans shall obtain the written approval of the Service that the parcel(s) are suitable for the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, and blunt-nosed leopard lizard prior to acquiring interest in those lands. The fee title or conservation easements for the 1108.59 acres shall be obtained by Caltrans at least sixty (60) calendar days prior to the date of initial groundbreaking at the State Route 46 project.

p. As described in Biological Assessment 1, fee title or conservation easements for 147.79 acres of habitat for the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake Shrew for the portion of the project located between post mile 32.8 and post mile 37.5 on State Route 46 on the east side of Interstate 5 shall be acquired along State Route 46. The parcels shall be located between post mile 32.8 and post mile 37.5 on State Route 46, and within 4.5 miles of the centerline of State Route 46 as delineated as

Figure 2 of this biological opinion. The parcels shall contain undisturbed natural habitat for these species. Caltrans shall obtain the written approval of the Service that the parcel(s) are suitable for the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake Shrew prior to acquiring interest in those lands. The fee title or conservation easements shall be obtained by Caltrans at least sixty (60) calendar days prior to the date of the initial ground breaking at the State Route 46 project.

q. If conservation easements are used by Caltrans, they shall include, but not be limited to, provisions and responsibilities of the project proponent and the land trust organization approved by the Service for the protection of all habitats set aside including any future transfers of the easements or fee interest that may be anticipated. The easements shall specify the purposes for which it is established (*i.e.*, measures to minimize impacts to the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew associated with the State Route 46 project). Caltrans shall provide the Service with a true copy of the recorded conservation easements within thirty (30) calendar days of its recordation. The conservation easements shall be held by a third party approved by the Service. The conservation easement shall include a list of prohibited activities that are inconsistent with the maintenance of the preserve for the listed species including, but not limited to:

i. leveling, grading, landscaping, cultivation, or any other alterations of existing topography for any purposes, including the exploration for, or development of, mineral resources;
ii. placement of any new structures on the preserve, including buildings and billboards;
iii. discharge, dumping, burning, or storing of rubbish, garbage, grass clippings, dredge material, household chemicals, or any other wastes or fill materials within the preserve;
iv. building of any roads or trails within the preserve areas;
v. killing, removal, alteration, or replacement of any existing native vegetation except in Service-approved prescribed burning situations, or as otherwise authorized in writing by the Service;
vi. activities that may alter the hydrology of the preserve and the associated watersheds, including but not limited to: excessive pumping of groundwater, manipulation or blockage of natural drainages, inappropriate water application or placement of storm water drains, etc. unless authorized in writing by the Service;
vii. incompatible fire protection activities;
viii. use of pesticides, herbicides, or rodenticides on the preserve or within the watershed that can contaminate the preserve except as authorized in writing by the Service; and

ix. introduction of any exotic species or species not native to the area, including aquatic species, except as approved by the Service.

r. In the event Caltrans seeks to obtain a conservation easement in lieu of fee title acquisitions for the purposes of satisfying the requirements of the terms and conditions of this biological opinion, Caltrans shall provide the language of the proposed conservation easements to the Service for prior review and approval. The conservation easements shall include language establishing a right of entry by the Service to determine compliance with the terms and conditions of this biological opinion and the terms of the conservation easements, as well as identifying the Service as a third party beneficiary with the standing to take whatever legal action is necessary to enforce the terms of this conservation easement. Should Caltrans make fee title acquisition of lands to satisfy the terms and conditions of this biological opinion, Caltrans shall encumber such lands with restrictive covenants that provide the same rights to the Service as would be established under the conservation easement described above. Such restrictive covenants shall be provided to the Service for prior review and approval before they are recorded against the conservation lands.

s. At least sixty (60) calendar days prior to the date of initial ground breaking at the proposed State Route 46 project, Caltrans shall endow a Service-approved fund for monitoring and perpetual management and maintenance of the 1256.38 acres that have been protected by Caltrans under fee title and/or conservation easements. The principal in the endowment must generate sufficient revenue to fully cover the costs of ongoing operations and management actions as described in the Service-approved management plan and this biological opinion, without the need to make use of the principal to adequately fund such expenditures. Specific actions funded by the endowment shall be addressed in the Service-approved management plan. Caltrans shall utilize an appropriate third party who has been approved by the Service to determine what amount of money is necessary for an endowment fund to adequately finance the monitoring and perpetual management and maintenance of the preserve for the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew. Caltrans shall empower the Service to access and expend such funds to implement Service-approved remedial measures in the event the responsible preserve managers fail to adequately implement the Service-approved management plan. The final determination of success or failure of the management plan shall be made solely by the Service. Prior to the date of initial groundbreaking at the State Route 46 project, Caltrans shall provide the Service with documentation that: (1) funds for the perpetual management and maintenance of the 1256.38 acres have been transferred to the appropriate third party approved by the Service; (2) the third party has accepted the funds and considers them adequate; and (3) that these funds have been deposited in an account (*i.e.*, endowment) that will provide adequate financing for the monitoring and perpetual management and maintenance of the 1256.38 acres.

3. The following Terms and Conditions implement Reasonable and Prudent Measure three (3):

   a. If requested, before, during, or upon completion of ground breaking and construction activities, Caltrans shall allow access by Service and/or California Department of Fish and Game personnel to the project site to inspect project effects to the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew, and their habitats.

   b. Because of the potential for significant changes to the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, Buena Vista Lake shrew, and blunt-nosed leopard lizard and their habitats, compensation guidelines, and the species baseline prior to the start of ground breaking for this project, FHWA and Caltrans shall reinitiate formal consultation if the initial ground breaking for the project is greater than two (2) calendar years from the date of issuance of this biological opinion.

   c. FHWA shall ensure Caltrans provides the Service with adequate annual written reports that describe the progress of implementation of all of the *Terms and Conditions* of this biological opinion. The first report is due December 31, the first year of groundbreaking, and annually thereafter on December 31 until all of the terms and conditions are completed, as stated in writing by the Service. The reports shall be addressed to the Chief of the Endangered Species Division (Central Valley) , Sacramento Fish and Wildlife Office.

   d. Caltrans shall submit a post-construction compliance report prepared by the on-site biologist to the Sacramento Fish and Wildlife Office within 60 calendar days of the completion of construction activity or within 60 calendar days of any break in construction activity lasting more than 60 calendar days. This report shall detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Shrew, if any; (v) occurrences of incidental take of any of these four species; and (vi) other pertinent information. The reports shall be addressed to the Chief of the Endangered Species Division (Central Valley) , Sacramento Fish and Wildlife Office.

   e. The FHWA shall require Caltrans to report to the Service any information about take or suspected take of listed wildlife species not authorized in this biological opinion. Caltrans must notify the Service via electronic mail and telephone within 24 hours of receiving such information. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal, and photographs of the specific animal. The individual animal shall be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes custody of the specimen. The Service contacts are the Chief of the Endangered Species Division (Central Valley) , Sacramento Fish and Wildlife Office at 916/414-6600, and the Service's Law Enforcement Division at 916/414-6660.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases. We have the following conservation recommendations:

1. For the San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and Buena Vista Lake shrew:

   a. Caltrans should participate in the planning for regional habitat conservation plans for the kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, and the Buena Vista Lake shrew.

   b. The FHWA and Caltrans should continue to conduct or fund road mortality studies for these five listed species.

   c. The FHWA and Caltrans should incorporate wildlife overpasses and underpasses in highway/road design and construction in order to reduce vehicle-related injuries and deaths of San Joaquin kit foxes and other animals who are attempting to cross the roadways.

2. For the endangered California jewelflower, endangered San Joaquin woolly-threads, and the threatened Hoover's woolly-star:

   a. To minimize the introduction of exotic weeds, only certified weed-free straw/hay bales, if bales are used, should be used for erosion control or other purposes at the project.

   b. A worker awareness training program on the California jewelflower, San Joaquin woolly-threads, and the Hoover's woolly-star for construction personnel should be conducted before groundbreaking at the project. The program should provide workers with information on their responsibilities with regard to the California jewelflower, San Joaquin woolly-threads, and the Hoover's woolly-star, an overview of the life-history of these three listed species, and a description of the measures being taken to reduce effects to the species during project construction. Caltrans should submit proof of the training to the Chief of the Endangered Species Division (Central Valley) at the Sacramento Fish and Wildlife Office.

c. Lands acquired as compensation for adverse effects to listed animal species, as described in Biological Assessment 1, Biological Assessment 2, and the project description and the terms and conditions of this biological opinion, should contain populations of the California jewelflower, San Joaquin woolly-threads, and Hoover's woolly-star. Caltrans should obtain the written concurrence of the Service that these lands are adequate for the conservation of the listed plants prior to the acquisition of fee-title or conservation easement.

d. If conservation easements for the conservation of Hoover's woolly-star, San Joaquin woolly-threads, and the California used by Caltrans, they should include, but not be limited to, provisions and responsibilities of the project proponent and the land trust organization approved by the Service for the protection of all habitats set aside including any future transfers of the easements or fee interest that may be anticipated. The easements should specify the purposes for which it is established (*i.e.*, measures to minimize effects to these three listed plants associated with the State Route 46 project). Caltrans should provide the Service with a true copy of the recorded conservation easements within thirty (30) calendar days of its recordation. The conservation easements should be held by a third party approved by the Service. The conservation easement should include a list of prohibited activities that are inconsistent with the maintenance of the preserve for the listed species including, but not limited to:

i. leveling, grading, landscaping, cultivation, or any other alterations of existing topography for any purposes, including the exploration for, or development of, mineral resources;
ii. placement of any new structures on the preserve, including buildings and billboards;
iii. discharge, dumping, burning, or storing of rubbish, garbage, grass clippings, dredge material, household chemicals, or any other wastes or fill materials within the preserve;
iv. building of any roads or trails within the preserve areas;
v. killing, removal, alteration, or replacement of any existing native vegetation except in Service-approved prescribed burning situations, or as otherwise authorized in writing by the Service;

vi. activities that may alter the hydrology of the preserve and the associated watersheds, including but not limited to: excessive pumping of groundwater, manipulation or blockage of natural drainages, inappropriate water application or placement of storm water drains, etc. unless authorized in writing by the Service;

vii. incompatible fire protection activities;

viii. use of pesticides, herbicides, or rodenticides on the preserve or within the watershed that can contaminate the preserve except as authorized in writing by the Service; and

ix. introduction of any exotic species or species not native to the area, including aquatic species, except as approved by the Service.

e. In the event Caltrans seeks to obtain a conservation easement in lieu of fee title acquisitions for the purposes of conserving the San Joaquin woolly-threads, Hoover's woolly-star, and the California jewelflower, Caltrans should provide the language of the proposed conservation easements to the Service for prior review and approval. The conservation easements should include language establishing a right of entry by the Service to determine the status of the listed plants, and the terms of the conservation easements, as well as identifying the Service as a third party beneficiary with the standing to take whatever legal action is necessary to enforce the terms of the conservation easement. Should Caltrans make fee title acquisition of lands to protect the Hoover's woolly-star, San Joaquin woolly-threads, and the California jewlflower, Caltrans should encumber such lands with restrictive covenants that provide the same rights to the Service as would be established under the conservation easement described above. Such restrictive covenants should be provided to the Service for prior review and approval before they are recorded against the conservation lands.

f. At least sixty (60) calendar days prior to the date of initial ground breaking at the proposed State Route 46 project, Caltrans should endow a Service-approved fund for monitoring and perpetual management and maintenance of the Hoover's woolly-star, San Joaquin woolly-threads, and California jewelflower on the lands that have been protected by Caltrans under fee title and/or conservation easements. The principal in the endowment should generate sufficient revenue to fully cover the costs of ongoing operations and management actions for the listed plants as described in the Service-approved management plan without the need to make use of the principal to adequately fund such expenditures. Specific actions funded by the endowment should be addressed in the Service-approved management plan. Caltrans should utilize an appropriate third party who has been approved by the Service to determine what amount of money is necessary for an endowment fund to adequately finance the monitoring and perpetual management and maintenance of the preserve(s) for the San Joaquin woolly-threads, Hoover's woolly-star, and the California jewelflower. Caltrans should empower the Service to access and expend such funds to implement Service-approved remedial measures in the event the responsible preserve managers fail to adequately implement the Service-approved management plan. The final determination of success or failure of the management plan for the three listed plants should be made solely by the Service. Prior to the date of initial groundbreaking at the State Route 46 project, Caltrans should provide the Service with documentation that: (1) funds for the perpetual management and maintenance of the lands that have been protected for the three listed plants have been transferred to the appropriate third party approved by the Service; (2) the third party has accepted the funds and considers them adequate; and (3) that these funds have been deposited in an account (*i.e.*, endowment) that will provide adequate financing for the monitoring and perpetual management and maintenance of the three listed plants and their habitats.

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

REINITIATION--CLOSING STATEMENT

This concludes formal consultation on the proposed State Route 46 from the Kern County/San Luis Obispo County line to post mile 37.5 project. As provided in 50 CFR §402.16 and in the terms and conditions of this biological opinion, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the actual date that the initiation of the initial ground breaking is two (2) calendar years or more from the date of issuance of this biological opinion, (3) the amount or extent of incidental take is exceeded; (4) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (5) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (6) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact Chris Nagano, Deputy Assistant Field Supervisor (Endangered Species), of this Field Office at the letterhead address or at 916/414-6600, if you have questions concerning this biological opinion on the State Route 46 Project.

Sincerely,

Cay C. Goude
Acting Field Supervisor

cc:

California Department of Fish and Game, Fresno, California (Attn: Donna Daniels)
California Department of Fish and Game, Sacramento, California (Attn: Dee Warenycia)
California Department of Fish and Game, Sacramento, California (Attn: Ron Schlorff)
California Department of Transportation, Sacramento, California (Attn: Gary Winters)
California Department of Transportation, Sacramento, California (Attn: Katrina Pearce)
California Department of Transportation, Fresno, California (Attn: David Armes)
USFWS, Clovis, California (Attn: S.A. B. Dickerson)

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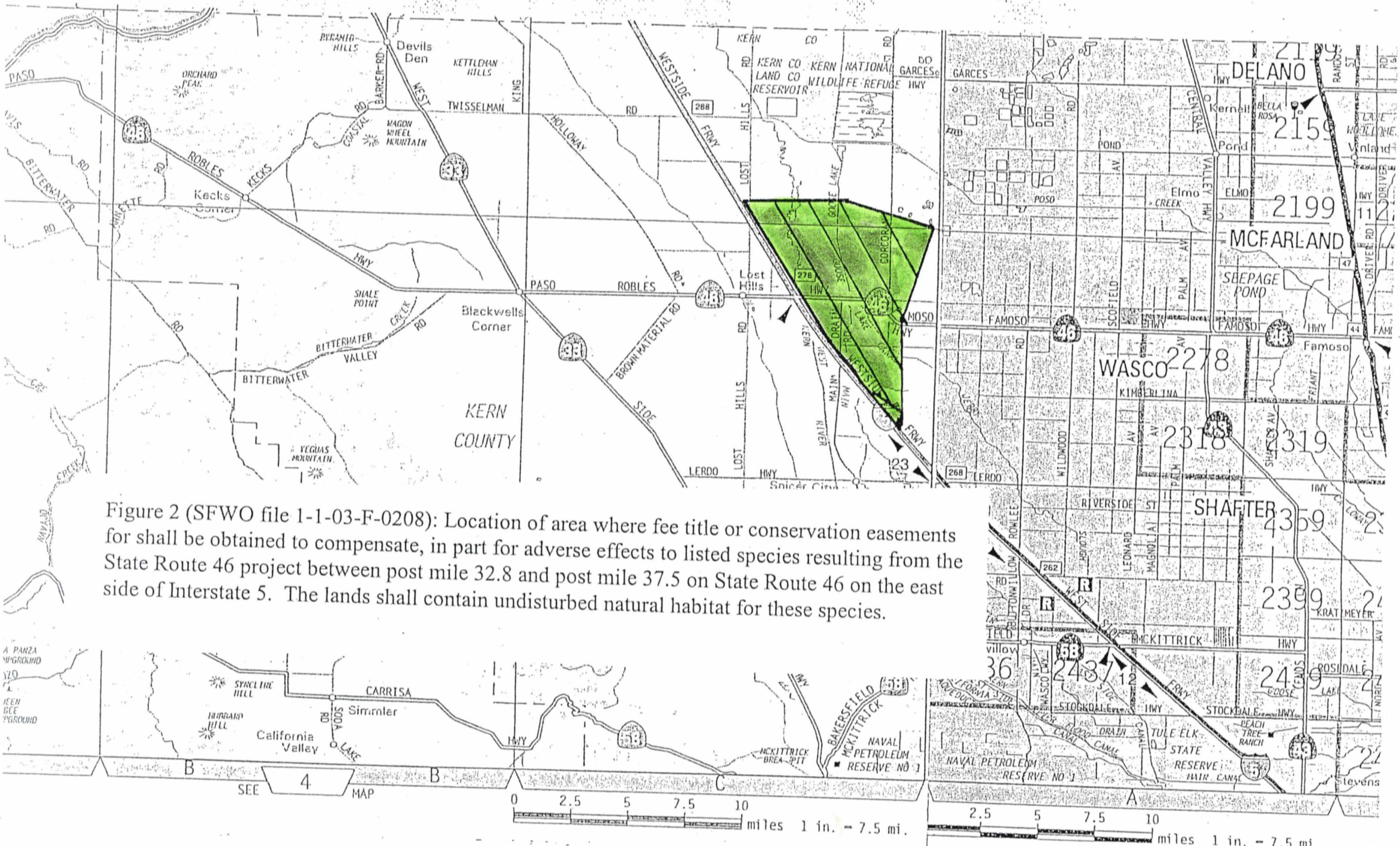

Figure 2 (SFWO file 1-1-03-F-0208): Location of area where fee title or conservation easements for shall be obtained to compensate, in part for adverse effects to listed species resulting from the State Route 46 project between post mile 32.8 and post mile 37.5 on State Route 46 on the east side of Interstate 5. The lands shall contain undisturbed natural habitat for these species.

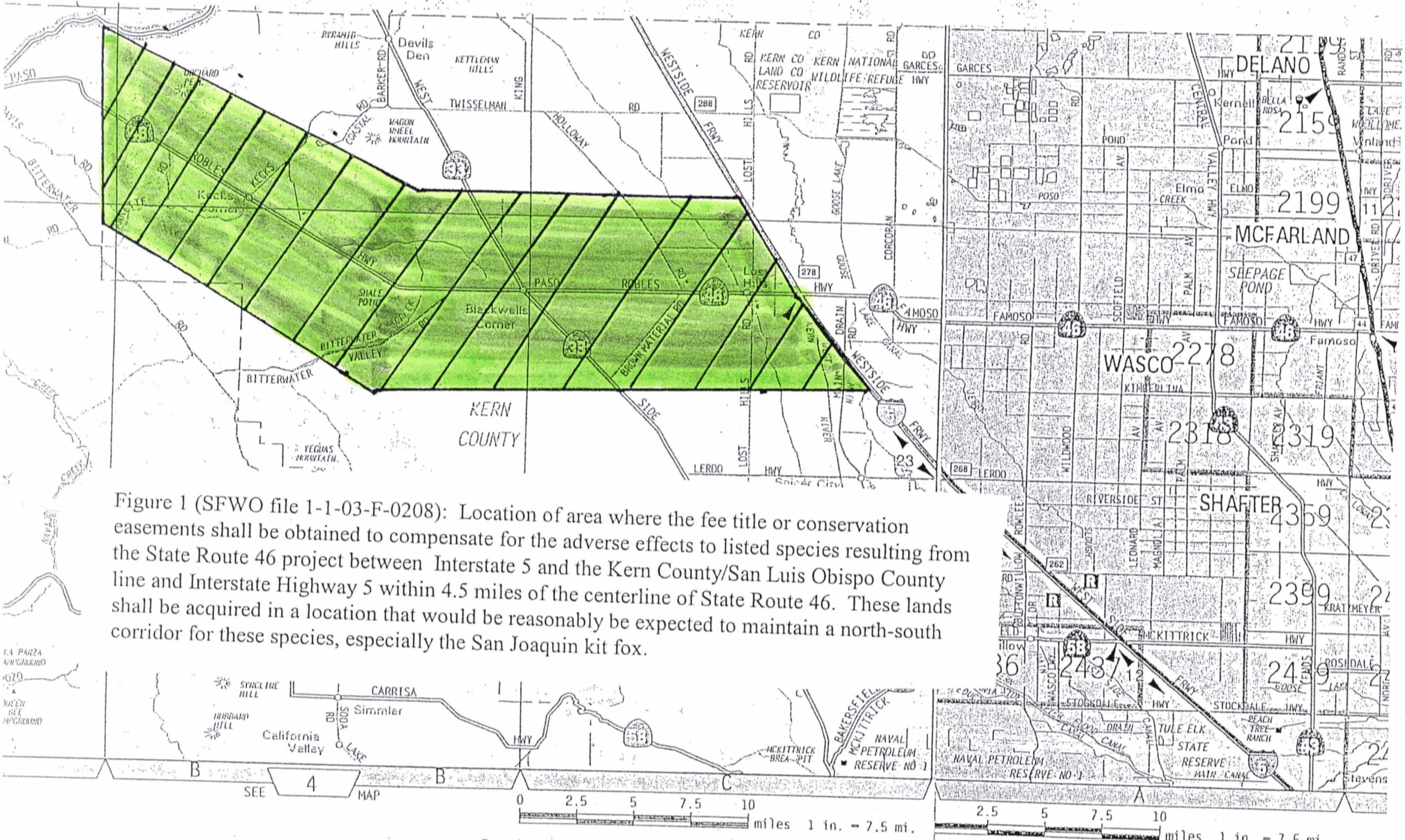

Figure 1 (SFWO file 1-1-03-F-0208): Location of area where the fee title or conservation easements shall be obtained to compensate for the adverse effects to listed species resulting from the State Route 46 project between Interstate 5 and the Kern County/San Luis Obispo County line and Interstate Highway 5 within 4.5 miles of the centerline of State Route 46. These lands shall be acquired in a location that would be reasonably be expected to maintain a north-south corridor for these species, especially the San Joaquin kit fox.

United States Department of the Interior

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In reply refer to:
1-1-07-F-0113

APR 4 2007

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Subject: Amendment of the Biological Opinion (File # 1-1-03-F-0367) for the Proposed State Route 46 4-Lane Widening Project from the San Luis Obispo County/Kern County line to mile post 37.5 in Kern County, California.

Dear Mr. Fong:

This letter is in response to your February 13, 2007 request to amend the Biological Opinion (BO) for the Proposed State Route (SR) 46 4-Lane Widening Project (Project). The U.S. Fish and Wildlife Service (Service) issued the BO (1-1-03-F-0367; change from 1-1-03-F-0208) for the State Route 46 Widening Project on September 22, 2003. The Service provided concurrence that the proposed project is likely to adversely affect the San Joaquin kit fox (*Vupes macrotis mutica*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), blunt-nosed leopard lizard (*Gambellia sila*), Hoover's wooly-star (*Eriastrum hooveri*), San Joaquin wooly-threads (*Monolopia congdonii*), California jewelflower (*Caulanthus californicus*), and Buena Vista Lake shrew (*Sorex inornatus relictus*). The Federal Highway Administration (FHWA) and the California Department of Transportation (Caltrans) are requesting that the Service amend the BO for the Project in order to account for (1) additional impacts that have been proposed to address road safety and utility company (ConocoPhilips, Pacific Gas and Electric [PG&E], and Verizon) needs during Phase 2 construction (post-mile [PM] 0.0 to 7.3), and (2) revised compensation for impacts to the Buena Vista Lake shrew (*Sorex ornatus relictus*).

Phase 2 Additional Work

North of the existing SR 46 from San Luis Obispo/Kern County line (PM 0.0 to PM 4.2)
The new alignment was adjusted to avoid the ConocoPhillips storage tanks located at the Antelope Pump Station and minimize highway crossings over the Department of Water Resources (DWR) facilities. At the request of ConocoPhillips, a 20-foot utility easement and a 100-foot temporary construction easement (TCE) will be required for relocation and construction of their facilities. The installation of their facilities will be accomplished by trenching, installing

pipe and then backfilling and compacting the topsoil. The impacts associated with the utility easement consist of temporary ground disturbance for placement of relocated utilities underground. The impact associated with TCE is grading. At the request of PG&E, a permanent easement will be added within the ConocoPhillips TCE. The proposed PG&E work includes relocation of transmission line poles, which will result in permanent impacts to the habitat totaling 0.002 acre. A total of 26 two-foot diameter poles spaced every 328 feet will be installed within a 1.3 miles section (PM 0.5 to 1.8); one pole will be located south of the existing SR 46.

Due to the minimal permanent impact associated with this work, compensation is not proposed. The impact is not likely to affect listed species and prior to the pole installation, pre-construction surveys will be conducted to avoid potential habitat. Temporary impacts north of SR 46 will be 31 acres and will be compensated for at a rate of preservation of 1.1:1.

South of the existing SR 46 between PM 0.0 and PM 7.3
Due to the erosion of a natural creek the runs parallel to SR 46 and into the Caltrans right-of-way, riprap will be placed at seven locations to prevent further deterioration of side slopes. Temporary impacts associated with this work include clearing and re-grading existing side slopes at 1:1.5 within identified areas and stacking 2-ton rock parallel to the slope at a thickness of 5 feet. Additional work to be conducted within this segment of SR 46 is to improve vertical and horizontal curves to meet Caltrans' stopping sight distance requirements. Permanent impacts associated with this work include backfilling in low points with soil and constructing a new structural section over the filled area. As a result of this change, the width of the cross-sectional area affected increased. Associated with these improvements is grading for cross culvert outlets at 12 spot locations. Temporary impacts at these 12 locations will consist of grading the proposed flow line to match the existing flow line. Additional temporary impacts include the relocation of PG&E power poles and Verizon fiber optic cable to utility easements south of existing SR 46. Work associated with the relocation of these utilities includes digging (with an auger) for power poles and trenching for underground fiber optic cable then backfilling in and compacting soil. The anticipated impacts from this additional work south of the existing SR 46 are 11.1 acres of permanent impacts and 11.5 acres of temporary impacts.

Phase 2 Habitat

The habitat that will be affected by the additional proposed construction consists entirely of non-native grassland, which is the same as described in the April 2002 Biological Assessment (BA). Proposed compensation for temporary impacts will include the restoration of the non-native grassland after disturbance to its previous condition within two years, along with a rate of preservation of 1.1:1.

Incidental Take

According to the BO (page 58), the Service quantified take incidental to the project as all of the listed species inhabiting 489.8 acres between the San Luis Obispo/Kern County line and Interstate 5 (I-5), and 62.14 acres between I-5 and PM 37.5. As a result of the additional work proposed between PM 0.0 and PM 7.3. The amount of incidental take of federally listed species that exceeds the original acreage is 53.6 acres, making for a total of 605.54 acres.

The following compensation ratios are proposed based on similar ratios approved by the Service in the BO.

Habitat Impacts	Acres of Impact	3:1	1.1:1	
Permanent impacts to non-native grassland	11.1 acres	33.3 acres	--	
Temporary impacts to non-native grassland	42.5 acres	--	46.75 acres	

Total area of compensation required for the additional activities described in this amendment is 80 acres.

As stated in the BO (page 63), fee title or conservation easements for 1108.59 acres for the portion of the project located between I-5 and the Kern/San Luis Obispo County line shall be acquired. Based on the table above, an additional 80 acres would also be included in the acquisition for the additional work proposed during Phase 2 construction. Caltrans will purchase fee title for at least 1188.59 acres owned by the Berrenda Mesa Water District. If acquired, the fee title for 1188.59 acres will then be transferred to the California Department of Fish and Game (CDFG) to be conserved in perpetuity.

<u>The following shall be amended to the BO (File # 1-1-03-F-0367):</u>

Of the **Terms and Conditions,** under part 2, Reasonable and Prudent Measures "O" (page 63):
"...fee title or conservation easements for 1108.59 acres..."

Shall be changed to:
"... fee title or conservation easements for 1188.59 acres..."

This change is made in order to reflect the additional proposed compensation for the impacts by the revised construction requirements for the project.

Of the **Terms and Conditions**, under part 2, Reasonable and Prudent Measures "P" (page 63): The inclusion of the Buena Vista lake shrew in this section shall be withdrawn, the fee title acquisition will exclude habitat for the Buena Vista Lake shrew due to minimal impacts (0.2 acre) anticipated to occur at the Kern River Channel during Phase 4 of construction. Caltrans proposes to compensate for the impacts to the shrew by the habitat restoration of an area, at minimum, 3 times that of the area of impact.

The following provision shall be added to the **Terms and Conditions,** part 2, Reasonable and Prudent Measures:

> "Prior to construction Caltrans shall conduct a pre-construction survey for the Buena Vista Lake shrew following Service approved protocol at the Main Flood Canal-Kern River (first drainage with vegetation east of Interstate 5). The survey effort will serve as one conservation strategy for the Buena Vista Lake shrew that may aid in the location and protection of additional extant populations within the Tulare Basin. If the survey confirms presence of the Buena Vista Lake shrew within the project area, additional avoidance and minimization measures, along with additional compensation will be discussed with the Service. Caltrans shall compensate on-site for potential loss of habitat of the Buena Vista Lake shrew. Compensation shall include the restoration and re-vegetation of in-kind riparian vegetation of the impacted riparian habitat along the Main Flood Canal-Kern River in the amount of a minimum of 0.25 acres of riparian habitat."

A new species has not been listed or critical habitat designated that may be affected by the action. Critical habitat for the California tiger salamander (*Ambystoma californiense*) central population has been designated within the Orchard Peak quadrangle (Unit 6, **FR**; August 23, 2005). However, the designated area will not be affected, as it is located approximately 4 miles southwest of the San Luis Obispo/Kern County line, which is the project limit. Critical habitat for the California red-legged frog (*Rana draytonii*) has been designated within the Orchard Peak quadrangle (Unit SLO-1, **FR**; April 13, 2006). However, the primary constituent elements for this species do not occur within the project area.

All pre-construction requirements mandated within the biological opinion will need to be completed as prescribed before the start of construction. In response to a June 28, 2006 electronic mail sent to the Service requesting written approval that the fee title for 1108.59 or more acres owned by the Berenda Mesa Water District, would be appropriate habitat to compensate for adverse effects resulting from this project, the Service did concur. With the above additional work the total number of acres proposed for compensation will be 1188.59 acres. The fee title shall be obtained by Caltrans at least sixty (60) days prior to the date of initial groundbreaking (item 2; o, Page 63). The fee title for the1188.59 acres will then be transferred to the California Department of Fish and Game and be conserved in perpetuity.

If you have any questions pertaining to this letter regarding the amending of the biological opinion for the proposed State Route 46 Widening Project, please contact Richard Montgomery or Susan P. Jones at (916) 414-6630.

Sincerely,

Kenneth Sanchez
Assistant Field Supervisor

cc:
Zachary Parker, Caltrans, Fresno, California
Steve Juarez, California Department of Fish and Game, Fresno, California