FOR CONTRACT NO.: 06-0L0504

INFORMATION HANDOUT

PERMITS

BIOLOGICAL OPINION (April 30, 2003)

AMENDMENT TO THE BIOLOGICAL OPINION (December 27, 2007)

(The Biological Opinion and the Amendment to the Biological Opinion were issued by the United States Fish and Wildlife Service. The requirements stated in these documents apply to the project with the Contract No. 06-0L0504, which is included in this bid package)

CENTRAL VALLEY FLOOD PROTECTION BOARD PERMIT

ROUTE: 06-Kin. Tul-198-R21.5/28.3, 0.0/R3.4

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO:
1-1-02-F-0218

APR 30 2003

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

Subject: Modification of State Route 198 from a Two-lane Highway to a Four-lane Highway in Kings and Tulare Counties, California

Dear Mr. Hamby :

This is in response to your May 18, 2001, request for formal consultation with the U.S. Fish and Wildlife Service (Service) on the State Route (SR) 198 modifications in Kings and Tulare counties, California. This document represents the Service's biological opinion on the effects of the proposed action on the endangered San Joaquin kit fox (*Vulpes macrotis mutica*; kit fox), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act).

This biological opinion is based on information provided in the March 2001, *Natural environmental study and biological assessment*; the May 18, 2001, *Kings-Tulare 198 expressway project proposal*; a visit to the proposed project site; and other sources of information available to the Service.

Consultation History

January 24, 2001. Maryann Owens of the Service conducted a visit to the project site with Tamara Nunes of The California Department of Transportation (Caltrans) and Annette Tenneboe of the California Department of Fish and Game (DFG).

March 2001. The Service received a biological assessment (BA) for the proposed project from Caltrans.

MAY 0 2 2003
FHWA SACRAMENTO

May 18, 2001. The Service received the project proposal from Caltrans.

July 9, 2001. The Service issued a letter to the Federal Highway Administration (FHWA) requesting additional information for the initiation of formal consultation on this project. This request included further information on the site description, project description, and proposed avoidance measures.

August 8, 2001. The Service received a letter from Caltrans describing a range of conservation measures they would implement to offset adverse effects to the kit fox.

July 25, 2002. Tamara Nunes advised Brian Peterson of the Service that Alternative # 4 would be implemented and that the new estimate of the permanent effects to the habitat of the kit fox was estimated to be 250 acres.

August 13, 2002. Tamara Nunes advised Brian Peterson that the estimated permanent effects to the habitat of the kit fox had been changed to 267 acres.

November 20, 2002. Caltrans sent the Service a letter stating the proposed project will result in permanent effects to 267 acres of San Joaquin kit fox habitat. Caltrans also included a schematic diagram of the project and a description of the method used by Caltrans to calculate the amount of permanent effects to the habitat of the kit fox.

BIOLOGICAL OPINION

Description of the Proposed Action

Caltrans and the FHWA, in cooperation with the Kings and Tulare County Association of Governments, are proposing to convert 10.1 miles of State Route (SR) 198 from a two-lane conventional highway to a four-lane expressway between 0.5 miles east of SR 43 and 0.4 miles west of SR 99 in Tulare and Kings counties. Five project alternatives were analyzed for environmental impacts. The alternative selected involves widening the existing two lane highway to four lanes to the north and removing all trees on the north side of the current right-of-way (ROW). This alternative would shift the existing centerline 21 feet to the north. This alternative differs from Alternative 1-3 because a 10 foot utility easement north of the proposed two new lanes would not be required. The 21-foot shift would allow for additional ROW south of the existing alignment and avoid a gas line relocation south of SR 198.

Project Purpose and Need

The existing facility serves as an interregional corridor for the San Joaquin Valley and connects the central coastal areas of California and the Sierra Nevada. This two-lane facility is bounded by a freeway at each end of the project limits and is the only segment within the route not expected to provide the conceptual level of service (LOS) in the year 2005. The purpose of this project is to improve traffic flow along the existing two-lane facility and reduce accident rates in Kings and Tulare counties. The purpose of this project is to provide route continuity, improve the LOS "C" and reduce the number of traffic accidents. As a result, there will be an increase in capacity of the existing alignment for traffic.

The project consists of the following elements:

1. Constructing two additional lanes with an 85-foot median.
2. Reconstructing the existing travel way with standard 12-foot traffic lanes and 10-foot outside shoulders with 5-foot inside shoulders.
3. Adding 143 feet of right-of-way (ROW) to the north.
4. Constructing an overcrossing along Road 68 spanning SR 198.
5. Constructing eight frontage roads (22 feet wide) at the following locations:
   a. At 7th Avenue from Post Mile (PM) 21.3 to PM 21.9, south of SR 198 (Kings Co.)
   b. At 7th Avenue from PM 21.6 to PM 21.9, north of SR 198 (Kings Co.)
   c. At 6th Avenue from PM 22.6 to PM 22.9, south of SR 198 (Kings Co.)
   d. At 6th Avenue from PM 22.9 to PM 23.3, south of SR 198 (Kings Co.)
   e. At 5th Avenue from PM 23.4 to PM 23.9, north of SR 198 (Kings Co.)
   f. At Road 1½ from PM 27.4 to PM 27.7, south of SR 198 (Kings Co.)
   g. Between Rd. 64/Rd. 68, from PM 2.5 to PM 3.0, north of SR 198 (Tulare Co.)
   h. At Road 68 from PM 3.0 to PM 3.3, south of SR 198 (Tulare Co.)

Affected Environment

The project area is located in western Tulare County and northeastern Kings County between 195 feet and 250 feet in elevation. The project is bounded on the west by SR 43 and on the east by SR 99. The topography is relatively flat with black walnut (*Juglans californica* var. *hindsii*) and eucalyptus (*Eucalyptus* sp.) lining both sides of the highway throughout most of the project area. The primary land use is agriculture, with the remaining land uses consisting of dairies interspersed with residences and schools. Agricultural land, fallow land, ruderal land, and waterways are the habitats that were identified within the Project Impact Area (PIA). A total of 267 acres of agricultural, fallow, and ruderal habitat will be impacted by the project. Each habitat type is described below

Agricultural Lands

Much of the cultivated agricultural lands within the PIA consist of row crops and walnut orchards. Orchards in California are typically open, single tree species dominated habitats. Depending on the tree type and pruning methods, they are usually low, bushy trees with an open understory to facilitate their harvest. Cultivated orchards provide poor habitat for most terrestrial wildlife due to disturbance from mechanical harvesting, pesticide application, regular watering regimes, and burning. However some common wildlife species, such as the California ground squirrel, (*Spermophilus beecheyi*) do well in cultivated agricultural lands. During spotlighting surveys, kit foxes were seen were seen more often in row crops than walnut orchards, however, one individual was sighted traveling through a walnut orchard.

One valley oak (*Quercus lobata*) will be removed as a result of this project. It is located within a cotton field 110 feet north of SR 198 and 0.2 miles west of Road 1½. The diameter breast height was measured at 41 inches classifying it as a heritage oak. Caltrans' landscaping will be re-planting valley oaks, as well as other native trees and shrubs, in order to compensate for the loss of this resource.

Fallow Habitat

Fallow habitats are areas that have been left unplanted or are otherwise inactive. Within the PIA, fallow habitat occurs on the southwest corner of 6th Avenue and SR 198 adjacent to a Portuguese language radio station. This area currently is disced yearly. The area was surveyed for habitat suitability and species presence, however, it was determined that the area did not contain suitable habitat for listed species, nor was any special-status plant species discovered.

Ruderal Habitat

Ruderal habitats are areas that have been greatly altered from their pristine state, primarily due to practices that require the removal of native vegetation and plowing. Within the PIA, ruderal habitat occurs along unpaved highway shoulders and weedy areas around buildings and between residences. Floral species observed within these areas include filaree (*Erodium sp.*), Russian thistle (*Salsola tragus*), and ripgut grass (*Bromus diandrus*). These plants are non-native, opportunistic species that quickly populate new and disturbed areas.

California ground squirrel and valley Botta's pocket gopher (*Thomomys bottae*) burrows were observed within these ruderal areas. A pair of red-tailed hawks (*Buteo jamaicensis*) was observed roosting within the ROW in a mature eucalyptus tree located near Cross Creek.

Waterways

New bridges will be constructed at Cross Creek and Lakeside Canal. In addition, the existing bridges over Cross Creek and Lakeside Canal will be widened to the north. Pipe and/or box culverts will be extended for all other ditches and canals. No special-status species or supporting habitats were observed within or adjacent to Cross Creek, however there is a wetland within Cross Creek. Species observed include bullfrog (*Rana catesbeiana*) and carp (*Cyprinus carpio*). A Streambed Alteration Agreement pursuant to section 1601 of the California Fish and Game Code will be obtained for construction within Cross Creek, and possibly the ditches and canals. A wetland delineation report will be sent to the Army Corps of Engineers for verification purposes. A Clean Water Act (CWA) Section 404 Nationwide Permit #14 will be required for Cross Creek, as well as a CWA Section 401 water quality certification required by the State Regional Water Quality Control Board (SRWQCB).

Field Surveys

Field surveys were conducted by Caltrans for habitat assessments and species presence determinations. Onsite field reviews were conducted to determine the habitat types and land uses occurring within and adjacent to the project area. Swainson's hawk (*Buteo swansoni*) surveys were conducted in accordance with the California Department of Fish and Game (DFG) survey protocol (1994) within a 10-mile radius of the project site between March and May 2000. San Joaquin kit fox spotlighting surveys were conducted in accordance with the DFG *Approved Survey Methodology for Sensitive Species San Joaquin kit fox* (1990) within a 2-mile radius of the project site in August 2000. Ruderal and fallow habitats were surveyed for presence of small mammals, burrowing owls (*Athene cunicularia*), and kit foxes. In addition, track stations were set up near potential den sites.

Survey Results

Swainson's Hawk Surveys

Active Swainson's hawk or other raptor nests were not observed within the PIA during surveys. Active red-tailed hawk nests were found between 2 - 5 miles away from the PIA. Approximately 25 migrating Swainson's hawks were sighted above a cotton field located on the southeast corner of Grangeville Blvd and SR 43 on August 15, 2000. This area is approximately two miles north of the PIA.

Track Stations

In August 2000, Caltrans biologists set track stations at locations where potential kit fox sign was identified within the PIA. The two locations were the SR 99/SR 198 interchange, due to presence of dens, and below SR 198 bridge over Cross Creek, due to presence of tracks. The dens located at the SR 99/SR 198 interchange were determined to be inhabited by California ground squirrels and no kit fox tracks were revealed along Cross Creek.

Spotlighting Surveys

In August 2000, Caltrans biologists also conducted spotlighting surveys within the PIA, and a two-mile radius around the PIA. Kit foxes were found approximately 2 - 5 miles from the project footprint at the following locations:

- Two kit foxes were found in a retention basin north of Doe Avenue between Shirk Road and Kelsey Avenue, Visalia, Tulare County; USGS 7.5 minute quadrangle GOSHEN, T18S, R24E, Section 21;
- Two kit foxes were found in a field behind a warehouse parking lot southwest of Clancy Street and Doe Avenue, Visalia, Tulare County; USGS 7.5 minute quadrangle GOSHEN, T18S, R24E, Section 21;
- Four kit foxes were found adjacent to a warehouse construction site on the northwest corner of Goshen Avenue and Plaza Drive, Visalia, Tulare County; USGS 7.5 minute quadrangle GOSHEN, T18S, R24E, Section 20; and
- One kit fox was found in a walnut orchard south of Houston Avenue and west of SR 43, Hanford, Kings County; USGS 7.5 minute quadrangle HANFORD, T19S, R21E, Section 11.

Proposed Conservation Measures

The kit fox sightings in the action area are found mostly near Cross Creek, which is utilized as a movement corridor. The waterway is dry most of the time but even when water is present there is enough space for kit foxes to move along the embankments. Caltrans will maintain sufficient space on either side of Cross Creek, under the highway bridge, for kit fox to pass at all water levels.

Caltrans will compensate for permanent effects with land acquisition at a ratio of 1.1 to 1 for impacts to 267 acres of kit fox habitat. Caltrans has committed to purchase 293 acres of land at a Service approved site. No temporary effects are expected to occur as all work will be done in areas that will be permanently effected.

Caltrans will implement procedures to deal with issues regarding listed species and borrow sites and other work performed outside the SR 198 right-of-way. They will provide the documentation prior to the use of the material at the site. The actions Caltrans will implement are:

(1) Caltrans, as the designated non-Federal representative under the Section 7 consultation, will require as part of the construction contract that all contractors comply with the Act in the performance of the work necessary for project completion but performed outside the SR 198 Project right-of-way.

(2) Caltrans will require documentation from the contractor that aggregate utilized in this project was obtained in compliance with the Act. Evidence of compliance with the Act will be satisfied by providing the Resident Engineer any one of the following: (1) a letter of compliance from the Service; (2) an incidental take permit pursuant to section 10(a)(1) (B), a biological opinion ,or concurrence with a "not likely to adversely affect" determination issued from the Service to the Federal Highway Administration or; 4) A properly documented "no effect" determination by the Federal lead agency, or their non-Federal representative, or pursuant to section 3703 of the California State Mining Reclamation Act.

Status of the Species and Environmental Baseline

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 (9-11 pounds) red fox (*Vulpes vulpes*). Gray foxes (*Urocyon cinereoargenteus*) are similar in coloration to the San Joaquin kit fox, but are heavier (about 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 1998). 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 1998).

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 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 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 1999). 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 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).

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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 endangered 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 rabbits (*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,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 endangered 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.

According to the biological assessment and the 11-20-02 letter from Caltrans to the Service, the pproposed project will result in permanent adverse effects to 267 acres of San Joaquin kit fox habitat.

2) <u>Competitive Interactions with Other Canids</u>: 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 radiocollared 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 1999). 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 1999), 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 (*Alopex lagopus*)(Hersteinsson and Macdonald 1982). 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 live trapping 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 San Luis Obispo 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, 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 found that it 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 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 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 incidents of potential section 9 violations and possible 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, 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).

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.

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.

There is a sighting of the San Joaquin kit fox adjacent to the project footprint and several sightings of the animal within 5 miles of the project (Caltrans 2000 survey; ESRP and CNDDB 2003). San Joaquin kit foxes may move 9 miles or more in a single night (USFWS 1998). Areas of suitable habitat exist within the project footprint in the form of ruderal grasslands and agricultural lands. Suitable habitat also is found adjacent to the project. Therefore, given the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the project, as well as the recent records, the San Joaquin kit fox is reasonably certain to inhabit the action area and it is reasonably certain it will be adversely affected by the proposed project.

Effects of the Proposed Action

<u>San Joaquin kit fox</u>

The proposed SR 198 Road modification project likely will result in 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. The animals also may be adversely affected by vehicle strikes, and 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 approximately 1000 feet outside and adjacent to the project footprint) are likely to be subject to indirect effects including death due to

vehicle strikes, loss of habitat, exotic predators, competitors, and non-native plants, and a reduction in natural food sources as a result of habitat disturbance and loss.

Construction and widening of the SR 198 Road Modification project will result in the loss, fragmentation, and degradation of 267 acres 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.

The proposed borrow sites for the SR 198 Road Modification project are locations where the contractors will obtain dirt and other fill material for project construction. Digging and removal of the fill material, and associated vehicle and construction activities could adversely affect the San Joaquin kit fox through death, injury, harm, harassment, destruction of burrows, and loss of habitat. The location, size, and implementation of the borrow sites have not been adequately analyzed in the biological assessment for possible adverse effects to the San Joaquin kit fox and other listed species.

Range-wide habitat loss, fragmentation, and degradation from multiple factors is the primary threat to the San Joaquin kit fox (Service 1998). Approximately 95% of native habitat for kit fox habitat in the San Joaquin Valley ha 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 a nd current habitat loss directly attributable to road has not been calculated. Estimates of the area occupied by roads under the jurisdiction of Caltrans includes 591 acres for Kings County, 1065 acres for Merced County, 2019 acres for Fresno County, and 3669 acres for Kern County (Cypher 2000). These estimates are based on a standard lane width of 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 to effects: (1) reduction in access to habitat as well as habitat suitability, and (2) disruption of movements, 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 feces 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 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 frm from 1.7 square miles to 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 (*Lynx canadensis*) 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.* 1974).

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 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 dead 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 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 (U.S. Fish and Wildlife 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 therefor 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 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 (78 miles vs. 41 miles). 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 30-20 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. However, harassment from long-term noise may cause kit foxes to eventually vacate the project site and adjacent areas. 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 antelope, bighorn sheep (*Ovis canadensis*), and elk (*Cervus elaphus*) (MacArthur 1976; Workman *et al* 1992; all in U.S. National Park Service 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 82 feet and 164 feet, temporary loss at a distance of 328 feet, and no measurable loss at 4,921 feet (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). Endangered 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.g. 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 that can then spread along roadsides and into adjacent habitat. Non-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, competes 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 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 (*Bromus madritensis rubens*) 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 swift 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 (*Felis catus*) 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 980 feet to either side of the road for an average total zone width of approximately 1,970 feet. However, in places they detected an effect 0.6 mile from the road Rudolph *et al* (1999) detected reduced snake abundance up to 2,790 feet from roads in Texas. They estimated snake abundance out to 2,790 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 1,640 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 1575-6560 feet from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep 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 66 feet of roads, by elevated levels of metals in both soil and plants were detected at 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 1000 feet in woodlands, 1197 feet in grasslands, and 2657 feet in natural lands near urban areas. Along secondary roads with lower traffic volumes, the effect zone was 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.

The proposed project will increase road size and traffic volume on a road that already presents a major obstacle to kit fox moving north-south. The traffic forecast study conducted for the proposed project estimates the traffic on SR 198 to increase in Kings County from 10,700 average daily trips (ADT) in 1998 to 22,400 ADT in 2018 and to increase in Tulare County from 13, 100 ADT in 1998 to 20, 000 ADT in 2018.

Cumulative Effects

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

Various non-Federal activities continue to eliminate habitat for the kit fox 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 some of the remaining populations of the kit fox may occur due to chance fluctuation of small populations, unusual climatic events, or to the loss of genetic fitness commonly associated with very small population sizes. The cumulative effects of these known actions pose a significant threat to the eventual recovery of the San Joaquin kit fox.

Conclusion

After reviewing the current status of the San Joaquin kit fox, the environmental baseline for the action area, the effects of the proposed SR198 expressway modifications and the cumulative effects, it is the Service's biological opinion that the SR 198 modifications project, as proposed, is not likely to jeopardize the continued existence this endangered species. No critical habitat has 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 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 as significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the agency so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If 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. Because of the potential for significant changes to existing habitat, compensation guidelines, and the species baseline prior to the start of construction for this project, the Terms and Conditions of this biological opinion include a requirement to reinitiate formal consultation if the actual construction start date is greater than 5 years from the date of issuance of this biological opinion.

Amount or Extent of Take

After reviewing the project as proposed, the Service anticipates the incidental take of San Joaquin kit foxes will occur as a result of implementing the action. The Service has developed reasonable and prudent measures in order to further minimize effects to listed species.

The Service expects that incidental take of the San Joaquin kit fox will be difficult to detect or quantify for the following reasons. The San Joaquin kit fox lives in dens and burrows, has a wide ranging territory, is primarily active at night, and often is extremely shy in its behavior around humans. Losses as a result of the action are difficult to quantify as there also may be seasonal fluctuations in numbers or distribution. Due to the difficulty in quantifying the number of San Joaquin kit foxes that will be taken as a result of the proposed action, the Service is quantifying take incidental to the project as the number of acres of habitat that will become unsuitable for this species as a result of the action.

Therefore, the Service estimates that all San Joaquin kit fox inhabiting 267 acres will be subject to incidental take as a result of the proposed action. Upon implementation of the following reasonable and prudent measures, incidental take of the San Joaquin kit fox associated with the State Route 198 modification project on 267 acres in the form of harm and harassment will become exempt from the prohibitions of section 9 of the Act.

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; critical habitat has not been designated or proposed for this 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 effects of the State Route 198 modification project on the San Joaquin kit fox.

1. Ensure compliance with this biological opinion by Caltrans and their contractors.

2. Implement conservation measures for the San Joaquin kit foxes to minimize (1) the incidental take of the San Joaquin kit fox that will occur as a result of the project; and (2) the potential for inadvertent capture or entrapment of the San Joaquin kit fox during construction activities.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, FHWA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are not discretionary.

A. The following Term and Condition will implement Reasonable and Prudent Measure number one:

   1. FHWA or Caltrans shall ensure that the project and conservation measures, as described in the *Natural Environmental Study and Biological Assessment* dated March, 2001, *Kings-Tulare 198 Expressway Project Proposal*, dated May 18, 2001 and *Description of the Proposed Action* and the *Proposed Conservation Measures* in this biological opinion, including contractor compliance on borrow sites, are fully implemented.

B. The following Terms and Conditions will implement Reasonable and Prudent Measure number two:

   1. Caltrans shall ensure that the following measures are implemented:

a. High visibility 5-foot tall fencing shall be placed to prevent encroachment of construction personnel and equipment onto any sensitive San Joaquin kit fox habitat during project work activities. Such fencing shall be inspected and maintained daily until completion of the project. The fencing will be removed only when all construction equipment is removed from the site.

b. An employee education program on the San Joaquin kit fox shall be conducted for construction personnel before groundbreaking for the SR 198 road modification project. The program shall consist of a brief presentation by a biologist knowledgeable about the kit fox to explain the animal and its habitat needs; an explanation of the status of the species and its protection under the Endangered Species Act; and a description of the measures being taken to reduce effects to the species during project construction. Caltrans shall submit proof of the training to the Chief of the Endangered Species Division (Central Valley) , at the Sacramento Fish and Wildlife Office.

c. Permanent and temporary construction disturbances and other types of project-related disturbance to San Joaquin kit fox habitat 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, shall be established in locations disturbed by previous activities to prevent further adverse effects.

d. 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 San Joaquin kit foxes 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.

e. To prevent inadvertent entrapment of San Joaquin kit foxes or other animals during the construction phase of a project, all excavated, steep-walled holes or trenches more than 2 feet 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 kit fox is discovered, the on-site biologist

should immediately place escape ramps or other appropriate structures to allow the animal to escape, or the Service shall be immediately contacted for guidance. If a kit fox(es) is released at the site, the Service shall be notified of the incident by telephone and electronic mail within one (1) working day.

f. 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 4 inches or greater that are stored at a construction site for one or more overnight periods shall be thoroughly inspected for kit foxes before the pipes are 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 animal has left the pipe under the direct monitoring of the on-site biologist.

g. Only Service-approved biologists may trap, capture, handle, and release San Joaquin kit fox that become trapped in ditches or pipes. All relocations must have prior approval from the Service.

h. To eliminate an attraction to predators of the San Joaquin kit fox, all food-related trash items such as wrappers, cans, bottles, and food scraps shall be disposed of in closed containers and removed at least once a week from the entire project site.

i. To avoid injury or death of the San Joaquin kit fox, except for authorized security personnel, or local, State, or Federal law enforcement officials, no firearms shall be allowed on the project site.

j. To prevent harassment, injury or mortality of San Joaquin kit foxes, or destruction of dens by dogs or cats, no canine or feline pets shall be permitted on the project site.

k. Upon completion of the project, all San Joaquin kit fox habitat subject to temporary ground disturbances, including storage and staging areas, temporary roads, et cetera shall be re-contoured if appropriate, and revegetated with appropriate locally collected 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. Appropriate methods

and plant species used to revegetate such areas should be determined on a site-specific basis in consultation with the Service, and the California Department of Fish and Game.

l. A qualified biologist shall be on-site or on-call during all activities that could result in the take of the San Joaquin kit fox. The qualifications of the biologist shall be presented to the Service for review and approval prior to any ground-breaking at the project site. The biologist shall be given the authority to stop any work or activities that may result in take of the San Joaquin kit fox. If the biologists exercises this authority, the Service and the California Department of Fish and Game must be notified within one (1) working day.

m The Sacramento Fish and Wildlife Office and the California Department of Fish and Game shall be notified within one (1) working day of the death or injury to a San Joaquin kit fox 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 and any other pertinent information. The Service contact is the Chief of the Division of Endangered Species, at the addresses and telephone numbers given below. The California Department of Fish and Game contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, (916) 654-4262.

4. As described in the *Environmental Study and Biological Assessment*, and Project Description of this biological opinion, Caltrans has identified the need to purchase, protect, and manage 293 acres of San Joaquin kit fox habitat. Caltrans shall ensure that the Service has approved in writing of all parcels prior to their acquisition. The Center For Natural Lands Management has been identified as a potential agent that may be able to provide assistance to Caltrans in identifying, acquiring, and/or managing conservation parcels.

5. Caltrans shall ensure that 293 acres of San Joaquin kit fox habitat are protected in perpetuity through a conservation easement. Caltrans shall ensure that any proposed conservation easements are reviewed and approved of by the Service. Caltrans shall have the specific elements of the conservation easement legally recorded before the initiation of groundbreaking at the project site.

6. Caltrans shall implement a management plan that has been approved of in writing by the Service for the 293 acres of San Joaquin kit fox habitat.

7. Caltrans shall conduct a Parcel Analysis Record (PAR) to determine the appropriate amount for a non-wasting endowment that will be used to manage the conservation land. The results of the PAR will be approved by the title holder (DFG or conservation organization) and the Service. Caltrans shall provide the identified endowment amount to the management entity prior to any groundbreaking at the project site.

8. Caltrans, upon completion of construction, will replace all excavated San Joaquin kit fox dens with artificial dens on a 2:1 basis in the 293 acres of San Joaquin kit fox habitat.

9. Every six months, Caltrans shall report to the Service the projected start date of construction, and the progress on meeting the conservation requirements for this project.

10. A post-construction report detailing compliance with the terms and conditions of this biological opinion shall be provided to the Service within 30 days of the date that construction at the project site is finished.

11. FHWA shall ensure the reporting requirements, as detailed below, are implemented and completed by Caltrans.

12. Because of the potential for significant changes to existing habitat, compensation guidelines, and the species baseline prior to the start of construction for this project, Caltrans shall reinitiate formal consultation if the start of ground breaking activities at the project site is greater than 5 calendar years from the date of issuance of this biological opinion.

Reporting Requirements

The Sacramento Fish and Wildlife Office is to be notified within three working days of the finding of any dead listed wildlife species or any unanticipated harm to the San Joaquin kit fox. The Service contact person for this is the Chief, Endangered Species Diversion at (916) 414-6620. FHWA must require Caltrans to report to the Service immediately any information about take or suspected take of listed wildlife species not authorized in this biological opinion. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal. The Service contact is 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.

The Service recommends the following actions to protect federally listed species and their habitats in conjunction with the proposed project:

1. Locate, map, and protect existing populations of the San Joaquin kit fox, (Recovery Plan Tasks 2.2.17 and 2.2.24 in the Upland Species of the San Joaquin Valley Recovery Plan).

2. Protect and create additional habitat for kit fox in key portions of its range (Recovery Plan Tasks 2.1.19 in the [Upland Species of the San Joaquin Valley Recovery Plan]).

3. Gather additional data on population responses to environmental variation at representative sites in their extant geographic range (Recovery Plan Task 3.2.21 of [Upland Species of the San Joaquin Valley Recovery Plan).

4. Determine appropriate habitat management and compatible land uses for the San Joaquin kit fox, (Recovery Plan Task 4.5.7 in [Upland Species of the San Joaquin Valley Recovery Plan]).

REINITIATION–CLOSING STATEMENT

This concludes formal consultation on the State Route 198 modification project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this biological opinion on the proposed modification of State Route 198 from a two-lane highway to a four-lane highway in Kings and Tulare Counties, California, please contact Brian Peterson or Chris Nagano at the letterhead address or at 916/414-6600.

Sincerely,

Chris Nagano

for Ken Sanchez
Acting Field Supervisor

Enclosure(s)

cc:
California Department of Fish and Game, Fresno, CA (Attn: Donna Daniels)
California Department of Fish and Game, Sacramento, California, CA (Attn: Ron Schlorff)
California Department of Fish and Game, Sacramento, CA (Attn: Dee Warenycia)
California Department of Transportation, Fresno, CA (Attn: Jay Norvell)
Tulare County Planning Department, Visalia, CA
Kings County Planning Department, Hanford, CA

Literature Cited

Barrett, L. 1990. Annual review of animal rabies in California. 1989. California Vet. 44:52-54.

Bell, H. M. 1994. Analysis of habitat characteristics of the San Joaquin kit fox in its northern range. Master of Arts thesis, California State University, Hayward, California. 90 pp.

Bell, W. 1970. Animal response to sonic boom. Paper delivered at the 80th meeting of the Acoustical Society of America. Houston, Texas. November, 1970.

Berry, W. H., W. G. Standley, T. P. O'Farrell, and T. T. Kato. 1992. Effects of military-authorized activities on the San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. U. S. Department of Energy Topical Report No. EGG 10617-2159, EG&G/EM Santa Barbara Operations, National Technical Information Service, Springfield, Virginia.

Briden L.E., M. Archon, and D.L. Chesemore. 1987. Ecology of the San Joaquin kit fox in western Merced County. California State University, Fresno, California. 16 pp.

Burglund, B. and T. Lindvall. 1995. Effects of Community Noise. Archives of the Center for Sensory Research 2(1): 1-195.

Carbyn, L.N., H.J. Armbuster, and C. Mamo. 1994. The swift fox reintroduction program in Canada from 1983 to 1992. Pages 247-270 *in* M.L. Bowles and C.J. Whelan, eds Restoration of endangered species: conceptual issues, planning and implemenation. Cambridge University Press, Cambridge, Great Britain

Caughley, G., and Gunn, A. 1993. Dynamics of large herbivores in deserts: kangaroos and caribou. Oikos 67: 47-55.

Clevenger, A.P. and N. Waltho. 1999. Dry drainage culvert use and design considerations for small- and medium-sized mammal movement across a major transportation corridor. In: Proceedings of the Third International Conference on Wildlife Ecology and Transportation. G.L. Evink, P. Garrett, and D. Zeigler (eds). Florida Department of Transportation, Tallahassee, Florida.

Cornman, David. 2001. Effects of Noise on Wildlife. Nature Sound Society. San Francisco State University, San Francisco, California.

Cypher, B. 2000. Effects of Roads on San Joaquin Kit Foxes: A Review and Synthesis of Existing Data. California State University-Stanislaus Endangered Species Recovery Program. Fresno, California.

Cypher, B. L., and Scrivner, J. H. 1992. Coyote control to protect endangered San Joaquin kit foxes at the Naval Petroleum Reserves, California. Pages 42-47 *in* J.E. Borrecco and R. E. Marsh (eds.). Proceedings of the 15th Vertebrate Pest Conference, March 1992, Newport Beach, Calif. University of California, Davis, California

Cypher, B. L., and Spencer, K. A. 1998. Competitive interactions between coyotes and San Joaquin kit foxes. Journal of Mammalogy 79: 204-214

Egoscue, H.J. 1956. Preliminary studies of the kit fox in Utah. Journal of Mammalogy 37:351-357.

Egoscue, H.J. 1962. Ecology and life history of the kit fox in Toolele County, Utah. Ecology 43:481-497.

Frankham, R., and K. Ralls. 1998. Inbreeding leads to extinction. Nature 241:441-442.

Goldingay, R.L., P.A. Kelly, and D.F. Williams. 1997. The kangaroo rats of California: endemism and conservation of keystone species. Pacific Conservation Biology 3:47-60.

Grinnell, J., J.S. Dixon, and J.M. Linsdale. 1937. Fur-bearing mammals of California. Volume 2. University of California Press. Berkeley, California.

Hall, H. M. 1983. Status of the kit fox at the Bethany wind turbine generating (WTC) project site, Alameda County, California. California Department of Fish and Game, Sacramento, California.

Henkin, H. 1969. The death of birds. Environment, p. 11.

Hersteinsson, P., and D.W. Macdonald. 1982. Interspecific competition and the geographical distribution of red and arctic foxes (*Vulpes vulpes* and *Alopex lagopus*). Oikos 64:505-515.

Koopman, M.E., J.H. Scrivner, and T.T. Kato. 1998. Patterns of den use by San Joaquin kit foxes. Journal of Wildlife Management 62:373-379.

Lande, R. 1988. Genetics and Demography in Biological Conservation. Science 241:1455-1460.

Laughrin, L. 1970. San Joaquin kit fox, its distribution and abundance. California Department of Fish and Game, Wildlife Management Branch Administrative Report 70-2. Sacramento, California.

MacDonald, D.W., and D.R. Voigt. 1985. The biological basis of rabies models. Pp. 71-108, *in* Population dynamics of rabies in wildlife (P.J. Bacon, ed.). Academic Press, London, Great Britain.

McCue, P.M., and T.P. O'Farrell. 1988. Serological survey for selected diseases in the endangered San Joaquin kit fox (*Vulpes macrotis mutica*). J. Wildl. Dis. 24(2)274-281.

McGrew, J. C. 1979. *Vulpes macrotis*. Mammal Species 123:1-6.

Morrell, S. H. 1970. Life history study of the San Joaquin kit fox. California Department of Fish and Game, Federal Aid in Wildlife Restoration project W-54R-2. Sacramento, California.

____ 1972. Life History of the San Joaquin kit fox. California Fish and Game 58:162-174.

____ 1975. San Joaquin kit fox distribution and abundance in 1975. California Dept. Fish and Game, Sacramento, California. Wildl. Manage. Branch, Admin. Rep. No. 75-3, 28 pp.

National Institute of Health. 1990. Noise and hearing loss. NIH Consensus Statement, 8(1):1-24.

National Park Service (NPS). 1994. Report on effects of aircraft overflights on the National Park System. Report to Congress. Technical Report No. NPSD1062. Washington, D.C.

Peters, E. 1965. Temporary shifts in auditory thresholds of chinchilla after exposure to noise. Journal of the Acoustical Society of America 37:831-833.

Ralls, K. and P.J. White. 1995. Predation on San Joaquin kit foxes by larger canids. Journal of Mammalogy 76:723-729.

Reilly, K., and D. Mangiamele. 1992. California rabies surveillance. 1991. California Vet. 46:47-51.

Saccheri, I., M. Kuussaari, M. Kankare, P. Vikman, W. Fortelius, and I. Hanski. 1998. Inbreeding and extinction in a butterfly population. Nature 392:491-494.

Schultz, L.J., and L.R. Barrett. 1991. Controlling rabies in California 1990. California Vet. 45:36-40.

Spencer, K.A., W.H. Berry, W.G. Standley, and T.P.O'Farrell. 1992. Reproduction of the San Joaquin kit fox on Camp Roberts Army National Guard Training site, California. U.S. Department of Energy Topical Report EGG 10617-2154.

Spiegel, L.K. and M. Disney. 1996. Mortality sources and survival rates of San Joaquin kit foxes in oil-developed and undeveloped lands of southwestern Kern County, California. Pages 71-92 *in* L.K. Spiegel, ed. Studies of the San Joaquin kit fox in undeveloped and oil-developed areas. California Energy Commission, Sacramento, California.

Spiegel, L.K. and J. Tom. 1996. Reproduction of San Joaquin kit fox undeveloped and oil-developed habitats of Kern County, California. Pages 53-69 *in* L.K. Spiegel (ed.). Studies of the San Joaquin kit fox in undeveloped and oil-developed areas. California Energy Commission, Sacramento, California.

Standley, W. G., W. H. Berry, T. P. O'Farrell, and T. T. Kato. 1992. Mortality of San Joaquin kit fox (*Vulpes velox macrotis*) at Camp Roberts Army National Guard Training Site, California. U. S. Department of Energy Topical Report No. EGG 10617-2157, EG&G/EM Santa Barbara Operations, National Technical Information Service, Springfield, Virginia.

Stebbins, J.C., W. Trayler, and R. Kokx. 1995. Habitat characterization study of San Joaquin Valley vernal pools. Unpublished report to the California Department of Fish and Game and the U.S. Fish and Wildlife Service, Sacramento, California.

Sovada, M.A., C.C. Roy, J.B. Bright, and J.R. Gillis. 1998. Causes and rates of mortality of swift foxes in western Kansas. Journal of Wildlife Management 62(4):1300-1306.

Shaw, E.W. 1970. California Condor. Library of Congress Legislative Reference Service, SK351, p. 70-127.

Tellman, B. 1997. Exotic pest plant introduction in the American southwest. Desert Plants 13:3-10.

Trombulak, S.C., and C.A. Frissell. 2000. The ecological effects of roads on terrestrial and aquatic communities: a review. Conservation Biology 14:18-30.

U.S. Fish and Wildlife Service. 1998. Recovery Plan for Upland Species of the San Joaquin Valley, California. Region 1, Portland, Oregon. 319 pp.

Van der Zandt, A.N., W.J. ter Keurs, and W.J. Van der Weijden. 1980. The impact of roads on the densities of four bird species in an open field habitat - evidence of a long-distance effect. Biological Conservation 18: 299-321.

Warrick, G.D. and B.L. Cypher. 1999. Variation in the body mass of San Joaquin kit foxes. Journal of Mammalogy 80:972-979.

Weiss, S.B. 1999. Cars, cows, and checkerspot butterflies: nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology 13:1476-1486.

White, P.J., and R.A. Garrott. 1999. Population dynamics of kit foxes. Can. J. Zool. 77:486-493.

White, P.J., and K. Ralls. 1993. Reproduction and spacing patterns of kit foxes relative to changing prey availability. Journal of Wildlife Management 57:861-867.

Williams, D.F. 1985. A review of the population status of the Tipton kangaroo rat, *Dipodomys nitratoides nitratoides*. Endangered Species Office U.S. Fish and Wildlife Service, Sacramento, California, Final Rep., 44 pp.

Zoellick, B. W., T.P. O'Farrell, P.M. McCue, C.E. Harris, and T.T. Kato. 1987. Reproduction of the San Joaquin kit fox on Naval Petroleum Reserve #1, Elk Hills, California 1980-1985. U.S. Department of Energy Topical report EGG 10282-2144.

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In reply refer to:
81420-2008-F-0461

DEC 27 2007

Zachary K. Parker
Biology Branch Chief
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2015 East Shields Avenue, Suite A-100
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Subject: Amendment to the Biological Opinion (1-1-02-F-0218) for the Proposed Hanford Expressway Project, Kings and Tulare Counties, California, for an Extension of the Biological Opinion's Time Limitation.

Dear Mr. Parker:

This letter is in response to your request, dated 9 November, 2007, received on that date, to re-initiate formal consultation and amend the Biological Opinion (BO) (1-1-02-F-0218) for the proposed Hanford Expressway Project (Project). The California Department of Transportation (Caltrans) is requesting that the U.S. Fish and Wildlife Service (Service) amend the BO due to an estimated starting date for the Project of more than 5 calendar years from the date of the issuance of the BO (30 April, 2003). Caltrans expects the project construction to begin in August 2009.

After reviewing the BO and assessing whether there have been any significant changes to existing habitat, compensation guidelines, or the species baseline the Service has found that there has not occurred any significant changes that were not anticipated in the BO, and so will make the following change to the BO:

- On page 35, **"Terms and Conditions"**, B., item 12:

  From:

  "Because of the potential for significant changes to existing habitat, compensation guidelines, and the species baseline prior to the start of construction for this project, Caltrans shall reinitiate formal consultation if the start of ground breaking activities at the project site is greater than 5 calendar years from the date of issuance of this biological opinion."

  To:

  "Because of the potential for significant changes to existing habitat, compensation guidelines, and the species baseline prior to the start of construction for this project,

TAKE PRIDE IN AMERICA

Caltrans shall reinitiate formal consultation if the start of ground breaking activities at the project site is greater than 7 calendar years from the date of issuance of this biological opinion."

Thank you for coordinating with us on this project. Please contact Richard Montgomery or Susan P. Jones at the letterhead address or at 916/414-6600 if you have any questions regarding the Proposed Hanford Expressway Project.

Sincerely,

Peter A. Cross

Peter A. Cross
Deputy Assistant Field Supervisor

cc:
Gene K. Fong, FHWA, Sacramento, CA