United States Department of the Interior

FISH AND WILDLIFE SERVICE
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Sacramento, California 95825-1846

In reply refer to:
1-1-01-F-0003

December 21, 2004

Mr. Gene K. Fong
Federal Highway Administration
U.S. Department of Transportation
650 Capitol Mall Room 4-100
Sacramento, California 95814

Subject: Programmatic Biological Opinion on the Effects of Minor Transportation Projects on the San Joaquin Kit Fox, Giant Kangaroo Rat, Tipton Kangaroo Rat, Blunt-nosed Leopard Lizard, California Jewelflower, San Joaquin Woolly-threads, Bakersfield Cactus, and Recommendations for the San Joaquin Antelope Squirrel

Dear Mr. Fong:

This is the Fish and Wildlife Service's (Service) programmatic biological opinion based on the Federal Highway Administration's (FHWA) proposed minor transportation projects in Fresno, Kern, Kings, Madera, Mariposa, Merced, Stanislaus, San Joaquin, Tulare, and Tuolumne counties, California and their effects on the following endangered species: the San Joaquin kit fox (*Vulpes macrotis mutica*), giant kangaroo rat (*Dipodomys ingens*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), blunt-nosed leopard lizard (*Gambelia sila*), California jewelflower (*Caulanthus californicus*), San Joaquin woolly-threads (*Lembertia congdonii*), and the Bakersfield cactus (*Opuntia basilaris* var. *treleasei*). We also have reviewed the potential effects of the proposed action on the San Joaquin antelope squirrel (*Ammospermophilus nelsoni*), which is protected under California State law. Your October 17, 2000, request for formal consultation was received by this Field Office on October 19, 2000. This biological opinion was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*)(Act).

This biological opinion is based on: (1) the FHWA's *Programmatic Biological Assessment for Minor Transportation Projects within the Range of the San Joaquin Kit Fox and Associated Upland Species in Caltrans' Central Region* (October 2000); (2) an updated list of proposed projects received by the Service from the California Department of Transportation (Caltrans), on behalf of the FHWA, in February 2003; (3) updated maps of potential project locations received by the Service from Caltrans, on behalf of the FHWA, in February 2003; and (4) other information available to the Service.

TAKE PRIDE IN AMERICA

Consultation History

September 19, 1996: The Service issued a biological opinion (file number 1-1-96-F-85) to the FHWA regarding a proposed project to repave and widen a portion of State Route 46, between Route 33 and Interstate 5 in Kern County, California. The biological opinion included a recommendation for the FHWA and Caltrans to initiate a programmatic consultation that addressed similar actions within the San Joaquin Valley.

November 22, 1996: The Service issued an informal consultation letter (file number1-1-96-I-0233) to the FHWA for a road-widening project in Kern County, California. This letter restated the Service's September 19, 1996, recommendation that the FHWA and Caltrans initiate a programmatic consultation for similar actions within the San Joaquin Valley.

April 15, 1997: A meeting was held between Caltrans, Endangered Species Recovery Program (ESRP), and the Service to discuss the programmatic consultation referenced above and the preparation of a habitat conservation plan for the San Joaquin kit fox and associated listed upland species.

March 22, 1999: The Service issued a biological opinion (file number 1-1-98-F-0139) for the State Highway 58 realignment project between Interstate 5 and State Highway 99 in Kern County, California. The biological opinion included a term and condition to develop a programmatic biological assessment for future Caltrans road projects funded by the FHWA.

March 25, 1999: The Service issued a biological opinion (file number 1-1-99-F-010) on the pavement rehabilitation and Los Gatos Creek Bridge project along State Route 33 in Fresno County, California. The biological opinion included a term and condition to Caltrans and the FHWA requesting that they initiate a programmatic consultation for highway construction and maintenance projects in the San Joaquin Valley.

November 30, 1999: The FHWA submitted a draft programmatic biological assessment to the Service for minor transportation activities and projects Caltrans Districts 4, 5, 6, and 10.

December 14, 1999: The Service and Caltrans exchanged correspondence regarding development of a habitat conservation plan. The Service, upon review of the kit fox study design and the November 30, 1999, programmatic biological assessment for minor transportation projects, provided comments to Caltrans.

December 15, 1999: Caltrans, FHWA, and the Service met and discussed the comments and suggestions contained in the Service's December 14, 1999, letter regarding the draft programmatic biological assessment.

December 21, 1999: The Service provided Caltrans with information on Caltrans projects from approximately 1994 to 1999 on file at the Sacramento Fish and Wildlife Office.

January 26, 2000: Caltrans, FHWA, and the Service met to discuss revisions to the draft programmatic biological assessment.

January 26, 2000: Caltrans Regional Environmental Division Chief provided a letter to the Service that committed Caltrans to developing a programmatic agreement on San Joaquin Valley species for rehabilitation and safety-related projects.

February 7, 2000: The Service provided Caltrans with information for use in the programmatic biological assessment.

March 20, 2000: Caltrans and Service representatives met and discussed the level of detail and specific content appropriate to include in the programmatic biological assessment.

August 29, 2000: The Service issued an amendment (file number 1-1-00-F-0185) to the biological opinion for realignment of State Highway 58 between Interstate 5 and State Highway 99 in Kern County, California; the amendment requested that Caltrans initiate a programmatic consultation for upland listed species in the San Joaquin Valley.

August 31, 2000. The Service and Caltrans met to discuss mapping and information gathered for the programmatic consultation.

October 17, 2000: The FHWA requested formal consultation with the Service and provided a biological assessment on the programmatic action for minor transportation projects within the range of the San Joaquin kit fox and associated upland species in Caltrans' Central Region.

November 15, 2000: The Service provided a letter (file number 1-1-01-I-0285) with preliminary comments on FHWA's October 17, 2000, biological assessment.

October 23, 2001: Service, Caltrans, and FHWA personnel met to discuss the status of the Service's review of FHWA's biological assessment.

January 7, 2003: The Service sent a letter to the FHWA (file number 1-1-03-I-0504) requesting additional information regarding FHWA's biological assessment.

January 13, 2003: Service and Caltrans staff discussed the Service's request for additional information (file number1-1-03-I-0504) by telephone conference call.

September 10, 2004: The Service sent the draft programmatic biological opinion to Caltrans and FHWA.

December 17, 2004: Carrie Bowen, Jennifer Taylor, and Terry Marshall of Caltrans, and Chris Nagano and Susan Jones of the Service discussed the draft programmatic biological opinion on the telephone.

BIOLOGICAL OPINION

Description of the Proposed Action

The following program design criteria were jointly developed by the Service, FHWA, and Caltrans to expedite FHWA-funded projects that the Service has determined to be non-growth inducing with relatively small effects on the San Joaquin kit fox and the seven other upland species described above. Projects that exceed small effects on these species and/or induce growth are not covered by this biological opinion and will require separate consultation. The Service will review this programmatic action annually to ensure that its application is consistent with the design criteria discussed herein. The term of the proposed action is five calendar years from the date of issuance of this biological opinion.

Action Area and Environmental Setting

The action area is defined as all areas to be affected directly or indirectly by the Federal action, and not merely the immediate area involved in the action (50 CFR § 402.02). This programmatic consultation addresses minor transportation projects within the following counties: Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tulare, and Tuolumne. These counties encompass an area of more than 16,671,079 acres. Throughout these counties are several hundred miles of highways and roads built and maintained by Caltrans and the FHWA. The action area for this programmatic consultation includes these roads and the adjacent areas within 1,000 feet (feet) from either side of the road.

Also considered within the action area are stockpile locations, the areas used to access the projects, and the borrow sites used in conjunction with the proposed minor transportation projects. Areas within 1,000 feet of the stockpile, access, and borrow site locations are included in the action area. Projects that will be reviewed to determine applicability under this programmatic biological opinion are shown in Figures 1-9. A list of these projects is provided in the Enclosures. Projects which meet the criteria of the programmatic but are not on the list may also be appended upon agreement between the Service and FHWA.

Project Description

Caltrans, as the non-Federal representative of the FHWA, conducts repair, rehabilitation, maintenance, and other routine activities related to the operation of the California State Highway Transportation System. The federally funded actions for which the FHWA and Caltrans are responsible also include the repair, rehabilitation, maintenance, and other routine activities for county and city roads, and "Local Assistance" projects.

The project description, provided by the FHWA and Caltrans, provides guidelines for avoiding, minimizing, and compensating for the direct effects, both temporary and permanent, to listed species from minor road rehabilitation and repair activities expected to occur in the counties of Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, Tulare, and Tuolumne counties. Project activities have been segregated into three categories, based on the potential

degree of effects to listed species and the size of the area expected to be directly affected. Caltrans estimates that 880 acres will be directly affected as a result of projects to be appended to this programmatic consultation over a period of two calendar years. Of that estimated total, half or 440 acres are expected to be permanently affected, and 440 acres are expected to be temporarily affected.

Project Categories

Projects that qualify for coverage under this biological opinion through an appended process must meet the criterion of one of the following three categories. The appendage of proposed projects to this programmatic biological opinion must include a written commitment by the FHWA, Caltrans, and, if appropriate, the local sponsor, to implement the appropriate conservation measures described below.

Category 1

Category 1 projects may disturb from 0 to 1 acre of land per 1 linear mile of the project. The projects described below are representative of Category 1 although not all-inclusive.

1. Roadway Rehabilitation: These projects include asphalt/concrete (A/C) overlays, dig-outs, and panel replacements. Construction activities associated with these projects include overlaying prepared surfaces with new pavement, laying shoulder-backing at the edge of pavement, excavating failing areas and covering them with A/C overlay, and replacing decaying concrete slabs with new slabs.

2. Gore Area Modifications: Modifications include removing the cement curbing in the area beyond the divergence of two roadbeds. The area is leveled and the surface remains as dirt or is paved with asphalt.

3. Rehabilitation or Improvements to Weigh Stations, Maintenance Stations, and Rest Areas: Rehabilitation of public facilities may include the surfacing of roadways, installation of signs, application of pavement, application of roadway markings, installation of landscaping, and the installation of improvements to building and electrical structures.

4. Installation of Signs, Traffic Signals, Lighting, and Call Boxes: For large signs, lighting, and changeable message signs, excavation is required for installation. Foundations for posts, standards, and pedestals are laid. Placement of underground wiring and conduits require trenching and backfilling. For the most common smaller signs and call boxes, the posts are driven into the ground with or without a pilot hole. A cement pad is installed for portable changeable message signs.

5. Installation of Fiber Optic Systems: The installation of fiber optic systems includes minor trenching, generally in the median for the placement of fiber optic cables.

6. Replacement or Installation of Guard Rails/Thrie-beam Rails: Replacement or installation includes the driving of wood or metal posts, with or without pilot holes, or the rails are placed in drilled holes. Spaces around the wood posts are back-filled. All metal work is done in the shop; none is permitted in the field. The area is cleared of vegetation when installing guard rails in the median. Guard and Thrie-beam rails are distinct from and do not include Jersey or concrete ("K") rails.

7. Soundwall Installation: Installation includes minor grading and landscaping of the road side, the installing of a foundation, and the construction of the soundwall.

8. Minor Pavement Widening: These projects include the addition of maintenance pads, California Highway Patrol pads, and bus and truck turnouts at railroad crossings. These projects require clearing and grubbing of vegetation, grading of the roadside, and the placing of concrete or asphalt placement.

9. Construct Curb Ramps: This project type includes minor cement work for the installation of wheelchair accessible ramps in urban areas.

10. Removal of Fixed Objects: Fixed objects include trees, headwalls, rocks, and utility poles, which are removed, generally, for safety reasons. Woody plant species that serve as the primary habitat for listed species will only be removed as required to complete the project.

11. Installation of Fencing: Installation of fencing consists of constructing barbed-wire fence, wire-mesh fence, or chain-link fence. Where possible, mesh- or chain-link fencing installed within the range of the San Joaquin kit fox will be placed 6 inches above the ground or will have 12-inch by 12-inch openings every 100 feet to allow for movement of wildlife.

12. Miscellaneous: Other projects with similar effects that involve limited or no right-of-way property acquisition and do not significantly alter the physical nature of the project area.

Category 2

Category 2 projects may disturb from 1 to 3 acres of land per 1 linear mile of project. The projects described below are representative of Category 2, although not all-inclusive.

1. Modification or Installation of Drainage Facilities: These projects include one or more of the following: extension, installation, or replacement of culverts; replacement, removal, or installation of headwalls; protection of minor rock slopes; placement of energy dissipaters; and alteration, for example, grading of minor channels. When possible, a culvert is installed without disturbing the roadbed. This is done by clearing the approach to the side of the road and the culvert is either pushed through under the roadbed or a tunnel is excavated and then the culvert is placed. When installation or replacement of culverts requires closing a section of road, a paved detour will be constructed. When we have an opportunity to install or modify culverts as part of the project, then we will upgrade or provide design modifications to facilate kit fox passage. Culvert work may require that a cofferdam be constructed. Under

these conditions, materials are excavated then backfilled after installation of the culvert. Concrete headwalls are constructed at the end of pipe culverts when needed to improve hydraulic efficiency and/or to retain the embankment and prevent erosion. To prevent erosion, rock slope stabilization is conducted. Projects that may affect listed species requiring aquatic habitat for all or part of their life cycles, for example the giant garter snake *(Thamnophis gigas)* and the vernal pool fairy shrimp, *(Branchinecta lynchi)* are not included as part of the proposed action.

2. Landscaping: These projects include the installation of new or replacement landscape planting, revegetation for erosion control, and the installation or upgrade of irrigation systems. Landscaping projects are typically done in urban or developed areas; however, these projects may occur in rural areas when the median is planted with shrubs for safety enhancement.

3. Bridge Rehabilitation. Bridge rehabilitation projects include deck rehabilitation, approach rail installation, bridge strengthening, seismic retrofitting, and bridge elevating. The repair of bridge surfaces requires removing and disposing of unsound concrete, overlaying existing surfaces with new surfaces, repairing steel or timber members in structures, and replacing or repairing railings. Strengthening includes the addition of timbers, steel members, or steel cables. Elevating a bridge is accomplished by jacking it up and lengthening the existing columns. Bridge rehabilitation projects include conservation measures for the protection of bats and nesting birds.

4. Ramp Meter Installation: These types of projects occur only in urban areas for traffic control purposes. These projects require ramp widening, adding entrance pads, and installing meter equipment.

5. Intersection Modification: This project type includes the addition of turn lanes or minor changes to turn radiuses. Pavement work, clearing and grubbing of vegetation, grading of drains, and when present, modifying irrigation systems, may all be part of intersection modifications. Signals and lighting may also be included as warranted.

6. Increase in Vertical Clearance: These projects entail lowering the mainline highway structure (a highway that runs beneath a bridge or overcrossing) to permit clearance for taller truck traffic. The section of road that runs underneath, and sections on either side are removed and graded and new pavement is placed. This process is done in sections by directing traffic to one side or onto a paved detour.

7. Miscellaneous: This project type includes other projects with similar effects that involve limited or no acquisition of a right-of-way and do not significantly alter the physical nature of the project area.

Category 3

Category 3 projects may disturb from 3 to 10 acres of land per 1 linear mile of the project. The projects described below are representative of Category 3, although not all-inclusive.

1. Slope Protection and Other Slope Treatments: These projects include rock slope protection or stabilization placement, concrete placement, step-bench cutting, or the revegetation of an area susceptible to erosion. The embankment is prepared to proper sloping according to engineering plans. This includes clearing and grubbing of vegetation, and cutting or filling and shaping. Slope protection is then applied. A footing trench is excavated along the toe of the slope; rocks or other material are then placed in the trench. Benches may be up to 20 feet wide. Projects that include the placement of rip-rap or concrete materials in wetlands or waters under the jurisdiction of the Army Corp of Engineers are not included as part of the proposed action.

2. Minor Interchange and Ramp Modifications: These projects include ramp lengthening, and/or additions of lanes for vehicle storage. These types of projects may require clearing and grubbing, removing and filling of materials, installing pavement, protecting slopes and upgrading drainages.

3. Add Passing Lane, Add Truck Climbing Lane, Add Auxiliary Lane, Left- and Right-turn Lane Channelization; Widen Lane Width, Add Standard Lane (11.8 feet wide): These projects require clearing/grubbing of vegetation, excavating materials, and removing and replacing pavement. Projects may also include the occasional installation of erosion control methods, relocation of irrigation or utilities, and the alteration or upgrading of drainage systems. Channelization of lane lengths vary depending on the designated speed for the highway. Auxiliary lanes generally are 0.5 miles in length to allow for the safe merging of traffic. The average length of a passing lane is 1 mile.

4. Projects that involve the addition of a truck climbing lane will be analyzed with specific attention to project location. Truck climbing lanes are often created where a road crosses an abrupt change in topography (Norris, Caltrans, personal communication 2003). This type of topography is prevalent where the San Joaquin Valley meets the coast range foothills to the west and the Sierra Nevada foothills to the east. The San Joaquin kit fox is known to inhabit these areas. The effects of a truck climbing lane in these areas may exceed the threshold of minor project effects associated with the proposed action.

5. Add Turn Out: These projects include adding paved areas for slow-moving vehicles to pull off and allow faster traffic to pass. These paved areas are about 197 to 492 feet long and up to 15 feet wide. Steeper slopes or drop-offs require greater width and/or installation of a guardrail.

6. Shoulder-widening: Shoulders are the portion of the roadway contiguous with the traveled way and serve the purpose of accommodating stopped vehicles, emergency use, and support of base and surface courses. Standard shoulder widths vary from 0 to 10 feet, depending on

the classification of the freeway or highway. Shoulder-widening projects generally also include pavement rehabilitation, safety improvements, and drainage upgrades. Safety improvements include installation of shoulder-backing, barrier installation around fixed objects (trees, headwalls, etc.), flattening of the side slopes, and minor curve and profile corrections. Drainage improvements include the grading of a shallow drainage ditch at the outer edge of the shoulders.

7. Install Catch Basin or Ponding Basin: Basins are typically built in developed or urban areas. Projects include clearing and grubbing of vegetation and excavating materials, installing pipe systems and fences, and paving access roads.

8. Profile Correction: Corrections include minor curve realignment and flattening lows/highs to allow better visibility or a smoother ride. This type of project requires earthwork, asphalt pavement work, side-slope grading, shoulder-backing, drainage modifications and slope stabilization and protection. These projects may also involve modification of irrigation facilities and relocation of utilities.

9. Miscellaneous: Other projects with similar effects that involve limited or no acquisition of right-of-way and do not significantly alter the physical nature of the project area.

Conservation Measures

The measures described below include avoidance, minimization, and compensation for project effects on listed species.

Avoidance and Minimization Measures

Caltrans shall implement the recommendations contained in the *U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to Ground Disturbance* (Service 2001), and other Service documents and recommendations as they become available when planning actions considered in this document. Equipment staging areas, site access routes, and debris storage areas, shall be identified prior to initiation of construction activities, surveyed by the biologist, and clearly identified with stakes and flags.

Avoidance and Minimization Measures that will be Implemented Prior to and During Ground Disturbance

Prior to initiation of any site preparation/construction activities, the Caltrans' or Service-approved biologist will conduct an education and training session for all construction personnel. All available individuals who will be involved in the site preparation or construction will be present, including the project representative(s) responsible for reporting take to the Service and the California Department of Fish and Game (CDFG). Training sessions will be repeated for all new employees before they are allowed to access the project site. Sign up sheets identifying attendees and the contractor/company they represent will be provided to the Service with the post-construction compliance report. At a minimum, the training will include a description of

the natural history of the species affected by the minor transportation project undertaken and may include all or any combination of the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, or the blunt-nosed leopard lizard, and their habitats. Training will included the general measures that are being implemented to conserve these species as they relate to the project, the penalties for non-compliance, and the boundaries (work area) within which the project must be accomplished. To ensure that employees and contractors understand their roles and responsibilities, training may have to be conducted in languages other than English.

On those occasions when borrow material will be used for a project, Caltrans shall follow the procedures outlined below to ensure that borrow materials come from sites that are in compliance with the Act. Also presented below is standard language for Caltrans to use in contracts to protect listed species that Caltrans will include in all construction and maintenance subcontracts. Caltrans and all its contractors will implement these requirements.

This section also describes conservation measures for minimizing take for which the Caltrans biologist assigned to the project shall be responsible. The Caltrans biologist shall have oversight over implementation of all the measures described in this section, and shall have the authority to stop project activities, through communication with the Caltrans Resident Engineer, if any of the requirements associated with these measures are not being fulfilled. If biologist/construction liaison has requested a stop work due to take of any of the listed species the Service and Fish and Game will be notified within one day via email or telephone. Caltrans shall include the following conservation measures in all construction and maintenance projects and contracts:

1. Project employees shall be directed to exercise caution when commuting within listed species habitats. A 20-mile per hour speed limit will be strongly encouraged on unpaved roads within listed species habitats.

2. Cross-country travel by vehicles will be prohibited, unless authorized by the Service.

3. Project employees shall be provided with written guidance governing vehicle use, speed limits on unpaved roads, fire prevention, and other hazards.

4. Prior to initiation of ground breaking, the Caltrans' or Service-approved biologist will conduct an education and training session for all construction personnel. All individuals who will be involved in the site preparation or construction shall be present, including the project representative(s) responsible for reporting take to the Service and the California Department of Fish and Game. Training sessions shall be repeated for all new employees before they access the project site. Sign up sheets identifying attendees and the contractor/company they represent shall be provided to the Service with the post-construction compliance report. At a minimum, the training shall include a description of the natural history of the species affected by the minor transportation project undertaken and include information on the San Joaquin kit fox, the giant and Tipton kangaroo rats, or the blunt-nosed leopard lizard and their habitats, as appropriate. The training shall include the general measures that are being implemented to conserve these species as they relate to the project, the penalties for non-compliance, and the boundaries (work area) of

the project. To ensure that employees and contractors understand their roles and responsibilities, training shall be conducted in languages other than English, as appropriate.

5. A litter control program shall be instituted at each project site. All workers ensure their food scraps, paper wrappers, food containers, cans, bottles, and other trash from the project area are deposited in covered or closed trash containers. The trash containers shall be removed from the project area at the end of each working day.

6. No canine or feline pets or firearms (except for Federal, State, or local law enforcement officers and security personnel) shall be permitted on construction sites to avoid harassment or killing or injuring of listed species.

7. Maintenance and construction excavations greater than 2 feet deep either shall be covered, filled in at the end of each working day, or have earthen escape ramps no greater than 200 feet apart provided to prevent entrapment of listed species.

8. All construction activity shall be confined within the project site, which may include temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes, as described in Conservation Condition 12 below. At no time shall equipment or personnel be allowed to adversely affect areas outside the project site without authorization from the Service.

9. The resident engineer or their designee shall be responsible for implementing these conservation measures and shall be the point of contact for each project.

10. All grindings and asphaltic-concrete waste shall be stored within previously disturbed areas absent of habitat and at a minimum of 150 feet from any culvert, wash, pond, vernal pool, or stream crossing.

11. Restoration and revegetation work associated with temporary impacts shall be done using California endemic plant material from on-site or local sources (i.e., local ecotype). Plant materials from non-local sources shall be allowed only with written authorization from the Service. To the maximum extent practiccable (i.e., presence of natural lands), topsoil shall be removed, cached, and returned to the site according to successful restoration protocols. Loss of soil from run-off or erosion shall be prevented with straw bales, straw wattles, or similar means provided they do not entangle, block escape or dispersal routes of listed animal species.

12. The project construction area shall be delineated with high visibility temporary fencing at least five (5) feet in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment onto any sensitive areas 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. Actions within the project area shall be limited to vehicle and equipment

operation on existing roads. No project activities will occur outside the delineated project construction area.

13. Prior to any ground disturbance, pre-construction surveys shall be conducted for San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat and blunt nosed leopard lizard. These surveys will consist of walking surveys of the project limits and adjacent areas accessible to the public to determine presence of the species (i.e., kit fox dens and related sign).

14. Only Service-approved workers holding valid permits issued pursuant to section 10(a)(1)(A) of the Act will be allowed to trap or capture listed species. Any relocation plan will be approved by the Service prior to release of any listed species.

15. Because dusk and dawn are often the times when listed species are most actively foraging, all construction activities will cease one half hour before sunset and will not begin prior to one half hour before sunrise. Except when necessary for driver or pedestrian safety, lighting of a project site by artificial lighting during night time hours is prohibited.

16. Tightly woven fiber netting or similar material shall be used for erosion control or other purposes at the project site to ensure that endangered species do not get trapped. This limitation will be communicated to the contractor through use of Special Provisions included in the bid solicitation package.

17. Use of rodenticides and herbicides at the project site shall be utilized in such a manner to prevent primary or secondary poisoning of listed species, and the depletion of prey populations on which they depend. All uses of such compounds hall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Pesticide Regulation, and other appropriate State and Federal regulations, as well as additional project-related restrictions deemed necessary by the Service or the CDFG.

Borrow Material Obtained From Offsite Locations

The following measures for borrow sites shall be implemented by Caltrans:

1. Caltrans shall require as part of the construction contract that all contractors comply with the Act in the performance of the work necessary for project completion performed inside and outside the project right-of-way.

2. Caltrans shall require documentation from the contractor that aggregate, fill, or borrow material provided for each project was obtained in compliance with the Act. Evidence of compliance with the Act shall be demonstrated by providing the Resident Engineer (RE) any one of the following:

a. a letter from the Service stating use of the borrow pit area will not result in the incidental take of listed species;
b. an incidental take permit for contractor-related activities issued by the Service pursuant to section 10(a)(1)(B) of the Act;
c. a biological opinion or a letter concurring with a "not likely to adversely affect" determination issued by the Service to the Federal agency having jurisdiction over contractor-related activities;
d. A letter from the Service concurring with the "no effect" determination for contractor-related activities; or
e. Contractor submittal of information to the Caltrans Resident Engineer indicating compliance with the State Mining and Reclamation Act (SMARA) and provide the County land use permits and CEQA clearance.

3. If a borrow site that is in compliance with the Act is not available, Caltrans will either:

a. identify/select a site that the Service has concurred with the "no effect" determination, or;
b. request reinitiation of formal consultation on the action considered herein based on new information.

San Joaquin Kit Fox

There are six general measures for conserving the San Joaquin kit fox from the effects of a minor transportation project:

1. Determine the presence of kit fox dens (natural or in pipes and culverts).

a. Pre-construction surveys within the project area shall be conducted no more than 30 calendar days prior to the start of construction in accordance with the most current protocols approved by the Service and CDFG.

b. Surveys for dens shall be conducted by qualified biologists with demonstrated experience in identifying San Joaquin kit fox dens.

c. Pipes and culverts shall be searched for kit foxes prior to being moved or sealed to ensure that an animal has not been trapped.

2. Protect all San Joaquin kit fox dens to the maximum extent practicable as determined by the on-site biologist.

3. Identify type of den (natal or non-natal) and its status (occupied or unoccupied) based on the extant Service guidance (Service 1999):

a. Known den: any existing natural den or human-made structure for which conclusive evidence or circumstantial evidence can show that the den is used or has been used at any time in the past by the San Joaquin kit fox.

b. Potential den: any natural den or burrow within the range of the species that has entrances of appropriate dimensions (4 to 12 inches in diameter) to accommodate San Joaquin kit foxes. Caltrans will survey and investigate using photo-detection equipment, track plate, or other methods to determine species utilization. If no information is collected that would indicate use by other species, the den will be treated as a potential kit fox den. Pupping den: any known San Joaquin kit fox den (as defined) used by kit foxes to whelp and/or rear their pups.

c. Atypical den: any known San Joaquin kit fox den that has been established in, or in association with, a human-made structure.

4. Identify and execute appropriate action(s) regarding notification, buffers, excavation and fill, or seal-off:

a. Occupied natal den: if an occupied natal den is is visible or encountered within the project limits, or other accessible land, or on publicly accessible land within1000 feet of the project construction area, the project will be constructed between August 1 and November 30 and the Service shall be contacted immediately, before any project action occurs.

b. A buffer or exclusion zone shall be established to protect the physical den and surrounding habitat of unoccupied natal dens and all non-natal dens that can be avoided:

i. Unoccupied natal dens shall be surrounded with a 200 feet buffer and the Service will be contacted. Occupied and unoccupied non-natal dens shall be surrounded with a 100 feet buffer.

ii. When occupied dens have been found on or near the project site, ground disturbing activities shall be restricted during the period December 1 to July 31.

iii. During this period, project activities within 0.3 mi of occupied natal dens are prohibited. Buffer zones shall be delineated with a temporary fence or other suitable barrier that does not prevent disbursal of the fox. Alternately, the project construction area can be delineated with temporary fence, flagging, or other barrier.

c. Unless necessary for pedestrian or driver safety, the project site shall not be lighted between sunset and sunrise.

d. Pipes or culverts with a diameter greater than 4 inches shall be capped or taped closed when it is ascertained that no San Joaquin kit fox is present. Any kit fox found in a pipe or culvert shall be allowed to escape unimpeded.

e. If a natural den cannot be avoided and must be destroyed, the following guidelines shall be followed:

a. Prior to the destruction of any den, the den shall be monitored for at least 3 consecutive days to determine its current status. Activity at the den shall be monitored by placing tracking medium at the entrance and by standard spotlighting detection techniques. If no kit fox activity is observed during this period, the den shall be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den shall be monitored for at least 5 consecutive days from the time of observation to allow any resident animal to move to another den during its normal activities. Use of the den can be discouraged during this period by partially plugging the entrance(s) with soil in such a manner that any resident animal can escape easily. Destruction of the den may begin when, in the judgment of a Service or Service-approved biologist, the animal has moved to a different den. The biologist shall be trained and familiar with kit fox biology. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may be excavated when, in the judgment of the Service-approved biologist, it is temporarily vacant, for example during the animal's normal foraging activities.

b. All dens shall be excavated by hand, by or under the supervision of, a Service-approved biologist.

c. The den shall be fully excavated and then filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If, at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den shall be resumed. Destruction of the den may be resumed, when in the judgment of the Service-approved biologist, the animal has escaped from the partially destroyed den.

d. Non-natal dens may be excavated at any time of the year natal dens shall be excavated only between August 15 and November 1.

5. Figure 11 in this biological opinion is a map of reported incidental sightings of San Joaquin kit fox compiled by the Service from CNDDB and ESRP data. A 10-mile radius circle has been applied to each sighting on the map, as shown in pink, based on research of nightly movements of kit fox at Elk Hills (Zoellick *et al.* 1987). All of the habitats within the 10-mile circle may represent potential kit fox habitat. Compensation in the form of permanent habitat protection will be provided when an adverse effect determination has been made by FHWA for species covered under this programmatic and located within the 10-mile circle,

6. Within ten (10) working days of the completion of earthmoving, Caltrans will replace all excavated kit fox dens with artificial dens on a 2:1 basis. The location and design of the artificial dens will be approved by the Service prior to installation.

Giant Kangaroo Rat and Tipton Kangaroo Rat

There are seven general measures for conserving giant and Tipton kangaroo rats from the effects of a minor transportation project:

1. Determine the presence of kangaroo rat burrows and sign.

    a. Pre-construction surveys to determine presence or sign of federally listed kangaroo rats within the project area shall be conducted no more than 30 calendar days prior to the start of construction. If listed kangaroo rats are located within the action area, the Service will be contacted to discuss ways to proceed with the project and avoid take to the maximum extent practicable.

    b. Surveys for burrows and other sign shall be conducted by qualified biologists with demonstrated experience in identifying kangaroo rat burrows.

    c. Pipes and culverts shall be searched for kangaroo rats prior to being moved or sealed to ensure that an animal has not been trapped.

2. A 50-foot buffer or exclusion zone shall be established around active burrows and precincts. Project-related activities within the buffer zone shall be prohibited.

3. When occupation of the project site by the giant kangaroo rat has been determined, ground disturbing activities shall be restricted during the period February 1 through May 31.

4. Unless necessary for pedestrian or driver safety, the project site shall not be lighted during night time hours.

5. If active burrows cannot be avoided, Caltrans shall obtain authorization to destroy burrows from the Service prior to disturbance.

6. When listed kangaroo rats are likely to be present within the action area, tightly woven materials will be used to prevent them from being entangled and injured inadvertently by project activities. Acceptable substitutes include coconut coir matting or tackified hydroseeding. This limitation will be communicated to the contractor through the use of special provisions included in the bid solicitation package.

Retired agricultural lands that will be temporarily disturbed by project implementation shall be restored to pre-construction conditions.

Blunt-Nosed Leopard Lizard

The blunt-nosed leopard lizard is a fully protected species under the California Fish and Game Code § 5050. There are six general measures for conserving blunt-nosed leopard lizards from the effects of a minor transportation project:

1. Determine the presence of blunt-nosed leopard lizards burrows and sign.

    a. When Caltrans believes the species is likely to be present, they will do a protocol survey no longer than one year prior to construction. Pre-construction surveys within the project area shall be conducted to determine presence or sign of blunt-nosed leopard lizard no more than 30 calendar days prior to the start of construction. If blunt-nosed leopard lizards are located within the action area, the Service will be contacted to discuss ways to proceed with the project and avoid take to the maximum extent practicable.

    b. Surveys for burrows and other sign shall be conducted by Caltrans biologist or service approved biologist with demonstrated experience in identifying blunt-nosed leopard lizard burrows.

    c. Pipes and culverts shall be searched for leopard lizards prior to being moved or sealed to ensure that an animal has not been trapped.

2. A 50-foot buffer or exclusion zone shall be established around active burrows and egg clutch sites. Project-related activities within the buffer zone shall be prohibited.

3. Burrows that may be used by blunt-nosed leopard lizards shall be avoided. Initial surface disturbing actions that occur during the active blunt-nosed leopard lizard season shall be monitored by a Service-permitted biological monitor. Provided there is suitable habitat adjacent to the project site and it is available in adequate abundance, blunt-nosed leopard lizards shall be allowed to vacate affected sites prior to ground disturbance. Should one or more blunt-nosed leopard lizards be discovered within the project site after ground disturbance, project activities shall cease until the lizard(s) vacate the area of their own accord. If the lizard(s) fails to vacate the area, a Service-permitted biologist may attempt to herd the blunt-nosed leopard lizards to the adjacent suitable habitat outside project boundaries. No capture, removal or holding of the blunt-nosed leopard lizards is allowed under state law, and cannot be approved by the Service.

4. Project activities that may result in destruction of dens or burrows likely to harbor blunt-nosed leopard lizards shall occur during the active season of this listed reptile, i.e., between April15 and October 15 and air temperature is between 75 and 95 degrees Fahrenheit. This does not preclude work done on pavement or in areas where the blunt leopard is not present. This will maximize the lizard's ability to escape from slow moving vehicles and minimize the risk of entombment in burrows. In addition, ground disturbing activities that occur in areas inhabited by the blunt-nosed leopard lizard shall occur only during daylight hours.

5. If trenches or pits will be left open between construction tasks for periods of more than seven hours, the following measures shall be taken to minimize the risk of blunt-nosed leopard lizards falling into the trench or pit. Wooden ramps or other structures of suitable surface that provide adequate footing for the blunt-nosed leopard lizard shall be placed in the trench or pit to allow for unaided escape. The trench or pit shall be surveyed in the morning and late afternoon hours to ascertain whether blunt-nosed leopard lizards have fallen into the trench.

If using the escape ramps and coaxing by a Service-permitted biologist fail to result in the blunt-nosed leopard lizard vacating the trench or pit, the Service shall be contacted for advice.

6. If areas adjacent to project sites lack adequate habitat to provide for the thermoregulatory or cover requirements for the blunt-nosed leopard lizard, Caltrans shall contact the Service. The Service shall advise Caltrans if it is appropriate to place temporary cover in the form of appropriately placed boards for the animals. The boards must be of sufficient length and width, and placed in such a manner that the lizards are able to take temporary shelter underneath. The boards shall be placed outside the project area, with the nearest shelter placed within 10 feet of the project and exclusion zone boundary or as judged appropriate by the Service.

San Joaquin Woolly Threads and California Jewelflower

1. Prior to construction, up to a year in advance, plant surveys shall be conducted at the appropriate times and methods according to the following or most current guidelines: *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (Service 1996); and *General Rare Plant Survey Guidelines and Supplemental Survey Methods for California jewelflower and San Joaquin woolly-threads* (Service Undated [approximately 2000]).

2. Extant populations of either of these two listed plants shall be avoided to the greatest extent practicable. The locations of listed plants shall be avoided and temporarily fenced or prominently flagged to prevent inadvertent encroachment by vehicles and equipment during project-related activities. Information regarding the location of listed plant populations shall be provided to CDFG's California Natural Diversity Database (CNNDB) according to their reporting protocols. A completed copy of the reporting form and a topographic quad map with the population location precisely marked shall be submitted to the Service. If extant populations cannot be avoided, surface disturbance shall be scheduled after seed set and prior to germination. Collection of seed, with reseeding undertaken at the project site following completion of the project, during seasonal time frames and weather conditions favorable for germination and growth may also be required. Topsoil may be stockpiled and replaced after project completion pursuant to the most current and successful methodology.

3. An assessment of plant occurrences shall be conducted, by a Caltrans biologist or Service-approved biologist during the appropriate season prior to scheduled construction. Effects to extant occurrences may be considered minimized when: (a) the number of plants lost is less than 1 percent of the affected population including any actual or potential seed bank, and disturbance is temporary; (b) the amount of habitat lost is less than 1 percent of the occupied habitat for the affected occurrence; and (c) the surface and subsurface hydrology of the site remains unaltered in terms of effects to on-site listed plant populations.

4. Herbicides shall not be permitted within 500 feet of listed plant populations identified during pre-project surveys. Pesticide and insecticides shall not be permitted during the insect pollination period.

5. Project avoidance and minimization measures shall be evaluated by the Service during the project development process . If listed plants cannot be avoided and minimization measures are judged to be inadequate or the project is not conducive to these measures, then land acquisition shall be required as described under Compensation Measures in this biological opinion.

Bakersfield Cactus

1. Since this cactus is observable throughout the year, plant surveys shall be conducted 30 days prior to construction.

2. Bakersfield cactus populations and individuals of this species shall be surrounded by a 100 feet buffer or exclusion zone at all times.

3. Herbicides shall not be permitted within 500 feet of listed plant populations identified during pre-project surveys. Pesticide and insecticides shall not be permitted during the insect pollination period.

4. If the Bakersfield cactus cannot be avoided and minimization measures are judged to be inadequate or the project is not conducive to the application of these measures, then land acquisition shall be used as described below in the Compensation Measures section of this biological opinion.

Post-construction Activities

At a minimum, restoration of temporary impacts at project sites shall include reestablishing vegetation and recontouring slopes as necessary to return the project site to original condition.. Where applicable (i.e., native habitat), top soil shall be cached and soil structure retained according to established and successful restoration protocols. Soil loss from run-off or erosion shall be minimized with use of straw bales, straw wattles, or other similar means when their usage will not interfere with the escape or dispersal of listed species. Plant material used for restoration shall be obtained from local native species or from elsewhere as approved by the Service.
Caltrans will provide a post-construction report for each project, detailing compliance with the terms and conditions of this biological opinion to the Service within 30 calendar days of completion of the project. The report will include the Service file number for the project.

Compensation Measures

Compensation measures include protecting and managing habitat in one location in return for authorization to alter, disturb, or destroy habitat in another appropriate location. Compensation

for loss of habitat is frequently implemented by action agencies and also recommended by the Service, including for temporal losses due to temporary disturbances. A temporary habitat disturbance is defined as a short-term event in which effects do not degrade the habitat beyond its ability to recover within one year of the disturbance or beyond its ability to support listed species and ecosystem functioning within one year following disturbance.

The effects of a temporary disturbance may include the loss of one or more reproductive cycles of the affected listed species, or the loss of one or more generation of young. Disturbance may include alteration or reduction in vegetative cover but is not limited to vegetation alone. An elevation in ambient noise level, for example, is also considered a disturbance.

Caltrans shall provide compensation in the form of land acquisition for newly-disturbed habitats, whether temporary or permanent, and shall not provide compensation for previously paved areas or non-habitat areas within the roadway, shoulder areas, or right-of-way. An area of non-habitat is not necessarily an area absent of vegetation. Shoulder areas or right-of-ways that lack vegetative cover may function in a landscape highly fragmented by linear structures (roads, railways, canals, etc.) as a corridor for dispersal, or a potential denning area despite degradation.

The proposed compensation ratios for adverse effects to the species addressed in this document are as follows except in kit fox core and satellite population areas:

1. 3 units of replacement habitat for every 1 unit of habitat permanently lost within grasslands and natural lands (for example, scrub and alkali sink communities)(3:1).

2. 1.1 units of replacement habitat for every 1 unit of habitat temporarily lost within grasslands and natural lands (1.1:1). 1.1 unit of replacement habitat for every 1 unit of habitat permanently lost within agricultural and ruderal lands (1.1:1).

3. 0.3 units of replacement habitat for every one unit of habitat temporarily lost within agricultural and ruderal lands (0.3:1)

Compensation shall be acquired within the same county where the project occurs, unless otherwise approved by the Service in writing.

Additional Requirements for Projects that Occur Within Kit Fox Core Population Areas, Satellite Population Areas

The FHWA and Caltrans are proposing to construct minor transportation projects within kit fox core,and satellite population areas and . If Caltrans proposes such projects in any of the three core population areas [Carrizo Plain in San Luis Obispo County, natural lands of western Kern County (i.e., the Elk Hills, Buena Vista Valley, Lokern Natural Area, and adjacent natural land), and the Ciervo-Panoche, natural area in Fresno County] or satellite population areas as shown on Figure 10 of the Enclosures, then the following compensation measures shall be applied. Compensation shall be provided at locations that preserve and enhance the population area being

affected by the proposed project. Caltrans or the Service may choose to address projects in these areas with a separate biological opinion, rather than appending the project to this opinion.

1. 4 units of replacement habitat for every 1 unit of habitat permanently lost within grasslands and natural lands (4:1).

2. 3.5 units of replacement habitat for every 1 unit of habitat temporarily lost within grasslands and natural lands (3.5:1)

3. 1.1 units of replacement habitat for every one unit of habitat permanently lost within agricultural and ruderal lands (1.1:1)

4. 0.5 units of replacement habitat for every 1 unit of habitat temporarily lost within agricultural and ruderal lands (0.5:1).

Crossing Structures

Due to the increased need for kit fox to travel through core and satellite population areas, and to be able to use corridor areas, crossing structures for the kit fox shall be provided where feasible and applicable under the highway at quarter mile intervals, or as approved by the Service. Design and placement of crossing structures shall be approved by the Service prior to issuance of a biological opinion for the project, where appropriate.

Priorities for Acquisition of Compensatory Habitat

San Joaquin Kit Fox

The priorities established in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (Recovery Plan) (Service 1998) and on other information available to the Service, for protecting kit fox include maintaining and enhancing movement corridors, linking natural lands and protecting existing kit fox habitat. Land acquisitions should occur in the following areas:

1. Between the Mendota area in Fresno County, natural lands in western Madera County.

2. Natural lands along Sandy Mush Road, and wildlife refuges and easement lands of Merced County.

3. Between Sandy Mush Road and the eastern side of Merced County.

4. East of Highway 99 between the Merced River south to the intersection of Highway 99/Interstate 5.

5. Natural lands in the Ciervo-Panoche Hills area of western Fresno and eastern San Benito counties.

6. Between natural lands in the Mendota area of Fresno County and the Ciervo-Panoche Hills area.

7. Between the Kettleman Hills in Kings County and along the Valley's western edge through the farmed land between the Kettleman Hills and Guijarral Hills in Kings County, and between the Guijarral Hills and Anticline Ridge in Fresno County.

8. Between the western edge of Pleasant Valley and Coalinga in Fresno County, and between this area and natural areas on the western edge of the Coastal Range in Kings and Kern counties.

9. Between the Lost Hills area and the Semitropic Ridge Natural area in Kern County.

10. Between the Maricopa area on the west of southern Kern County and the Poso Creek area to the northeast.

11. Between the natural lands on the eastern base of Ortigalita Mountain through farmlands north along the edge of the Diablo Range to Santa Nella, all in Merced County.

Giant Kangaroo Rat

Priorities in considering site selection for land acquisition and other recommended actions are as follows:

1. Protection of land in the Lokern area of western Kern County. The goal is to protect 90 percent of the existing natural land bounded on the east by natural lands just east of the California Aqueduct, on the south by Occidental of Elk Hills, on the west by State Highway 33, and on the north by Lokern Road.

2. Protection of existing natural land providing habitat for the giant kangaroo rat in western Fresno and eastern San Benito Counties. The goal is to protect all existing natural land on the Silver Creek Ranch, and existing habitat for this species along the eastern bases of Monocline Ridge and the Tumey Hills, between Arroyo Ciervo on the south and Panoche Creek on the north.

3. Acquisition and restoration of habitat on periodically farmed land with no or Class-3 irrigation water rights immediately east of occupied natural habitat west of Interstate Highway 5. Protection or acquisition of other natural land occupied by giant kangaroo rats in western Kern County. The goal is to protect 80 percent of existing habitat for giant kangaroo rats.

4. Protection or acquisition of land occupied by giant kangaroo rats in the Cuyama Valley, Santa Barbara County. Protection or acquisition of land occupied by giant kangaroo rats in the Kettleman Hills, Kings County.

5. Protection or acquisition of land occupied by giant kangaroo rats in the San Juan Creek Valley, San Luis Obispo County.

Tipton Kangaroo Rat

Caltrans shall acquire and protect occupied habitat in areas of large protected blocks of natural lands, whenever possible and with Service approval. Caltrans shall assess lands contiguous to and near existing protected natural lands with the objective of connecting and expanding the following:

1. The Pixley National Wildlife Refuge and the scattered parcels of the Allensworth Ecological Reserve.

2. The Kern National Wildlife Refuge and the scattered parcels of the Semitropic Ridge conservation lands.

3. The Kern River alluvial fan area including the Kern Fan Element, Cole's Levee Ecosystem Preserve, and other mitigation parcels.

Blunt-nosed Leopard Lizard

Priorities in considering site selection for land acquisition and other recommended actions are as follows:

1. Natural lands in western Madera County.

2. Natural lands in the Panoche Valley area of Silver Creek Ranch, San Benito County.

3. Agricultural and natural land between the north end of the Kettleman Hills and the Guijarral Hills and the Guijarral Hills and Anticline Ridge (western rim of Pleasant Valley, Fresno County) for the purpose of restoring and protecting a corridor of continuous habitat for blunt-nosed leopard lizards and other species which lack the ability to move through irrigated farmland.

4. Natural lands west of Highway 33 and east of the coastal ranges between the Pleasant Valley, Fresno County, on the north and McKittrick Valley, Kern County, on the south.

5. Natural lands containing lizard habitat west of Interstate 5 between Pleasant Valley and Panoche Creek, Fresno County.

6. Natural lands in upper Cuyama Valley. Natural and retired agricultural lands around the Pixley National Wildlife Refuge, Tulare County, with the objective of expanding and connecting the Refuge units with each other and with the Allensworth Ecological Reserve.

7. Natural land in and around the Elk Hills Naval Petroleum Reserves and the Lokern Natural Area with the objective of expanding and connecting existing protected lands with those established under other conservation programs.

8. Natural and retired agricultural lands in the Semitropic Ridge Natural Area, Kern County, with the objective of expanding and connecting existing reserves and refuges.

9. Lands acquired for compensation for project effects shall contain this species.

San Joaquin Woolly-threads and California Jewelflower

Priorities in considering site selection for land acquisition and other recommended actions are as follows:

1. When San Joaquin Woolly-threads and California Jewelflower are found within the action area and will be adversely affected, Caltrans will mitigate at lands that contain this species.

2. Attempt to protect parcels of land at least 160 acres that have an average density of at least 400 plants per acre in perpetuity.

Bakersfield Cactus

Priorities in considering site selection for land acquisition and other recommended actions are as follows:

1. When Bakersfield cactus is found within the action area and will be adversely affected, Caltrans will mitigate at lands that contain this species.

2. Attempt to protect parcels at least 40 acres in perpetuity.

Compensation Process

At least thirty (30) calendar days prior to ground breaking, Caltrans shall (a) purchase any required compensation land, place a Service-approved conservation easement on that land, and arrange for Service-approved management and endowment, or (b) deposit sufficient funds to purchase and endow sufficient compensation land with a Service-approved compensation bank. The Service's detailed draft outline of Service requirements, *Selected Review Criteria for Conservation Banks and Section 7 Off Site Compensation* dated August 4, 2004 is included as Appendix I of this biological opinion will be followed when Caltrans does not use a Service-approved bank. Land or conservation easement acquisition will be conducted according to the most current Service guidelines.

Implementation Process for this Programmatic Biological Opinion

This biological opinion is effective for five (5) calendar years from the date of its issuance. During this period, Caltrans will meet with the Service at least three times (every six months after the date of issuance of this biological opinion) to discuss whether the avoidance, minimization, and compensation measures are adequately addressing the biological needs of the species. Based on new information including, but not limited to, delisting or listing of new species, the Service, FHWA, or Caltrans may need to reinitiate this consultation. The FHWA and Caltrans shall also reinitiate consultation if they anticipate any changes in the project description.

The following process shall be used to append proposed projects under this biological opinion:

1. The FHWA shall submit a letter to the Service requesting that the proposed project (inclusive of appropriate compensation, based on the project level effect and compensation criteria above) be appended to this programmatic biological opinion and also provide the Service with a brief biological assessment. The biological assessment will include, at minimum, the following information:

   a. a description of the project, including potential borrow sites, if any
   b. a vicinity map
   c. a legal location description
   d. a map showing known listed plant populations and listed animal sightings, from CNDDB and other sources, present and within 16 km (10 mi) of the project
   e. if available, a map showing the general types of habitat within 16 km (10 mi) of the project, and information related to proximity of nearby natural lands, and grasslands
   f. the results of project species surveys, if any
   g. a map (scale 1" =100' or 1"=200') delineating the major vegetation communities present on the project site and immediately adjacent to it
   h. color photographs of the major vegetation communities present on the project site, with the locations of the photographs presented on the vegetation map
   i. a geographic information systems (GIS) computer document and digital file showing the project site, points or polygons of observations of listed species at and adjacent to the site.

2. The Service shall review the proposed project to determine if the proposed projectis appropriate to append to this programmatic biological opinion; or needs an individual biological opinion.

3. For projects that qualify for appending to this biological opinion, the Service shall evaluate the anticipated effects and the adequacy of the proposed compensation and provide formal comments to the FHWA if the review reveals inadequacies.

4. Upon receipt of the FHWA's letter, the Service shall formally append the project to this biological opinion and specify the amount of incidental take exempted, if any, in a letter to the FHWA with copies to the appropriate Caltrans office.

The Service shall give priority to completing appended consultations on the minor transportation projects considered herein over other Caltrans projects, as requested by Caltrans and the FHWA. The Service shall respond in writing to requests to append projects to this programmatic biological opinion. The Service's response will be made within 60 days or as soon thereafter as practicable once all the information listed above has been received. No projects can be appended to this biological opinion without written concurrence from the Service.

Annually from the date of issuance of this biological opinion, Caltrans shall report to the Service the following information:

1. The projected start date of construction of each project.

2. The progress made to date on meeting each of the compensation requirements for each project.

3. The FHWA and Caltrans shall provide a cumulative tally and description of all projects that have been appended to this programmatic biological opinion.. The description shall include a GIS file and hard copy map depicting projects for which incidental take has been issued, the total acres affected by each project, the type and category of each project, and the correlating compensation lands, if any, that have been acquired for each project.

4. The first report is due in January 2006.

Status of the Species/Environmental Baseline

San Joaquin Kit Fox

The San Joaquin kit fox was listed as an endangered species on March 11, 1967 (Service 1967) and was listed by the State of California as a threatened species on June 27, 1971. The Recovery Plan includes this canine (Service 1998).

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; Service 1998). Historically, this species 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 pasturelands, 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 (Service 1998). The San Joaquin kit fox seems to prefer more gentle terrain and decreases in abundance as terrain ruggedness increases (Grinnell *et al.* 1937; Morrell 1972; Warrick and Cypher 1998).

The kit fox is often associated with open grasslands, which form large contiguous blocks within the eastern portions of the range of the animal. The listed canine also utilizes oak savanna and some types of agriculture (e.g. orchards and alfalfa), although the long-term suitability of these habitats is unknown (Jensen 1972; Service 1998). In eastern Merced County, the lands between the urban corridor along Highway 99 and the open grasslands to the east are a mixture of orchards and annual crops, mostly alfalfa. Orchards occur in large contiguous blocks in the northwest portions of the study area and at scattered locations in the southwest portions. Orchards sometimes support prey species if the grounds are not manicured; however, denning potential is typically low and kit foxes can be more susceptible to coyotes predation within the orchards (Orloff 2000). Alfalfa fields provide an excellent prey base (Woodbridge 1987; Young 1989), and berms adjacent to alfalfa fields sometimes provide good denning habitat (Orloff 2000). Kit foxes often den adjacent to, and forage within, agricultural areas (Bell 1994; Scott-Graham 1994). Although agricultural areas are not traditional kit fox habitat and are often highly fragmented, they can offer sufficient prey resources and denning potential to support small numbers of kit foxes.

Adult San Joaquin kit foxes are usually solitary during late summer and fall. In September and October, adult females begin to excavate and enlarge natal dens (Morrell 1972), and adult males join the females in October or November (Morrell 1972). Typically, pups are born between February and late March following a gestation period of 49 to 55 days (Egoscue 1962; Morrell 1972; Spiegel and Tom 1996; Service 1998). 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 appear 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 in the following year's litter of pups (Spiegel and Tom 1996). The young kit foxes begin to forage for themselves at about four to five months of age (Koopman *et al.* 2000; Morell 1972).

Although most young kit foxes disperse less than 5 miles(Scrivner *et al.* 1987a), dispersal distances of up to 76.3 miles have been documented for the San Joaquin kit fox (Scrivner *et al.* 1993; Service 1998). Dispersal can be through disturbed habitats, including agricultural fields, and across highways and aqueducts. The age at dispersal ranges 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.

Kit foxes are reputed to be poor diggers, and their dens are usually located in areas with loose-textured, friable soils (Morrell 1972; O'Farrell 1983). However, the depth and complexity of their dens suggest that they possess good digging abilities, and kit fox dens have been observed on a variety of soil types (Service 1998). Some studies have suggested that where hardpan layers predominate, kit foxes create their dens by enlarging the burrows of California ground squirrels (*Spermophilus beecheyi*) or badgers (*Taxidea taxus*)(Jensen 1972; Morrell 1972; Orloff *et al.* 1986). In parts of their range, particularly in the foothills, kit foxes often use ground squirrel burrows for dens (Orloff *et al.* 1986). Kit fox dens are commonly located on flat terrain or on the lower slopes of hills. About 77 percent of all kit fox dens are at or below midslope (O'Farrell 1983), with the average slope at den sites ranging from 0 to 22 degrees (California Department of Fish and Game 1980; O'Farrell 1983; Orloff *et al.* 986). Natal and pupping dens are generally found in flatter terrain. Common locations for dens include washes, drainages, and roadside berms. Kit foxes also commonly den in human-made structures such as culverts and pipes (O'Farrell 1983; Spiegel *et al.* 1996a).

Natal and pupping dens may include from two to 18 entrances and are usually larger than dens that are not used for reproduction (O'Farrell *et al.* 1980; O'Farrell and McCue 1981). Natal dens may be reused in subsequent years (Egoscue 1962). It has been speculated that natal dens are located in the same location as ancestral breeding sites (O'Farrell 1983). Active natal dens are generally 1.2 to 2 miles from the dens of other mated kit fox pairs (Egoscue 1962; O'Farrell and Gilbertson 1979). Natal and pupping dens usually can be identified by the presence of scat, prey remains, matted vegetation, and mounds of excavated soil (i.e. ramps) outside the dens (O'Farrell 1983). However, some active dens in areas outside the valley floor often do not show evidence of use (Orloff *et al.* 1986). During telemetry studies of kit foxes in the northern portion of their range, 70 percent of the dens that were known to be active showed no sign of use (e.g., tracks, scats, ramps, or prey remains)(Orloff *et al.* 1986). In another more recent study in the Coast Range, 79 percent of active kit fox dens lacked evidence of recent use other than signs of recent excavation (Jones and Stokes Associates 1997).

A kit fox can use more than 100 dens throughout its home range, although on average, an animal will use approximately 12 dens a year for shelter and escape cover (Cypher *et al.* 2001). Kit foxes typically use individual dens for only brief periods, often for only one day before moving to another den (Ralls *et al.* 1990). Possible reasons for changing dens include infestation by ectoparasites, local depletion of prey, or avoidance of coyotes (*Canis latrans*). Kit foxes tend to use dens that are located in the same general area, and clusters of dens can be surrounded by hundreds of hectares of similar habitat devoid of other dens (Egoscue 1962). In the southern San Joaquin Valley, kit foxes were found to use up to 39 dens within a denning range of 320 to 482 acres (Morrell 1972). An average den density of one den per 69 to 92 acres was reported by O'Farrell (1984) in the southern San Joaquin Valley.

Dens are used by kit foxes 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 foxes 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). 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 portion of their geographic range that includes Merced County, known prey species of the kit fox include white-footed mice (*Peromyscus* spp.), insects, California ground squirrels, kangaroo rats (*Dipodomys* spp.), San Joaquin antelope squirrels, black-tailed hares (*Lepus californicus*), and chukar (*Alectoris chukar*) (Jensen 1972, Archon 1992), listed in approximate proportion of occurrence in fecal samples. Kit foxes also prey on desert cottontails (*Sylvilagus audubonii)*, ground-nesting birds, and pocket mice (*Perognathus* spp.).

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 to 4.5 square miles (White and Ralls 1993). A mated pair of kit foxes and their current litter of pups usually occupy each home range. 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 to 9.1 miles and are greatest during the breeding season (Cypher 2000).

Kit foxes maintain core home range areas that are exclusive to mated pairs and their offspring (White and Ralls 1993, Spiegel 1996, White and Garrott 1997). This territorial spacing behavior eventually limits the number of foxes that can inhabit an area owing to shortages of available space and 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 than 65 percent of dispersing juvenile foxes die within 10 days of leaving their natal range (Koopman *et al.* 2000).

Estimates of fox density vary greatly throughout its range, and have been reported as high as 1.3 animals per square mile in optimal habitats in good years (Service 1998). At the Elk Hills in Kern County, density estimates varied from 1.86 animals per square mile in the early 1980s to

0.03 animals per square mile in 1991 (Service 1998). Kit fox home ranges vary in size from approximately 1 to 12 square miles(Spiegel *et al.* 1996b; Service 1998). Knapp (1978) estimated that a home range in agricultural areas is approximately 1 square mile. Individual home ranges overlap considerably, at least outside the core activity areas (Morrell 1972; Spiegel *et al.* 1996b).

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 and 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.

The status (i.e., distribution, abundance) of the kit fox has decreased since its listing in 1967. This trend is reasonably certain to continue into the foreseeable future unless measures to protect, sustain, and restore suitable habitats, and alleviate other threats to their survival and recovery, are implemented. Threats that are seriously affecting kit foxes are described in further detail in the following paragraphs.

Loss of Habitat

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 1980).

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 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 1980). Data from the CDFG (1985) and Service file information indicate that between 1977 and 1988, essential habitat for the blunt-nosed leopard lizard, 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 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 (C. Van Horn, Endangered Species Recovery Program, Bakersfield, personal communication to S. Jones, Fish and Wildlife Service, Sacramento, 2000), 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 that 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 (Service 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, personal communication to P. White, Fish and Wildlife Service, Sacramento, April 6, 2000). Hence, the fragmentation of habitat and destruction of earthen dens could adversely affect 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 that are the staple prey of kit foxes (Spiegel 1996), to species adapted to early successional stages and disturbed areas (e.g., California ground squirrels)(Spiegel 1996). Because more than 70 percent of the diets of kit foxes usually consist of abundant leporids (*Lepus*, *Sylvilagus*) and rodents (e. g., *Dipodomys* spp.), and kit foxes often continue to feed on their staple prey during ephemeral periods of prey scarcity, such changes in the availability and selection of foraging sites by kit foxes could influence their reproductive rates, which are strongly influenced by food supply and decrease during periods of prey scarcity (White and Garrott 1997, 1999).

Extensive habitat destruction and fragmentation have contributed to smaller, more-isolated populations of kit foxes. Small populations have a higher probability of extinction than larger populations because their low abundance renders them susceptible to stochastic (i.e., random) events such as high variability in age and sex ratios, and catastrophes such as floods, droughts, or disease epidemics (Lande 1988, Frankham and Ralls 1998, Saccheri *et al.* 1998). Similarly, isolated populations are more susceptible to extirpation by accidental or natural catastrophes because their recolonization has been hampered. These chance events can adversely affect small, isolated populations with devastating results. 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 1995).

Oil fields in the southern half of the San Joaquin Valley also continue to be an area of expansion and development activity. 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). There are no limiting factors or regulations that are likely to retard the development of additional oil fields. Hence, it is reasonably certain that development will continue to destroy and fragment kit fox habitat into the foreseeable future.

Competitive Interactions with Other Canids

Several species prey upon San Joaquin kit foxes. Predators (such as coyotes, bobcats, non-native red foxes, badgers, and golden eagles [*Aquila chrysaetos*]) will kill kit foxes. Badgers, coyotes, and red foxes also may compete for den sites (Service 1998). The diets and habitats selected by coyotes and kit foxes living in the same areas are often quite similar (Cypher and Spencer 1998). Hence, the potential for resource competition between these species may be quite high when prey resources are scarce such as during droughts (which are quite common in semi-arid, central California). Land conversions and associated human activities have led to changes in the distribution and abundance of coyotes, which compete with kit foxes for resources.

Coyotes occur in most areas with abundant populations of kit foxes and, during the past few decades, coyote abundance has increased in many areas owing to a decrease in ranching operations, favorable landscape changes, and reduced control efforts (Orloff *et al.* 1986, Cypher and Scrivner 1992, White and Ralls 1993, White *et al.* 1995). Coyotes may attempt to lessen resource competition with kit foxes by killing them. Coyote-related injuries accounted for 50-87 percent of the mortalities of radio collared kit foxes at Camp Roberts, the Carrizo Plain Natural Area, the Lokern Natural Area, and the Naval Petroleum Reserves (Cypher and Scrivner 1992, Standley *et al.* 1992, Ralls and White 1995, Spiegel 1996). Coyote-related deaths of adult foxes appear to be largely additive (i.e., in addition to deaths caused by other mortality factors such as disease and starvation) rather than compensatory (i.e., tending to replace deaths due to other mortality factors; White and Garrott 1997). Hence, the survival rates of adult foxes decrease significantly as the proportion of mortalities caused by coyotes increase (Cypher and Spencer 1998, White and Garrott 1997), and increases in coyote abundance may contribute to significant declines in kit fox abundance (Cypher and Scrivner 1992, Ralls and White 1995, White *et al.* 1996). There is some evidence that the proportion of juvenile foxes killed by coyotes increases as fox density increases (White and Garrott 1999). This density-dependent relationship would provide a feedback mechanism that reduces the amplitude of kit fox population dynamics and keeps foxes at lower densities than they might otherwise attain. In other words, coyote-related mortalities may dampen or prevent fox population growth, and accentuate, hasten, or prolong population declines.

Land-use changes also contributed to the expansion of nonnative red foxes into areas inhabited by kit foxes. Historically, the geographic range of the red fox did not overlap with that of the San Joaquin kit fox. By the 1970's, however, introduced and escaped red foxes had established breeding populations in many areas inhabited by San Joaquin kit foxes (Lewis *et al.* 1993). The larger and more aggressive red foxes are known to kill kit foxes (Ralls and White 1995), and could displace them, as has been observed in the arctic when red foxes expanded into the ranges of smaller arctic foxes (Hersteinsson and Macdonald 1982). The increased abundance and distribution of nonnative red foxes will also likely adversely affect 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.

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). 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). 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*).

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 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).

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

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 lit., 1989) documented widespread pesticide use in known kit fox and Fresno kangaroo rat habitat adjoining agricultural lands in Madera County. In a separate report, Williams (in lit., 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 Bureau of 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 issued by the Service to the 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)(Service 1999).

Endangered Species Act Section 9 Violations and Noncompliance with the Terms and Conditions of Existing Biological Opinions

The intentional or unintentional destruction of areas occupied by kit foxes is an issue of serious concern. Section 9 of the Act prohibits the "take" (e.g., harm, harass, pursue, injure, kill) of federally-listed wildlife species. "Harm" (i.e., "take") is further defined to include habitat modification or degradation that kills or injures wildlife by impairing essential behavioral patterns including breeding, feeding, or sheltering. Congress established two provisions (under sections 7 and 10 of the Act) 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 potential section 9 of the Act if any unauthorized take occurs. There are numerous examples of section 9 violations and noncompliance with the terms and conditions of existing biological opinions on file at the Sacramento Fish and Wildlife Office. The most egregious violations, and those with the most evidence, are being pursued when Service Law Enforcement and California Department of Fish and Game Enforcement are able to do so.

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).

Many populations of kit fox are at risk of chance extinction owing to small population size and isolation. This risk has been prominently illustrated during recent, drastic declines in the populations of kit foxes at Camp Roberts and Fort Hunter Liggett. Captures of kit foxes during annual live trapping sessions at Camp Roberts decreased from 103 to 20 individuals during 1988 to 1991. This decrease continued through 1997 when only three kit foxes were captured (White *et al.* 2000). A similar decrease in kit fox abundance occurred at nearby Fort Hunter Liggett, and only 2 kit foxes have been observed on this installation since 1995 (L. Clark, Wildlife Biologist, Fort Hunter Liggett, pers. comm. to P. White, Service, Sacramento, February 15, 2000). It is unlikely that the current low abundances of kit foxes at Camp Roberts and Fort Hunter Liggett will increase substantially in the near future owing to the limited potential for recruitment. The chance of substantial immigration is low because the nearest core population on the Carrizo Plain is distant (greater than 16 miles) and separated from these installations by barriers to kit fox movement such as roads, developments, and irrigated agricultural areas. Also, there is a relatively high abundance of sympatric predators and competitors on these installations that contribute to low survival rates for kit foxes and, as a result, may limit population growth (White *et al.* 2000). Hence, these populations may be on the verge of extinction.

The destruction and fragmentation of habitat could also eventually lead to reduced genetic variation in populations of kit foxes that are small and geographically isolated. Historically, kit foxes likely existed in a metapopulation structure of core and satellite populations, some of which periodically experienced local extinctions and recolonization (Service 1998). Preliminary genetic assessments indicate that historic gene flow among populations was quite high, with effective dispersal rates of at least one to 4 dispersers per generation (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. White, 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).

An area of particular concern is Santa Nella in western Merced County where pending development plans threaten to eliminate the little suitable habitat that remains and provides a dispersal corridor for kit foxes between the northern and southern portions of their range. Preliminary estimates of expected heterozygosity from foxes in this area indicate that this population may already have reduced genetic variation.

Other populations that may be showing the initial signs of genetic isolation are the Lost Hills area and populations in the Salinas-Pajaro River watershed (i.e., Camp Roberts and Fort Hunter Liggett). Preliminary estimates of the mean number of alleles per locus from foxes in these populations indicate that allelic diversity is lower than expected. Although these results may, in part, be due to the small number of foxes sampled in these areas, they may also be indicative of an increase in the amount of inbreeding due to population subdivision (M. Schwartz, University of Montana, Missoula, pers. comm. on March 23, 2000, to P. J. White, Fish and Wildlife Service, Sacramento, California). Further sampling and analyses are necessary to adequately assess the effects of these potential genetic bottlenecks.

Arid systems are characterized by unpredictable fluctuations in precipitation, which lead to high frequency, high amplitude fluctuations in the abundance of mammalian prey for kit foxes (Goldingay *et al.* 1997, White and Garrott 1999). 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 primary goal of the recovery strategy for kit foxes identified in the Recovery Plan is to establish a complex of interconnected core and satellite populations throughout the species' range. The long-term viability of each of these core and satellite populations depends partly upon periodic dispersal and genetic flow between them. Therefore, kit fox movement corridors between these populations must be preserved and maintained. In the northern range, from the Ciervo Panoche in Fresno County northward, kit fox populations are small and isolated, and have exhibited significant decline. The core populations are the Ciervo Panoche area, the Carrizo

Plain area, and the western Kern County population, as shown on Figure 10 (enclosed). Satellite populations are found in the urban Bakersfield area, Porterville/Lake Success area, Creighton Ranch/Pixley Wildlife Refuge, Allensworth Ecological Reserve, Semitropic/Kern National Wildlife Refuge (NWR), Antelope Plain, eastern Kern grasslands, Pleasant Valley, western Madera County, Santa Nella, Kesterson NWR, and Contra Costa County. Major corridors connecting these population areas are on the east and west side of the San Joaquin Valley, around the bottom of the Valley, and cross-valley corridors in Kern, Fresno, and Merced Counties.

In response to the drastic loss of habitat and steadily increasing fragmentation, Caltrans and the Service convened a San Joaquin Kit Fox Conservation and Planning Team to address the rapid decline of kit fox habitat in the northern range, and increasing barriers to kit fox dispersal. Consisting of Federal, State, and local agencies, local land trusts, environmental groups, researchers, and other concerned individuals, the goal of this team was to coordinate agency actions that will recover the species, and troubleshoot threats to San Joaquin kit foxes as they emerge. Between the years 2001-2003, the team addressed connectivity issues at specific points along the west-side corridor north of the Ciervo Panoche core population.

There has never been a comprehensive survey of San Joaquin kit foxes or their habitat except for one core population in western Kern County. What is known comes from incidental sightings, local surveys, research projects, and aerial photos. There are more than several hundred recorded sightings of San Joaquin kit foxes in the San Joaquin Valley (CNDDB 2004). Given the biology and ecology of the animal (San Joaquin kit foxes have been documented to move 9 miles or more in a single night), the kit fox is highly likely to inhabit the action area. Areas of suitable habitat that exist within the potential Caltrans project footprints and adjacent to the projects include scrub lands, other less disturbed natural lands, grasslands, ruderal lands, row cropland, and orchards. Ruderal lands, row cropland, fallow fields, and orchards provide denning and foraging habitat, although farming activities have likely reduced denning opportunities and prey base. Kit foxes are able to travel through fallow and active agricultural fields, seasonal wetland areas, and old orchards for both local movement and long distance dispersal. Seasonal wetlands may also provide amphibian prey for kit foxes. Many of the potential Caltrans project sites are within 9 miles of these incidental sightings, and contain habitat components that can be used by the kit fox for feeding, resting, mating, other essential behaviors, or as movement corridors.

Giant Kangaroo Rat

The giant kangaroo rat was federally listed as endangered on January 5, 1987 (Service 1087) and was listed by the State of California as endangered on October 2, 1980. The Recovery Plan includes the giant kangaroo rat (Service 1998). The giant kangaroo rat was distributed historically from southern Merced County, south through the San Joaquin Valley, to southwestern Kern County and northern Santa Barbara County. Significant populations survive only in a few areas of remaining habitat, including the Panoche Hills, Cuyama Valley, Carrizo and Elkhorn Plains, and the Lokern area.

The preferred habitat of giant kangaroo rats is annual grassland on gentle slopes of generally less than 10 degrees, with friable, sandy-loam soils. However, most remaining populations are on

poorer and marginal habitats which include shrub communities on a variety of soil types and on slopes up to about 22 degrees. Completion of the San Luis Unit of the Central Valley Project and the California Aqueduct of the State Water Project resulted in rapid cultivation and irrigation of natural communities that had provided habitat for giant kangaroo rats along the west side of the San Joaquin Valley (Williams 1992, Williams and Germano 1993). Between about 1970 and 1979, almost all the natural communities on the western floor and gentle western slopes of the Tulare Basin were developed for irrigated agriculture, restricting occurrence of most species of the San Joaquin saltbush and valley grassland communities, including the giant kangaroo rat. This rapid habitat loss was the main reason for its listing as endangered.

Up until the 1950s, colonies of giant kangaroo rats were spread over hundreds of thousands of acres of continuous habitat in the western San Joaquin Valley, Carrizo Plain, and Cuyama Valley (Grinnell 1932a; Shaw 1934; Hawbecker 1944, 1951). The causes of decline of the giant kangaroo rat are similar to those discussed above for the kit fox. The decline of giant kangaroo rats is attributed primarily to habitat loss from the conversion of native scrub and grasslands to agriculture (Service 1998). An estimated 1.8 percent of the giant kangaroo rat's historical habitat remains extant (Williams 1992). Habitat destruction resulting from the development of small cities and towns along the western edge of the San Joaquin Valley between Coalinga and Maricopa, as well as development of the infrastructures for petroleum and mineral exploration and extraction, roads and highways, energy and communications infrastructures, and agriculturally related industrial developments collectively have contributed to the endangerment of the giant kangaroo rat. Widespread use of rodenticides and rodenticide-treated grain to control ground squirrels and kangaroo rats may also have contributed to the decline of giant kangaroo rats in some areas.

Populations within remaining habitat fluctuate widely in response to changing weather patterns (Williams 1992, Service 1998). Since listing as endangered, conversion of habitat for giant kangaroo rats has slowed substantially, because most tillable land has already been brought into cultivation, and because of a lack of water for additional irrigated ac. However, during and following the 1994-1995 winter, biologists noted a decline in abundance of kangaroo rats in the southern San Joaquin Valley. Decreased sign of activity and lower than expected trapping results were observed at several dispersed sites. Dramatic declines were noted for short-nosed, Tipton, and Heermann's kangaroo rats, although only modest reductions were noted for giant kangaroo rat populations on the valley floor (Single et al. 1996).

Urban and industrial developments, roads, petroleum and mineral exploration and extraction, new energy and water conveyance facilities, and construction of communication and transportation infrastructures continue to destroy habitat for giant kangaroo rats and increase the threats to the species by reducing and further fragmenting populations. Rodent control programs have also contributed to the species' decline. Habitat degradation due to lack of appropriate habitat management on conservation lands, especially lack of grazing or fire to control density of vegetation (including shrubs) may be an additional threat to giant kangaroo rats (Williams and Germano 1993). Though many recent and future habitat losses will be mitigated for by protecting habitat elsewhere, they still result in additional loss and fragmentation of habitat.

The Bureau of Land Management (BLM), in cooperation with species experts, has initiated giant kangaroo rat population monitoring studies in the Lokern and CPNA areas. There have been significant declines in giant kangaroo rat numbers on BLM lands in response to both drought and above average rainfall conditions. While these fluctuations have been drastic in nature, the giant kangaroo rats have rebounded from low population numbers following the drought. Since the 1993 rebound, numbers have declined to various levels. Wildfire and prescribed burn monitoring has indicated that this species responds positively to fire (Germano and Saslaw, 1999, unpublished data).

The decline in kangaroo rat abundance and distribution has been well documented in the southern San Joaquin Valley (Single et al. 1996). In the Lokern area, the decline in giant kangaroo rats may have been caused by the combination of an extremely hot fire that occurred in spring 1997 that burned approximately 5800 acres, and several years of heavier than normal precipitation. Because of the small, isolated nature of many remaining populations, their lack of genetic diversity, and low dispersal capability, giant kangaroo rats are especially vulnerable to local extirpation from random environmental events such as fires, flooding, or unpredictable land use changes.

In 1995, the most recent year in which substantial information is available, the giant kangaroo rat was believed to be present in only a few remaining isolated populations: Cuyama Valley, San Juan Creek Valley, and the Carrizo Plan in San Luis Obispo County; the Panoche Hills on the Fresno-San Benito County line; in the Kettleman Hills of Kings County; and in western Kern County, as shown on Figure 39 of the Recovery Plan. Proposed projects presented on maps by Caltrans, as potential projects to append to this biological opinion in Fresno, Kings, and Kern County (Figures 6, 7, and 9) are in the vicinity of known occurrences of giant kangaroo rats (CDFG 2002) and could affect the type of habitat in which this animal occurs (Caltrans 2000).

Tipton Kangaroo Rat

The Tipton kangaroo rat was federally listed as endangered on August 8, 1988 (Service 1988), and was listed by the State of California as endangered on June 11, 1989. The Recovery Plan includes the Tipton kangaroo rat (Service 1998). The Recovery Plan calls for (1) research to determine how to manage natural lands to reduce the frequency and severity of population crashes, and (2) consolidation and protection of blocks of suitable habitat to minimize the effects of random catastrophic events on their populations.

Tipton kangaroo rats inhabit saltbush scrub and alkali sink scrub communities in the southern San Joaquin Valley. The historical geographic range of Tipton kangaroo rats was over 1.7 million acres. Its distribution was limited to arid-land communities occupying the valley floor of the Tulare Basin in level or nearly level terrain. By 1985, the inhabited area had been reduced, primarily by cultivation and urbanization, to about 60,000 acres. In 1997, the Service estimated that Tipton kangaroo rats inhabited approximately 4 percent of their historic range (Service 1998). Current occurrences are limited to scattered, isolated areas. In the southern San Joaquin Valley, this includes the Kern National Wildlife Refuge, Delano, and other scattered areas within Kern County.

The preferred location for Tipton kangaroo rat burrows typically involves alluvial fans and flood plains and includes fine, highly alkaline sands and, to a lesser degree, alkaline sandy loams. Burrow systems are usually in open areas but may occur in areas of thick scrub. They are typically simple, but may include interconnecting tunnels. Most are less than 10 inches deep. They are commonly in slightly elevated mounds, the berms of roads, canal embankments, railroad beds, and bases of shrubs and fences where wind-blown soils accumulate above the level of surrounding terrain. Terrain not subject to flooding is essential for permanent occupancy by Tipton kangaroo rats.

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

The causes of decline of the Tipton kangaroo rat are similar to those discussed above for the giant kangaroo rat and for the kit fox. Conversion of native habitats to agricultural production is considered the primary reason for the Tipton kangaroo rat's population decline (Service 1988). Construction of canals, roads, highways, railroads, and buildings and the use of rodenticides have probably also accelerated this subspecies' population decline. Because of the small, isolated nature of many remaining populations, their lack of genetic diversity, and low powers of dispersal, Tipton kangaroo rats are especially vulnerable to local extirpation from random environmental events such as flooding or unpredictable land use changes.

In 1995, the most recent year in which sufficient information is available, the Tipton kangaroo rat was believed to be present in only about 63,000 acres, or 3.7% of the historical range. Tipton kangaroo rats are found in Tulare County both east and west of State Route 99, in Kings County in the Tulare Lake Bed and Allensworth, and in Kern County in scattered populations across the valley floor from the California Aqueduct to several locations east of Bakersfield, as shown on Figure 45 of the Recovery Plan. Proposed projects presented on maps by Caltrans, as potential projects to append to this biological opinion in Tulare, Kings, and Kern County (Figures 7-9) are in the vicinity of known occurrences of Tipton kangaroo rats (CNDDB 2002) and could affect the type of habitat in which this animal occurs (Caltrans 2000).

Blunt-nosed Leopard Lizard

The blunt-nosed leopard lizard was federally listed as endangered on March 11, 1967 (Service 1967) and was listed by the State of California as endangered on June 27, 1971. A recovery plan

for the blunt-nosed leopard lizard was first prepared in 1980, revised in 1985, and then superceded by the Recovery Plan (Service 1998). The recovery strategy requires that the Service (1) determine appropriate habitat management and compatible land uses for the blunt-nosed leopard lizard; (2) protect additional habitat for them in key portions of their range; and (3) gather additional data on population responses to environmental variation at representative sites in their existing geographic range (Service 1998).

The blunt-nosed leopard lizard was distributed historically throughout the San Joaquin Valley and adjacent interior foothills and plains, extending from central Stanislaus County south to extreme northeastern Santa Barbara County. Today its distribution is limited to scattered parcels of undeveloped land, with the greatest concentrations occurring on the west side of the valley floor and in the foothills of the Transverse Range. The blunt-nosed leopard lizard prefers open, sparsely vegetated areas of low relief and inhabits valley sink scrub, valley saltbush scrub, valley/plain grasslands, and foothill grasslands vegetation communities.

Adult lizards often seek safety in burrows, while immature lizards use rock piles, trash piles, and brush. The lizards use burrows constructed by mammals, such as kangaroo rats, for overwintering and estivation. Adult lizards hibernate during the colder months of winter, and are less active in the hotter months of late summer. Adults are active above ground from about March or April through September. Hatchlings are active until mid-October or November, depending on weather. Lizard habitat has been significantly reduced, degraded, and fragmented by roads, agricultural development, petroleum and mineral extraction, livestock grazing, pesticide application, and off-road vehicle use.

In Kern County, the blunt-nosed leopard lizard currently occupies scattered parcels of undeveloped land on the Valley floor, and occurs in the foothills of the Coast Range. While the blunt-nosed leopard lizard can occupy grassland used for grazing it prefers lands with scattered shrubs and sparse grass/forb cover. Habitat for the blunt-nosed leopard lizard has been lost or degraded due to oil development, urban development, row crops, pesticide application, and off-road vehicle use (Service 1998).

Habitat disturbance, destruction, and fragmentation continue as the greatest threats to blunt-nosed leopard lizard populations. Disturbances and modifications of habitats within areas of mineral and petroleum development pose lesser, but continuing threats as they degrade the habitat. Direct mortality occurs when animals are killed in their burrows during construction, killed by vehicle traffic, drowned in oil, or fall into excavated areas from which they are unable to escape. Displaced lizards may be unable to survive in adjacent habitat if it is already occupied or unsuitable for colonization.

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

Because leopard lizards often inhabit ground squirrel burrows, they may be inadvertently poisoned.

In recent years, above average precipitation seems to have increased the amount of vegetative cover. This increase in cover may be a factor in the low abundance of adult lizards seen during the population monitoring at the former Naval Petroleum Reserve in western Kern County in 1995 (U.S. Department of Energy and Chevron 1996).

The BLM has conducted surveys and compiled observational data from BLM lands in western Kern, Kings, and Fresno Counties. Currently, the BLM and USGS-Biological Research Division are conducting a 5- to 10-year research study in the Lokern Area to evaluate the effects of cattle grazing on blunt-nosed leopard lizards, giant kangaroo rat, San Joaquin antelope squirrel, other small mammals, and Kern mallow.

Extant populations of blunt-nosed leopard lizards are known from the Carrizo Plain, Elk Hills, around Taft, and at various other locations in the vicinity of the project area (Service 1998). There are numerous records from the vicinity in the NDDB and other sources. The McKittrick Valley area is included in one of several larger areas given highest priority for habitat protection for the blunt-nosed leopard lizard. The Lokern and Elk Hills areas have also been targeted for habitat protection for the species (Service 1998).

There has never been a comprehensive survey of the entire historical range of the blunt-nosed leopard lizard, and therefore less is known about this animal's distribution than giant and Tipton kangaroo rats (Service 1998). The currently known occupied range of the blunt-nosed leopard lizard is in scattered parcels of undeveloped land and margins of developed land on the Valley floor, and in the foothills of the Coast Range. Blunt-nosed leopard lizards occur from Merced and Madera Counties in the north, through Fresno, Kings, Tulare, and Kern Counties to San Luis Obispo, Santa Barbara, and Ventura Counties in the south, as shown on Figure 49 of the Recovery Plan. Proposed projects presented on maps by Caltrans, as potential projects to append to this biological opinion in Merced, Madera, Tulare, Kings, and Kern Counties (Figures 4-9) are in the vicinity of known occurrences of the blunt-nosed leopard lizard (CNDDB 2002) and could affect the type of habitat in which this animal occurs (Caltrans 2000).

San Joaquin Antelope Squirrel

The San Joaquin antelope squirrel was removed as a Category 1 candidate for Federal listing in 1995 (Service 1995b) and is now considered a Species of Concern. It was listed by the State of California as threatened in 1980. Conservation of the San Joaquin antelope squirrel is addressed in the Recovery Plan (Service 1998). The Recovery Plan calls for protecting the two largest populations on the Carrizo Plain Natural Area and in western Kern County, as well as protecting additional populations in western Fresno and eastern San Benito counties, along the edge of the Valley between Fresno and Kern counties, and on the Valley floor. Protection and enhancement of habitat in the Semitropic Ridge area of Kern County is important to maintaining a population on the Valley floor. Protecting and restoring habitat in the area including Pixley National Wildlife Refuge and Allensworth Natural Area, encompassing all the natural and abandoned

farm lands in the Allensworth-Delano area of Tulare and Kern counties, and reintroducing antelope squirrels to Pixley National Wildlife Refuge is necessary to secure a population in the eastern portions of the Valley.

Historically, the San Joaquin antelope squirrel occurred in the western and southern portions of the Tulare Basin and the contiguous areas to the west in the upper Cuyama Valley and on the Carrizo and Elkhorn plains. They ranged from western Merced County on the northwest, southward along the western side of the Valley to its southern end. They were distributed over the Valley floor in Kern County and along the eastern edge of the Valley northward to near Tipton, Tulare County. Since 1979, this species has disappeared from many of the smaller islands of habitat on the Valley floor, including Pixley National Wildlife Refuge, Tulare County; Alkali Sink and Kerman Ecological Reserves, Fresno County; and several areas within the Allensworth Conceptual Area of Tulare and Kern counties.

San Joaquin antelope squirrels inhabit arid annual grassland and shrubland communities in areas typically receiving less than 10 inches of mean annual precipitation. They are most numerous in areas with sparse-to-moderate cover of shrubs. Shrubless areas only have sparse populations, especially where giant kangaroo rats are uncommon or not present. This species requires areas free from flooding. Soils are friable and primarily loam and sandy-loam, but soils with a wide range of textures are used. Loss of habitat to agricultural developments, urbanization, and petroleum extraction is the primary cause for decline in numbers of antelope squirrels. Use of rodenticides and insecticides may also negatively impact the species.

The processes of habitat loss and fragmentation are expected to continue on a smaller scale than in the past, but the direct and indirect effects of these processes are expected to accelerate the decline of the species. One of the two largest populations and most important habitat areas, the Carrizo Plain Natural Area, is now mostly under public ownership. Potential protection is tenuous for the equally important population of in the Lokern-Elk Hills area of western Kern County. Another threat to the San Joaquin antelope squirrel on private land may be the long-term effects of excessive grazing by livestock. Elimination of shrubs and soil erosion from heavy use of rangeland communities, degrades their carrying capacities for most species. Substantial soil erosion has occurred on both public and private lands throughout the historical geographic range of the species (Williams et al. 1993).

The currently known occupied range of the San Joaquin antelope squirrel is in scattered parcels of undeveloped land and margins of developed land on the Valley floor, from Merced County south to Kern and San Luis Obispo Counties, as shown on Figure 57 of the Recovery Plan. Proposed projects presented on maps by Caltrans, as potential projects to append to this biological opinion in Merced, Fresno, Tulare, Kings, and Kern Counties (Figures 4, 6, 7, and 9) are in the vicinity of known occurrences of the blunt-nosed leopard lizard (CNDDB 2002).

California Jewelflower

The California jewelflower was listed as a federally endangered species in 1990 (Service 1990) and was listed as endangered by the State of California in January 1987. The Recovery Plan

includes the California jewelflower (Service 1998). The recovery goal is to maintain self-sustaining populations in protected areas representative of the former geographic and topographic range of the species and in a variety of appropriate natural communities.

The primary reason for the decline of California jewelflower is habitat destruction. All the populations on the San Joaquin and Cuyama Valley floors have been eliminated. Conversion to agriculture accounts for the loss of most sites, but those closest to Bakersfield and Fresno were destroyed by urbanization. Oilfield activity may have eliminated a few sites in the foothills at the western margin of the San Joaquin Valley (Taylor and Davilla 1986). Potential threats to one or more of the remaining populations of California jewelflower include competition from exotic plants, the effects of certain insecticides on pollinators, and small population size (Service 1998). California jewelflower is an annual, meaning that each plant lives less than 1 year, and the entire life cycle from seed germination to seed set is completed in a single growing season. As is typical of annuals, both plant size and population size can vary dramatically, depending on site and weather conditions. California jewelflower probably forms a persistent seed bank. The presence of a seed bank would explain the reappearance of California jewelflower in uncultivated areas where it has not been observed for decades. In years of above-average rainfall during the growing season, 46 percent to 85 percent of plants in study areas on the Carrizo Plain survived long enough to produce seed. In years of below-average precipitation or above-average temperatures, all the plants may die before setting seed (Service 1998).

The historical distribution of the California jewelflower is known from seven counties. Occurrences were noted in Fresno, Kern, and Tulare counties and the Carrizo Plain (San Luis Obispo County) and the Cuyama Valley (Santa Barbara and Ventura counties). The species was also found in the Sierra Nevada foothills at the eastern edge of Kern County and in Kings County. By 1986, all occurrences on the San Joaquin and Cuyama Valley Floors had been extirpated, and the only known natural population still in existence was in Santa Barbara Canyon, which is adjacent to the Cuyama Valley in Santa Barbara County. A small, introduced population colony also existed at the Paine Preserve in Kern County at that time. Since 1986, several more introductions have been attempted, and a number of colonies were rediscovered in two other areas where the species had been collected historically. Populations of California jewelflower that are known to be extant are shown on Figure 6 in the Recovery Plan (Service 1998); within the action area of this biological opinion, California jewelflowers are found in the Kreyenhagen Hills in western Fresno County, and in Lost Hills in Kern County. At least one minor road project potentially could occur in the vicinity of Lost Hills, as shown on Figure 9.

San Joaquin Woolly-threads

San Joaquin woolly-threads, a member of the sunflower family (Asteraceae), was federally listed as endangered in 1990 (Service 1990). It has not been listed by the State of California. The Recovery Plan includes the San Joaquin woolly-threads (Service 1998). The recovery goal for this species is similar to that for other plant species discussed in the Service's 1998 Recovery Plan: to maintain self-sustaining populations in protected areas representative of the former geographic and topographic range of the species and in a variety of appropriate natural

communities. The recovery task with the highest priority is to protect existing habitat within the San Joaquin Valley.

The historic range of San Joaquin woolly-threads included the Valley floor, the hills west of the valley, and the Cuyama Valley Occurrences were found in Fresno, Kings, Kern, San Benito, San Luis Obispo, and Santa Barbara counties. Currently, populations can be found on the Carrizo Plain (San Luis Obispo County), near Lost Hills (Kern County), in the Kettleman Hills (Kings and Fresno counties), in the Jacalitos Hills and Panoche Hills (Fresno and San Benito counties, respectively), in the Bakersfield area (Kern County), and in the Cuyama Valley (San Luis Obispo and Santa Barbara counties.)

San Joaquin woolly-threads occurs in grassland and scrubland habitats. The species generally occupies microhabitats with less than 10 percent shrub cover, although herbaceous cover may be sparse or dense, and cryptogamic crust may or may not be present. San Joaquin woolly-threads occurs on neutral to subalkaline soils. On the San Joaquin Valley floor, the species typically is found on sandy or sandy-loam soils, whereas on the Carrizo Plain it occurs on silty soils. The species frequently occurs on sand dunes and sandy ridges as well as along the high-water line of washes and on adjacent terraces. Habitat loss is the reason for the decline of the species on the floors of the San Joaquin and Cuyama valleys. Intensive agriculture led to the loss of the majority of the occurrences in the valleys, with other sites being destroyed by urban development in and around Bakersfield and intensive oilfield development between Lokern and Lost Hills.

The San Joaquin woolly-threads once ranged throughout the floor of the San Joaquin Valley from western Fresno County and eastern Tulare County south to the foothills of the Tehachapi Mountains, reaching into San Benito County (Taylor 1989). Four metapopulations and several small, isolated populations occur in the hills and plateaus west of the San Joaquin Valley. The largest metapopulation occurs on the Carrizo Plain, where the occupied habitat totaled over 1,100 hectares (2,800 acres) in 1993, a particularly favorable year. Much smaller metapopulations are found in Kern County near Lost Hills, in the Kettleman Hills of Fresno and Kings Counties, and in the Jacalitos Hills of Fresno County. Several isolated occurrences are known from the Panoche Hills in Fresno and San Benito Counties, the Bakersfield vicinity, and the Cuyama Valley (Service 1998). The species has been extirpated from Tulare County.

It appears to favor non-alkaline soils of sandy or silty sand texture and an arid climatic regime (Taylor 1989). It is thought to be a poor competitor with introduced annual grasses (Ibid), but specific competitive effects have not yet been documented by scientific study. Much of the habitat for San Joaquin woolly-threads has been eliminated by conversion of annual grassland sites to agriculture. It currently is known to occupy scattered areas that total approximately 3,000 acres of pastures in the Carrizo and Elkhorn Plains (Service 1998).

Bakersfield Cactus

Bakersfield cactus was listed as a Federal endangered species in 1990 (55 FR 29361) and as a State endangered species in January 1990 (Service 1990). The Recovery Plan issued by the Service in 1998 addresses the San Joaquin woolly-threads (Service 1998). The recovery goal for this species is similar to that for the other plant species discussed above: to maintain self-sustaining populations in protected areas representative of the former geographic and topographic range of the species and in a variety of appropriate natural communities. Habitat protection is an important action to prevent the extinction or irreversible decline of the Bakersfield cactus.

Bakersfield cactus is endemic to a limited area of central Kern County in the vicinity of Bakersfield. Approximately one-third of historical occurrences have been eliminated, and the remaining populations are highly fragmented. The range of Bakersfield cactus was extended to the south when several plants were found in south-central Kern County, just north of Wheeler Ridge.

Bakersfield cactus typically occurs on sandy soils although gravel, cobbles, or boulders may also be present. Known populations occur on flood plains, ridges, bluffs, and rolling hills. It typically is associated with saltbush scrub communities but may also be found in blue oak and riparian woodlands (Holland 1986). The primary reason for the decline of Bakersfield cactus is habitat loss. Populations near Edison and Lamont were destroyed by conversion to agriculture. Residential development eliminated numerous plants in northeast Bakersfield in recent years. Petroleum production, off-road vehicle activity, overgrazing, and flooding also have contributed to habitat loss and fragmentation and degradation of populations.

The Bakersfield cactus is found chiefly within annual grassland of the San Joaquin Valley on sandy to sandy-loam soils. This cactus historically grew atop the low hills northeast of Oildale, southeasterly along the valley floor to the low foothills of the Tehachapi Mountains southeast and southwest of Arvin in Kern County. Bakersfield cactus is a low-growing cactus that typically spreads to form extensive thickets. Agricultural land conversion, oil and gas development, sand mining, urbanization, and perhaps wildfire have reduced this formerly widespread species to numerous small, isolated colonies that can be divided into five general population areas: the oilfields northeast of Oildale, Kern River Bluffs northeast of Bakersfield, the bluffs and hills west and north of Caliente Creek east of Bakersfield, Comanche Point on the Tejon Ranch southeast of Arvin, and northwest of the community of Wheeler Ridge. Off-highway vehicle (OHV) use, proposed flood control basins, and activities previously referred to continue to threaten the remaining sites.

Effects of the Proposed Action

Overview of Potential Effects

Lists of potential projects that might be appended to this opinion are provided in Tables 1 through 7 (enclosed). Potential effects from these transportation projects are summarized below:

Category 1 Projects

Project Type	Potential Effects
Roadway Rehabilitation	Habitat loss, fragmentation, and degradation; disturbance; loss of dens; exposure to contaminants; invasion by non-native species.
Modify Gore Area	Habitat loss; disturbance; exposure to contaminants, habitat loss.
Rehabilitation or Improvements to Weigh Stations, Maintenance Stations, and Rest Areas	Disturbance; exposure to contaminants.
Installation of Signs, Traffic Signals, Lighting, and Call Boxes	Habitat loss; disturbance; exposure to contaminants; invasion by non-native species.
Installation of Fiber Optic System	Habitat loss; disturbance; exposure to contaminants.
Replacement or Installation of Guard Rail or Thrie-beam Rail	Habitat loss; disturbance; exposure to contaminants; invasion by non-native species
Soundwall Installation	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; invasion by non-native species.
Minor Pavement Widening	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; invasion by non-native species.
Construction of Curb Ramps	Disturbance; exposure to contaminants.
Removal of Fixed Objects	Disturbance; exposure to contaminants.
Installation of Fencing	Habitat fragmentation; disturbance; exposure to contaminants; blocked corridors; altered use of space.

Category 2 Projects

Project Type	Potential Effects
Modification or Installation of Drainage Facilities	Habitat degradation; disturbance, exposure to contaminants; altered use of space, altered plant dependent hydrology.
Landscaping	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; altered use of space; invasion by non-native species, loss of seed bank.
Bridge Rehabilitation	Disturbance; exposure to contaminants; altered use of space; invasion by non-native species.
Ramp Meter Installation	Disturbance; exposure to contaminants; invasion by non-native species.
Intersection Modifications	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; altered use of space; invasion by non-native species.

Increasing Vertical Clearance	Habitat loss, degradation; disturbance; exposure to contaminants; invasion by non-native species

Category 3 Projects

Project Type	Potential Effects
Slope Protection and Other Slope Treatments	Habitat loss, degradation; disturbance; exposure to contaminants; altered use of space; invasion by non-native species, altered plant dependent hydrology.
Minor Interchange and Ramp Modifications	Habitat loss, degradation; disturbance; exposure to contaminants; altered use of space; invasion by non-native species.
Add Passing Lane, Auxiliary Lane, Left-and Right-turn Lane Channelization, Add Truck Climbing Lane, Widen Lane Width	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; blocked corridors; altered use of space; invasion by non-native species, loss of seed bank, loss of below and above ground plant habitats.
Add Turnout	Habitat loss, fragmentation degradation; disturbance; exposure to contaminants; blocked corridors; altered sue of space; invasion by non-native species, loss of below and above ground plant habitats.
Shoulder Widening	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; blocked corridors; altered use of space; invasion by non-native species.
Installation of Catch Basin or Ponding Basin	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; blocked corridors; altered use of space; invasion by non-native species, alteration of plant dependent hydrology.
Profile Corrections	Habitat loss, fragmentation, degradation; disturbance; exposure to contaminants; blocked corridors; altered use of space; invasion by non-native species.

San Joaquin Kit Fox

The range-wide habitat loss, fragmentation, and degradation from multiple factors are the primary threat to the survival and recovery of the San Joaquin kit fox (Service 1998). Approximately 95% of native habitat for the kit fox in the San Joaquin Valley has been destroyed by agricultural, industrial, and urban development (Service 1998). Loss of natural lands continues to occur, further reducing its habitat.

The amount of habitat loss directly attributable to roads has not been calculated. Estimates of the area occupied by roads under the jurisdiction of Caltrans include 3,669 acres for Kern County, 591 acres for Kings County, 1,065 acres for Merced County, and 2,019 acres for Fresno County (Cypher 2000). These estimates are based on a standard lane width of 11.8 feet. Though not all areas included in this estimate are kit fox habitat, the estimates may nonetheless under represent the effects of roads as these totals do not include road shoulders, medians, or associated developments (e.g., interchanges, signs, drain facilities, weigh stations); nor do they include the

area occupied by county and city roads. Furthermore, the above totals do not reflect the arrangement or density of San Joaquin Valley roads or the traffic volume on these roads.

The Service estimate of affected habitat acres is based on the number of projects listed in Table 1 of this biological opinion, that also was submitted by Caltrans as an amendment to FHWA's October 2000 biological assessment. The figures in Table 1 list proposed projects for which information was accurate as of February 13, 2003. Based on a tally of proposed projects possibly scheduled for environmental clearance within the next three years, approximately 89 projects are planned by Caltrans on behalf of the FHWA. If all of these projects were to be of the maximum area discussed in the *Description of the Proposed Action* section of this biological opinion, loss of habitat could potentially total 880 acres. The Service therefore estimates that up to 880 acres inhabited by San Joaquin kit foxes will be taken as a result of the proposed action. All of the habitat acres taken under this programmatic consultation likely will support the San Joaquin kit fox.

The effects of roads and minor transportation projects on the San Joaquin kit fox are anticipated to be greater within (1) crucial San Joaquin kit fox corridors and linkages, such as the Santa Nella Area in Merced County, Patterson in Stanislaus County, and the Tracy Triangle area in San Joaquin County; (2) the area east of Highway 99 extending from the Merced River south to the intersection of the intersection of Highway 99/Interstate 5; and (3) through any of the three core population areas: Carrizo Plain in San Luis Obispo County, natural lands of western Kern County (i.e., Elk Hills, Buena Vista Hill, and the Buena Vista Valley, Lokern Natural Area and adjacent natural land), and the Ciervo-Panoche Natural area in Fresno and Benito Counties.

Road Density

The importance of road density to the ecological effects on species is indicated by research coordinated at the national level. The National Academy of Science (NAS) has formed a committee to review the scientific findings pertaining to road density. The NAS committee is focusing on hard-surfaced roads and will assess data and ecological indicators needed to measure effects, including cumulative effects. The NAS committee will produce a conceptual framework for the development of a rapid assessment methodology that transportation and regulatory agencies can use to assess and measure the ecological impact of road density (NAS 2003). The project is being sponsored by the Federal Highways Administration.

Although the effects of road density are unstudied relative to the San Joaquin kit fox, road density appears to adversely affect other diminishing species, for example wolves (*Canus lupis*) and mountain lions (*Felis concolor*). According to Forman *et al.* (2003), wolves in Minnesota, Wisconsin, and Michigan and mountain lions in Utah appear to thrive only where road density is less than 1.0 mile/square mile. In an examination of radio-collared wolves in Wisconsin, a total of 60% of human-induced mortality occurred at road densities above 1.0 mile/square mile (Wydeven *et al.* 2001). In areas where road density is high, San Joaquin kit fox are likely to be adversely affected by several factors including direct mortality due to vehicle strikes, alteration of behavior patterns due to road and road zone avoidance, road barrier effects which reduce reproductive potential due to the inaccessibility of mates, prey, and shelter. Additionally roads

are documented as serving as conduits for invasion by non-native plants and animals as well as the means by which contaminants and toxins are introduced to habitat.

Habitat Fragmentation

The area or diameter of patches enclosed within a network, referred to by Forman *et al.* (2003) as mesh size, is inversely related to road density. As road density increases, mesh size decreases. As the landscape becomes more fragmented, the fragments become progressively smaller (Forman *et al.* 2003). Patches within dense road networks are constrained in terms of ecosystem functioning and are thus degraded. As patches become progressively smaller, they become unsuitable to support the San Joaquin kit fox and its prey.

If a habitat fragment is too small to support a home range, animals may abandon it. Abandonment increases the probability that the animals will be extirpated from each patch. Estimates of home range size for the San Joaquin kit fox vary from 1.7 square miles to 4.5 square miles (White and Ralls 1993). Typically, a mated pair will share a home range. As mesh size becomes smaller, the patches themselves can function as barriers with habitat degraded to the point that it offers little in the way of foraging grounds or refuge from predators. These remnant patches interrupt dispersal corridors and reduce genetic exchange and mating opportunities.

Road density and mesh size are directly related to the total surface area occupied by roads in a given region. On a local scale, the surface area of a road may be the major contributor to adverse effects to San Joaquin kit foxes depending on lane width and kit fox occupation of or dispersal through adjacent habitat.

Road Surface Area

Based on a lane width of 11.8 feet, the combined Caltrans' road area for the counties of Fresno, Kern, and Merced counties totals 3,674 acres (Cypher 2000) (information for the other counties in this biological opinion was unavailable). The surface area of a road or road network both reflects the type of traffic, traffic volume, and traffic speed of the region it serves and induces an increase in volume (or average daily traffic (ADT)) and speed as commuters seek alternative, time-saving routes and connections between growing cities. Two-lane roads may appear to be more permeable than multi-lane freeways. However, direct mortality due to vehicle strikes may occur more frequently on two-lane high volume roads. Multi-lane freeways may act as such a strong deterrent that crossings are not attempted. Two major road ways traverse San Joaquin kit fox habitat: State highway 99 and Interstate highway 5 (I-5). According to Caltrans, average daily traffic at the Sacramento/San Joaquin county line is 55,000 motor vehicles on Highway 99 and 47,000 on I-5. At the San Joaquin/Stanislaus county line, average daily traffic is 102,000 on Highway 99 and 24,900 on I-5. At the Madera/Fresno county line, average daily traffic is 61,000 on Highway 99, the same as at the Los Angeles/Kern county line on I-5 (Caltrans as reported in the Fresno Bee 2002). These major highways present a substantial barrier and threat to kit foxes throughout their range.

Direct Mortality

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. Such strikes are usually fatal for an animal the size of a 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 December through March 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.

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. The type of road (e.g., number of lanes) traffic volume, and average speed of vehicles likely all influence the number of vehicle strikes for which San Joaquin kit foxes are as risk. The number of strikes likely increases with road size, traffic volume, and average speed (Clevenger and Waltho 1999). Another factor influencing the number of vehicles striking San Joaquin kit foxes, but for which little data is available, is the frequency with which the animals cross roads and are therefore at risk. The proportion of successful road crossings by these animals likely declines with increasing road size, traffic volume and density, and vehicle speeds. The proportion of San Joaquin kit foxes successfully crossing roads may increase in areas where they obtain more experience crossing roads, such as in and near urban areas.

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 the period 1980-1995 at the Naval Petroleum Reserves in California in western Kern County (Cypher *et al.* 2000). During this period, 341 adult San Joaquin kit foxes were monitored using radio telemetry, and 225 of these animals were recovered dead. Of these, 20, or 9% were struck and killed by vehicles. During this same period, 184 juvenile (<1 year old) kit foxes were monitored. Of these, 142 were recovered dead and 11 or 8%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 the period 1980-1991 (Scrivner *et al.* 1993). Of these, 34 were hit by vehicles on the approximately 1,600 km (990 miles) of roads at the Reserve, and 36 were struck on the approximately 80 km (50 miles) of State and County roads (e.g., State Route 119, Elk Hills Road), where traffic volumes and average vehicle speeds were higher than those on the Reserve.

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 the period 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. Though six 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 National Monument in eastern San Luis Obispo County (Ralls and White 1995). Twenty-two were found dead; 1 (5%) was 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 the period 1988-1992 (Standley *et al.* 1992). Forty-nine were found dead of which two were attributed to vehicle strikes. In western Merced County, 28 San Joaquin kit foxes were radio-collared during the period 1985-1987 (Briden *et al.* 1992). Seventeen were found dead and two (12%) of these deaths were attributed to vehicles.

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. Though predators such as coyotes, bobcats, non-native red foxes, and domestic dogs likely constitute a higher source of mortality than vehicle strikes (Service 1998; Cypher 2000), predation as a source of mortality is likely dependent upon local conditions. Where abundance of predators has also been reduced due to road density and loss of habitat, vehicle strikes may present a significant threat to kit fox survival and recovery.

Based on a study of another kit fox subspecies, Egoscue (1962) reported that eight tagged foxes (*Vulpes macrotis nevadensis*) in Utah were killed by vehicles, and five 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.

The swift fox (*Vulpes velox*) is closely related to the San Joaquin kit fox, and is listed as 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 five of 89 (6%) of the foxes found dead (Carbyn *et al.* 1994). Pups appeared to be especially vulnerable, particularly if the natal dens were located near roads (Carbyn 1998). In western Kansas, 41 adults and 24 juvenile swift foxes were radio collared and monitored during 1996-97 on two 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 four (29%) of these had been struck by vehicles. All seven 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 mi vs. 41 mi). At a remote site in Colorado with few roads and restricted public access, swift foxes were rarely struck by vehicles (Covell 1992; Kitchen *et al.* 1999).

Vehicle-related mortality has significantly affected other listed or rare species. Vehicles caused 49% of the mortality documented among endangered Florida panthers (*Felis concolor coryi*)

(Maehr *et al.* 1991). With a remaining population of 20-30 animals, the loss of any to vehicles likely constitutes a significant population effect. Similarly, Tubak in 1999 estimated at least 15% of the remaining 250-300 key deer (*Odocileus virginianus clavium*) are killed annually by vehicles, and this mortality is considered to be a limiting factor for this endangered species (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).

Barrier Effects

Roads 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 to act as barriers to a number of species. Bobcats in Wisconsin readily crossed dirt roads, but were reluctant to cross paved roads (Lovallo and Anderson 1996). Lynx also exhibit a reluctance to cross roads (Barnum 1999) as do mountain lions (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). Forman *et al.* (2003) suggests that road crossings are as much about individual behavior as they are about habitat requirements and reports that a four-lane divided highway in Canada served as a complete barrier to adult female grizzly bears (*Ursus arctos*) and a partial filter-barrier for adult male grizzlies.

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 vole (*Clethrionomys glarelous*) populations separated by a 164 foot wide highway in Germany (Gerlach and Musolf 2000). In California, local extinctions of mountain lions have occurred when roads and other developments fragmented habitat in small patches and blocked movement corridors thereby isolating the patches and preventing recolonization (Beier 1993).

Traffic Volume

Traffic volume influences the permeability (the likelihood of crossings) of roads and the probability for mortality due to vehicle strikes. Factors such as the width of the road, the presence of a median with or without Jersey or "K" rail concrete barriers, the velocity of the traffic, the physical nature of the approach and shoulder of the road, and the behavior of the animals attempting to cross determine probabilities for mortality. Clevenger *et al.* (2003) studying roads in Canada found that a low volume road (1,068 to 3,231 vehicles per day) resulted in higher mortalities of small vertebrate fauna than high volume roads (14,000 to 35,000 vehicles per day). These and other results indicate that the disturbance generated from roads with high traffic volume may deter animal movements onto or across the roadway. Multi-lane roads with high traffic volume may produce the greatest barrier effect to the San Joaquin kit fox.

Knapp (1978) monitored movements of radio-collared San Joaquin kit foxes in the vicinity of Interstate 5, a divided four-lane freeway in Kern County. Many of the foxes used areas within three km (two miles) of the highway, and most exhibited movement and home range patterns that paralleled the highway, but did not cross it. Only on two occasions were animals located on the opposite side of the highway from their primary area of use.

Noise Harassment

Disturbance from the construction of minor transportation projects and from roads and road networks could induce stress in the San Joaquin kit fox which may affect physiological parameters or behavior. The resulting effects could include increased energetic requirements, decreased reproductive output, decreased 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 different types of disturbance may result in reduced local abundance.

One type of disturbance that may adversely affect San Joaquin kit foxes is an increase in the ambient noise level. Minor transportation projects may result in an increase in the ambient noise level during and after project construction. Harassment from long-term noise may cause kit foxes to eventually vacate the project site and adjacent areas. Projects that have the effect of enhancing traffic flow or increasing traffic volume have the potential to result in higher associated noise levels. When traffic volume increases up to 1,000 vehicles per day, noise rises to over 50 decibels (dBA). As the speed of traffic flow increases, noise levels increase. Noise levels also increase as a result of increased truck usage. Traffic flow that includes medium to heavy trucks (i.e., six or more tires on two axles to three or more axles) noticeably increases the

noise level. A heavy truck passing produces approximately 10 dBA more noise than a passing automobile (Forman *et al.* 2003). Traffic noise likely contributes to San Joaquin kit fox behaviors with regard to road avoidance and decisions as to when and where to attempt road crossings.

No specific research on the physiological effects of noise on San Joaquin kit foxes has been conducted, but a "safe, short-term level" for humans has been determined to be 75 decibels by the National Institutes of Health (NIH)(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 their hearing is more acute than that of humans (Jameson and Peeters 1988). 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). 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 (U.S. National Park Service 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 (*Antilocapra americana*), 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 25 and 50 meters, temporary loss at a distance of 100 meters, and no measurable loss at 1,500 meters (Gonzales *et al.* 1970). Over clear (i.e. unobstructed) land as in San Joaquin fox habitat, sound diminishes slightly more quickly at 6 dBA per doubling of distance:

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

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

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

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

Contaminants

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 to 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 (i.e. dioxins, polychlorinated biphenyls) are higher in soils along roads (Benfenati *et al.* 1992). Ozone levels are higher in the air near roads (Trombulak and Frissell 2000). Vehicles may leak hazardous substances such as motor oil and antifreeze. Although the quantity leaked by a given vehicle may be minute, these substances can accumulate on roads and may be washed into the adjacent environment by runoff during rain storms. An immense variety of substances, including fertilizers, pesticides, and herbicides from vehicles traveling through agricultural zones, 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 include inhalation, dermal contact, direct ingestion, ingestion of contaminated soil or plants, or consumption of contaminated prey. Exposure to contaminants may cause short- or long-term morbidity, possibly resulting in reduced productivity or mortality. Carcinogenic substances may 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, three 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 (Scrivner *et al.* 1993). Such spills potentially can cause local reductions in the abundance of kit foxes and their prey.

Invasive Species

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. Non-native plants can spread along roadsides and then into adjacent habitat (Gelbard and Harrison 2003). 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, and 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 roads (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 solstitialis*). 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, exhibits 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* spp.) 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 non-native 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 1989). 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 human 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).

Road Effect Zone

Adverse 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 (2000) described the effect as the "road effect" zone. Along a 4-lane road in Massachusetts, they determined that this zone extend for an average of approximately 980 ft to either side of the road for an average total zone width of approximately 1970 feet. However, in places they detected an effect > 0.6 miles 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 Texas is within 1,640 feet of a road.

Effects within the road zone can be subtle. Van der Zande *et al.* (1980) reported that lapwings (*Vanellus vanellus*) and black-tailed godwits (*Limosa limosa*) feeding at 1,575-6,560 feet from roads were disturbed by passing vehicles. The heart rate, metabolic rate and energy expenditure of female bighorn sheep (*Ovis canadensis*) increases near roads (MacArthur *et al.* 1979). Trombulak and Frissell (2000) described another type of road zone effect. Heavy metal concentrations from vehicle exhaust were greatest within 66 feet of roads, but elevated levels of metals in both soil and plants were detected at ≥660 feet of roads. The road effect zone apparently varies with habitat type and traffic volume. Based on responses by birds, Forman (2000) estimated the effect zone along primary roads at 1,000 feet in woodlands, 1,197 feet in grasslands, and 2,657 feet in natural lands near urban areas. Along secondary roads with lower traffic volumes, the effect zone was 656 feet. The road effect zone and the San Joaquin kit fox have not been adequately investigated; however, it is possible it exists given the effects of roads on the animal.

The direct adverse effects to San Joaquin kit foxes from minor transportation projects may be avoided when such projects are begun and completed between August and November within a single year. Measures to minimize take and compensation to off-set the loss of habitat are expected to reduce the likelihood that minor transportation projects will undermine the survival and recovery of the San Joaquin kit fox.

While the minor transportation projects described here have numerous effects on the kit fox, they are generally offset by the proposed avoidance, minimization, and compensation measures described in the Project Description. The avoidance and minimization measures will reduce the effect of the minor transportation projects on individual foxes resident in the area of each project by reducing noise, activity at sunset when kit foxes are most active, by identifying and avoiding dens, by avoiding inadvertent capture of kit foxes, and other avoidance and minimization efforts.

Caltrans estimates that up to 880 acres inhabited by San Joaquin kit foxes will be taken as a result of the implementation of this programmatic biological opinion. While the proposed compensation for loss of kit fox habitat reduces the negative effect of the increased road footprint of the projects, the total amount of kit fox foraging habitat is reduced by the size of the footprint

of the projects, because the compensation land being protected is already kit fox habitat, and no additional kit fox habitat is being created such as by converting land back to grassland or other suitable habitat from more intensely developed land uses. While the total amount of kit fox habitat will continue to diminish, the amount of protected kit fox habitat in key areas will increase.

Caltrans proposes to acquire compensation lands in areas identified in the Recovery Plan that will most benefit the kit fox. Protection of a portion of kit fox core and satellite population lands, and movement corridors between them, will likely contribute to a slowing of the downward trend in reproduction, numbers, and distribution of the kit fox. Additional functional undercrossings at regular intervals along roads in core and satellite population lands, and movement corridors between them, are crucial. Functional undercrossings, where feasible and applicable, will reduce effects to the kit fox from some Category 3 transportation projects. The present lack of undercrossings increases direct mortality and habitat fragmentation, and creates dispersal barriers for this wide-ranging species. The action as proposed is compatible with the conservation needs of the kit fox because of the avoidance, minimization, and compensation measures that are included in the project description.

Giant Kangaroo Rat, Tipton Kangaroo Rat, and San Joaquin Antelope Squirrel

Although restricted to smaller ranges throughout the San Joaquin Valley compared to the San Joaquin kit fox, the giant and Tipton kangaroo rats, and the San Joaquin antelope squirrel are likely to be affected in a manner similar to that described above for the San Joaquin kit fox.

The Service estimate of affected habitat acres is based on the number of projects listed in Table 1 of this biological opinion, that also was submitted by Caltrans as an amendment to FHWA's October 2000 biological assessment. The figures in Table 1 list proposed projects for which information was accurate as of February 13, 2003. Based on a tally of proposed projects scheduled for completion within the next three years, approximately 89 projects are planned by Caltrans on behalf of the FHWA. If all of these projects were to be of the maximum area discussed in the *Description of the Proposed Action* section, loss of habitat could potentially total 880 acres. The giant kangaroo rat is found in Merced, Fresno, Tulare, Kings, and Kern counties within the area addressed by this consultation, and 81 percent of the projects listed in the *Description of the Proposed Action* section will occur in those five counties. Therefore the Service estimates that 710 acres inhabited by giant kangaroo rats will be taken as a result of this action. The Tipton kangaroo rat is found in Fresno, Tulare, Kings, and Kern counties within the area addressed by this consultation, and 72 percent of the projects listed in the *Description of the Proposed Actions* section will occur in counties where the Tipton kangaroo rat is found. Therefore, the Service estimates that 630 acres inhabited by Tipton kangaroo rats will be taken as a result of this action. San Joaquin antelope squirrels are found in all the counties addressed by this consultation except Stanislaus, Mariposa, and Tuolumne counties, and 87 percent of the projects listed in the *Description of the Proposed Action* section will occur in counties where the squirrel is found. Therefore the Service estimates that 760 acres inhabited by the San Joaquin antelope squirrel will be adversely impacted as a result of this action.

Giant and Tipton kangaroo rats and San Joaquin antelope squirrels may be adversely affected by vehicle strikes, entombment in burrows, temporary and permanent loss or degradation of their habitat, and harassment from noise and ground vibration. The road effect zone is likely to include the fragmenting and barrier effects previously described, and the introduction of contaminants or toxins into giant and Tipton kangaroo rats' and San Joaquin antelope squirrels' habitat via roads and road networks is likely.

Giant kangaroo rats are nocturnal and active all year. Minor transportation projects that coincide with the winter to spring reproductive and rearing season may have the greatest potential to adversely affect the species. Projects that prohibit or alter the dispersal behavior of juveniles in spring and summer may result in harassment or harm to giant kangaroo rats.

Tipton kangaroo rats give birth in February and April. Minor transportation projects constructed during this time period in or near to Tipton kangaroo rat habitat are likely to result in adverse effects to the species. As species that feed on seeds, both giant kangaroo rats and Tipton kangaroo rats cache seeds in areas within or adjacent to their burrow systems. Minor transportation projects may therefore result not only in partial or complete loss of burrow systems, but loss of food reserves due to grading, paving, or contouring with or without added fill material. Loss of burrow systems compromise the ability of the giant and Tipton kangaroo rats to maintain their optimal body temperature and exposes them to predators. Loss of food caches may result in reduced caloric intake, reduced energy reserves, leading to reduced reproductive capacity, and viability of individuals.

San Joaquin antelope squirrels mate in late winter through early spring and give birth in March and April. The young mature primarily in burrows and are not seen above ground until late May. Minor transportation projects that are constructed during winter through late spring will likely adversely affect San Joaquin antelope squirrels by reducing fecundity and reproductive success.

Giant and Tipton kangaroo rats and San Joaquin antelope squirrels feed on seeds but also other plant materials. Minor transportation projects such as pavement widening which requires the clearing of vegetation, may remove food sources and cover upon which these species depend. Pavement widening and road enhancement projects that increase the surface area of roads permanently reduces abundance of habitat and may increase the likelihood of mortality due to vehicle strikes suffered when attempting to cross wider roads. Widened roads may further enhance the barrier effects of a road.

Ground vibration and noise is thought to have a significant effect on giant and Tipton kangaroo rats. Giant kangaroo rats are known to communicate with each other by foot drumming (Randall 1997). Foot drumming may serve the function of allowing neighbors to recognize each other, or may serve as a warning call. Thus, interference from ambient noise produced by the project construction may interfere with communication among the kangaroo rats, causing them to be unusually susceptible to predators and predation. Kangaroo rat hearing is highly developed and a large portion of the brain is devoted to auditory input. As stated previously, 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). These potential effects would most likely be restricted to areas where noise levels are at or above 95 decibels (dBA), estimated to be within about 91 meters (300 feet) of some construction activities (La Paloma Generating Company 1998). Habitat compensation measures are anticipated to minimize habitat effects resulting from project implementation.

Blunt-nosed leopard lizards and San Joaquin antelope squirrels are found in all the counties addressed by this consultation except Stanislaus, Mariposa, and Tuolumne counties, and 87 percent of the projects listed in the *Description of the Proposed Action* section will occur in counties where the lizard and squirrel are found. Therefore the Service estimates that 760 acres inhabited by blunt-nosed leopard lizards will be taken as a result of this action. The giant kangaroo rat is found in Merced, Fresno, Tulare, Kings, and Kern counties within the area addressed by this consultation, and 81 percent of the projects listed in the *Description of the Proposed Action* section will occur in those five counties. Therefore the Service estimates that 710 acres inhabited by giant kangaroo rats will be taken as a result of this action. The Tipton kangaroo rat is found in Fresno, Tulare, Kings, and Kern counties within the area addressed by this consultation, and 72 percent of the projects listed in the *Description of the Proposed Action* section will occur in counties where the Tipton kangaroo rat is found. Therefore, the Service estimates that 630 acres inhabited by Tipton kangaroo rats will be taken as a result of this action."

While the proposed compensation for loss of upland species habitat reduces the negative effect of the increased road footprint of the projects, the total amount of upland species foraging habitat is reduced by the size of the footprint of the projects, because the compensation land being protected is already habitat for upland species, and no additional upland species habitat is being created, such as by converting land back to grassland from more intensely developed land uses. While the total amount of upland species habitat will continue to diminish, the amount of protected kit fox habitat in key areas will increase.

Caltrans proposes to acquire compensation lands in areas identified in the Recovery Plan that will most benefit the blunt-nosed leopard lizard, giant kangaroo rat, and Tipton kangaroo rat. Protection of core and satellite population lands, and movement corridors between them, will likely contribute to a slowing of the downward trend in reproduction, numbers, and distribution of blunt-nosed leopard lizards, giant kangaroo rats, and Tipton kangaroo rats. These actions will also benefit the San Joaquin antelope squirrel because it usually occupies the same habitat as these three listed species.

Where feasible and applicable, additional functional undercrossings at regular intervals along roads in kit fox core and satellite population areas, and movement corridors between them, shown on Figure 10, will reduce the fragmentation caused by some Category 3 projects for the blunt-nosed leopard lizard, giant kangaroo rat, and the Tipton kangaroo rat. Functional undercrossings are crucial to the ability of upland species to survive and recover in the San Joaquin Valley. Addition of undercrossings will minimize effects to upland listed species from minor transportation projects. The present lack of undercrossings increases direct mortality and

habitat fragmentation, and creates dispersal barriers for these upland species. The action as proposed is compatible with the conservation needs of the blunt-nosed leopard lizard, giant kangaroo rat, and the Tipton kangaroo rat because of the avoidance, minimization, and compensation measures that are included in the project description.

California Jewelflower, San Joaquin Wooly-threads, and Bakersfield Cactus

The following category 1, 2, and 3 type projects will likely involve removal of vegetation and may result in adverse effects to the California jewelflower, San Joaquin wooly-threads, and Bakersfield cactus: replacement or installation of guard rails, pavement widening, installation or modification of drainage facilities, landscaping, modification of intersections, construction of slope protection or stabilization, modification of interchange or ramp, addition of passing, auxiliary, or truck climbing lane; addition of turn out, widening of shoulder, installation of catch or ponding basin, and correction of profile. According to Caltrans' Figure 9 in *Planned Transportation Projects*, Bakersfield cactus, California jewel flower, and San Joaquin woolly threads occur within or adjacent to a least nine projects in Kern County.

Plants are partitioned into above and below ground habitats and respond to stimuli and conditions pertaining to each. When one or both of these habitats is adversely affected, the results may be death, injury, reduced reproductive capacity, and reduced long term viability.

The potential effects of minor transportation projects to listed plants include direct mortality from mowing, clearing and grubbing, earth grading and excavation, crushing by vehicles, or burying from fill materials. Potential harmful or injurious effects include impairment of respiratory and photosynthesis processes due to excessive dust resulting from project activities. Removal of structures or trees may degrade microhabitats and other site specific conditions upon which listed plants depend. Alteration of microhabitats may include the destruction of cryptogamic crusts that help to exclude invasive non-native plants and improve water infiltration. Below ground effects include loss or degradation of soil structure, fertility, porosity, and water holding capacity. These effects typically result from the soil compaction that precedes projects such as widening shoulders, adding lanes or turn out areas. Below ground effects also include potential loss of seed banks which are vital to re-establishing broadly distributed populations. Species which are broadly distributed are less likely to suffer catastrophic population declines over their entire range and less likely to become extinct.

Deposits of dust upon road side plants can abrade leaves, and adversely affect photosynthesis (Thompson *et al.* 1984). Dust cover on leaves can also induce an increase in leaf temperature from greater absorption of incident radiation resulting in reduced net photosynthesis and productivity (Eller 1977, Hirano *et al.* 1995). Dust abatement measures that include the wetting or dampening of exposed ground surfaces may result in adverse effects. Unseasonal moisture may trigger untimely germination of seeds when growing conditions are unfavorable. Seeds may potentially germinate followed by dessication and the eventual death of seedlings, a process that has been used as an eradication method for the invasive yellow star thistle (DeTimoso, Univ. of California at Davis, pers. comm., 2000). In addition, inappropriately applied dust abatement moisture may harm the Bakersfield cactus which is susceptible to inundation and is maladapted

to events which result in water collecting in pools or temporary ponds at its base and prolonged saturation of its root zone.

As previously described in this biological opinion, roads can facilitate the encroachment of non-native plants into native plant communities (Forman *et al.* 2003). Minor road projects may contribute to this encroachment as a result of soil disturbance which may provide non-native invasive or weedy plants with a competitive advantage over listed plants. Gelbard and Harrison (2003) studying plant communities in Napa, Lake, and Colusa counties of California, found that of their 92 sampling sites, those located more than 3,281 feet from roads, contained a substantially greater percentage, variety, and coverage of native species than sites closer to roads. Non-native seeds or propagules can be inadvertently introduced into roadsides on equipment during construction or through the use of mulch and imported soil, or gravel (Forman *et al.* 2003).

Construction through occupied habitat fragments populations and may restrict gene flow, thereby reducing the species' ability to survive and may undermine the Service's efforts to recover these species in the wild. Fragmentation of plant habitat isolates plant populations such that cross-pollination between populations becomes prohibitive or limited. Fragmentation also limits seed dispersal resulting in a reduced chance of repopulation from extirpated species. Isolation due to fragmentation can result in distinct genetic populations and the ultimate decline of some species because of the lack of genetic variability and reduced adaptability within populations. Road improvements may increase vehicular traffic or may provide increased access for off-road vehicle use. Off-road vehicle recreation may, in some habitats, contribute to soil disturbance and enhance erosion.

Insufficiently large exclusion zones, those less than 100 feet, for minor transportation projects may fail to minimize adverse effects to the California jewelflower, San Joaquin wooly-threads, and Bakersfield cactus. Loss of soil through inappropriate stockpiling techniques will result in adverse effects to below ground habitats and may undermine restoration efforts.

Avoidance and minimization measures in the form of (1) pre-project surveys for listed and proposed plants, (2) avoidance of effects in plant habitat, and (3) acquisition of appropriate compensation areas, will likely reduce and offset the adverse effects of the proposed action, and therefore the proposed action is compatible with the conservation needs of the three plant species. The proposed pre-project survey effort that will occur at appropriate times of the year to best detect the presence of the species, will add to our knowledge about the numbers and distribution of these species. Caltrans will be able to use the pre-project surveys information to avoid and minimize project activities where plants are found. If the whereabouts of the plants are known, then those areas can be avoided if possible. If the areas where the plants are known to occur cannot avoided, then collection of seed, and acquisition of land where the plants are known to occur will add to the acreage of protected lands occupied by the plants. Only one project is proposed that is in the vicinity of a known occurrence of the California jewelflower as its distribution is limited.

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.

Numerous non-Federal activities continue to eliminate habitat for the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, California jewelflower, San Joaquin woolly-threads, and the Bakersfield cactus in the action area. Loss and degradation of habitat affecting both animals and plants with or without Service authorization continues as a result of: urbanization; oil and gas development on private lands; road and utility right-of-way management; flood control and water banking projects that may not be funded, permitted, or constructed by a Federal agency; overgrazing by livestock; and continuing agricultural expansion including the building of new dairies and stockyards. Listed and proposed animal species are also affected by poisoning, shooting, increased predation associated with human development, ground squirrel reduction efforts, mosquito control, and reduction of food sources. Unauthorized take is occurring, and the Service continues to request re-initiation of projects when project descriptions have changed markedly since our biological opinion was issued, and Service Law Enforcement continues to investigate potential violations of the Act.

The Service continues to pursue the creation of large area habitat conservation plans (HCP) through local and county governments and industry groups in order to address effects to listed species in a more comprehensive manner. Large area HCPs already in place in the action area include the *San Joaquin County Multi-species and Open Space Plan,* the *Metropolitan Bakersfield HCP*, and the *Kern Water Bank Authority HCP/Natural Community Conservation Plan*, which addresses small projects in Kern, Tulare, and Kings counties. The HCPs in Kern County have been in place for several years, and have started to contribute protected habitat lands to the recovery effort for kit fox and Tipton kangaroo rat.

Existing habitat is so fragmented in the San Joaquin Valley that extirpation of certain remaining populations of San Joaquin kit fox, Tipton kangaroo rat, giant kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope, California jewelflower, San Joaquin woolly-threads, and Bakersfield cactus appears likely, due to chance fluctuation of small populations, unusual climatic events, the loss of genetic fitness commonly associated with very small populations, and other factors discussed previously. The cumulative effects of these threats pose a significant impediment to the survival and recovery of these species.

The following list provides the names or descriptors of projects for which the Service has received limited information. The project descriptions when initially provided to the Service, lacked a Federal nexus and were therefore not considered Federal projects that would be subject to a section 7 consultation under the Act. Some of these projects may eventually become Federal projects whereas others may be abandoned for reasons unknown to the Service. The list therefore provides an example of the projects that are representative of development throughout the San Joaquin Valley. The size of such projects and the habitat loss consequential to each is

often unknown; however, some of the projects listed are known to range in size from less than 25 acres to more than 655 acres. If HCPs were in place in these counties or around growing urban areas such as Fresno, they would provide a locally-designed mechanism for complying with the Act and for project proponents to make targeted and effective contributions to the survival and recovery of listed species.

Fresno County

Subdivision
50 unit housing development
Millerton New Town housing
Dairy

Kern County

Dairy expansion
Dairy, new
Surface mining
Administrative center
Subdivisions
Composting and bio-solids facility
Wild animal keeping facility

Kings County

EVMS land development
Lealand/Peichoto land development
Stryd land development
Bailon land development
Subdivision
Dairy new
Feedlot new
Ramirez Travel Plaza
Nextel Land development
Soales Land development
Westlake Farms
Azevedo Ag land division
Veterinary Pharmecuticals Land development
Wireless communications facilities

Madera County

Dairy, new
Airport industrial park
Wireless communications facilities

Mariposa County

information unavailable

Merced County

Horse riding stables development
Ferriers Ranch subdivision
Lupton fish farm
Crane ranch subdivision
Woodland generating plant
Aggregate mining
ORV park
Planada Wastewater Facilities Expansion,
Yosemite Lake Estates (655 acres)
Vander Woude dairy (123 acres)
Subdivision (655 acres)
Subdivision (269.7 acres)
Balatti subdivision (433.7 acres)
West Merced subdivision (240.28 acres)
Santa Nella housing development
Mini-storage facility
Merced Sports Center
Water utility pipeline extension 5.5 km (3.4 mi)
Airport, new

Stanislaus County

West Patterson developments
Diablo Grande access road
Airport
Landfill expansion

Tulare County

Visalia landfill
County road widening project
Schakel dairy
50-unit housing development
Waste water effluent facility (486.5 acres)

Tuolumne County

information unavailable

Several unpermitted projects are likely to sever the north-south kit fox corridor at Patterson on the west side of Stanislaus County in the next year, effectively cutting off kit fox in the Contra Costa/Alameda satellite population north of Patterson from satellite and core populations south of Patterson. The expansion of the urban areas north of Highway 145 in Madera County, north of the City of Fresno, and to the east of the City of Porterville threatens the north-south kit fox corridor on the east side of the valley. Growth around the City of Merced that is induced by the selection of a new University of California campus in that city is threatening to cut off kit fox that inhabit the valley edge north of the City of Merced. Expanding development in the Santa Nella area also threatens the north-south corridor on the west side, although the Service has had initial discussions with some landowners concerning a regional HCP for the area.

Less is know to the Service about unpermitted projects and their effects on the more localized giant kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, San Joaquin antelope squirrel, California jewelflower, San Joaquin woolly-threads, or Bakersfield cactus. Tipton kangaroo rats in an important population in the Lemoore area are being harassed and individuals are possibly being harmed, injured, and killed by off-road vehicle use on private unfenced property. Another small population nearby precariously exists on the side of a County road and in a farmer's pasture. A robust population of Bakersfield cactus was cleared from a parcel adjacent to a Bakersfield cactus preserve east of Bakersfield approximately 5 years ago, and the land is now an irrigated vineyard.

As the human population of central California increases, and land continues to be converted to municipal and industrial uses, the amount and quality of habitat suitable for the species considered in this biological opinion will decrease. Between 1970 and 2000, California's total population increased by approximately 71% while the Central Valley's population increased 200%. Of the Sacramento and San Joaquin Valleys within the Central Valley, the San Joaquin Valley had the greater population growth (California Department of Finance (CDF) 2002). Among counties in the San Joaquin Valley, Tulare experienced the least increase percentage in population at 226% from 1940 to 1995, while Stanislaus experienced the greatest increase at 453% during the same period. Also during the period 1940 to 1995, the increase in population for Fresno was 322%; for Kern and Madera: 356% each, for Kings: 227%, for Merced: 322% (CDF 2002). (Information for the valley portions of Mariposa and Tuolumne was unavailable). During the period 1988 to 1998, 82,756 acres in the San Joaquin Valley were converted to urban and built-up land uses (California Department of Conservation 2000). Although not each of the converted acres can be considered habitat, this trend indicates that habitat loss continues to threaten the survival and recovery of listed species.

The cumulative effects of all the future State, Tribal, local, and private actions that are reasonably certain to occur in the action area will continue to have a deleterious effect on the reproduction, numbers, and distribution of the species considered herein. The adverse cumulative effects described in this section serve to magnify the adverse effects of the proposed action and diminish any beneficial effects.

Conclusion

The population sizes and distributions of the San Joaquin kit fox, blunt-nosed leopard lizard, giant kangaroo rat, Tipton kangaroo rat, California jewelflower, San Joaquin woolly-threads, and the Bakersfield cactus have appreciably shrunk since they were listed under the Act. The cumulative effects of projects that have been implemented without authorization under either sections 7 or 10(a)(1)(B) of the Act, and without appropriate offsetting or compensatory measures are likely to have deleterious effects on these listed species in the foreseeable future. However, after reviewing the current status of the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, California jewelflower, San Joaquin woolly-threads, and the Bakersfield cactus, the environmental baseline for the action area, the effects of the proposed minor transportation projects, and the cumulative effects, it is the Service's biological opinion that the minor transportation projects, as proposed, are not likely to jeopardize the continued existence of these seven species. No critical habitat has been designated or proposed for these species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

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

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. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Sections 7(b)(4) and 7(o)(2) of the Act, which refer to terms and conditions and exemptions on taking listed fish and wildlife species, do not apply to listed plant species. However, section

9(a)(2) of the Act prohibits removal, reduction to possession, and malicious damage or destruction of listed plant species on Federal lands and the removal, cutting, digging up, or damaging or destroying such species in knowing violation of any State law or regulation, including State criminal trespass law. Actions funded, authorized or implemented by a Federal agency that could incidentally result in the damage or destruction of such species on Federal lands are not a violation of the Act, provided the Service determines in a biological opinion that the actions are not likely to jeopardize the continued existence of the species.

Amount or Extent of Take

Incidental take of the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, and the blunt-nosed leopard lizard is anticipated to occur as a result of the proposed project. However, incidental take will be difficult to detect or quantify for the following reasons: The relatively small body sizes of the Tipton kangaroo rat, giant kangaroo rat, and blunt-nosed leopard lizard, make the finding of a dead specimen unlikely, these listed animals spend much of their time underground in burrows, where their deaths likely would go undetected; losses may be masked by seasonal fluctuations in numbers or other causes; and the species occur in habitat that makes detection of them difficult. For these reasons, the Service is quantifying take incidental to the proposed action as the number of acres of habitat that will become unsuitable for each of the species as a result of the action. Loss of habitat is a reasonable surrogate for expressing the amount or extent of take because it accurately reflects the biological effects to the species.

The Service estimate of affected habitat acres is based on the number of projects listed in the attached Table 1 in this biological opinion. The figures in Table 1 list proposed projects for which information was current as of February 13, 2003. Based on a tally of proposed projects scheduled for completion within the next three years, approximately 89 projects are planned by Caltrans on behalf of the FHWA. If all of these projects were to be of the maximum area described in the *Description of the Proposed Action* of this biological opinion, the loss of habitat would total 880 acres. Therefore, the Service estimates that all San Joaquin kit foxes inhabiting 880 acres will be subject to take in the form of harm and harassment as a result of the proposed action. It is expected that all of the habitat acres taken under this programmatic consultation will support the San Joaquin kit fox. Blunt-nosed leopard lizards are found in all the counties addressed by this consultation except Stanislaus, Mariposa, and Tuolumne counties, and 87 percent of the projects listed in the *Description of the Proposed Action* of this biological opinion will occur in counties inhabited by this reptile. Therefore the Service estimates that all blunt-nosed leopard lizards inhabiting 760 acres will be subject to take in the form of harm and harassment as a result of this action. The giant kangaroo rat is found in Merced, Fresno, Tulare, Kings, and Kern counties within the area addressed by this consultation, and 81 percent of the projects listed in the *Description of the Proposed Action* of this biological opinion will occur in those five counties. Therefore the Service estimates that all giant kangaroo rats inhabiting 710 acres will be subject to take in the form of harm and harassment as a result of this action. Up to two giant kangaroo rats may be wounded or killed from minor transportation projects appended to this programmatic over the life of this biological opinion. The Tipton kangaroo rat is found in Fresno, Tulare, Kings, and Kern counties within the area addressed by this consultation, and 72 percent of the projects listed in the *Description of the Proposed Action* of this biological opinion

will occur in counties inhabited by the Tipton kangaroo rat is found. Therefore, the Service estimates that all Tipton kangaroo rats inhabiting 630 acres will be subject to take in the form of harm and harassment as a result of this action. Up to two Tipton kangaroo rats may be wounded or killed from minor transportation projects appended to this programmatic over the life of this biological opinion.

NOTE: The blunt-nosed leopard lizard is a fully protected species under California law (California Fish and Game Code § 5050), and no injury or killing of this reptile is authorized by California law. The exemption from section 9 of the Act provided by this Incidental Take Statement for the blunt-nosed leopard lizard does not exempt FHWA, Caltrans and its contractors from complying with State law.

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, giant kangaroo rat, Tipton kangaroo rat, and the blunt-nosed leopard lizard. Critical habitat for these species has not been designated or proposed; therefore none will be affected.

Reasonable and Prudent Measures

1. Caltrans shall implement the conservation measures as described in the biological assessment and this biological opinion.

2. Caltrans shall comply with the *Reporting Requirements* of this biological opinion.

Terms and Conditions

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

1. The following Terms and Conditions implement Reasonable and Prudent Measure one (1):
    a. Caltrans shall minimize the potential for harm or harassment of the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, and the blunt-nosed leopard lizard resulting from the project related activities by implementation of the conservation measures as described in the *Project Description* of this biological opinion.

    b. Caltrans shall include Special Provisions that include the avoidance and minimization measures of this biological opinion in the solicitation for bid information. In addition, Caltrans will educate and inform contractors involved in the project as to the requirements of the biological opinion.

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

   a. Caltrans shall comply with the *Reporting Requirements* of this biological opinion.

Reporting Requirements

1. The FHWA and Caltrans shall provide the reports described in the project description portion of this biological opinion including, if applicable, borrow site compliance documents.

2. The FHWA and Caltrans shall provide a cumulative tally and description of all projects that have been appended to this programmatic biological opinion.. The description shall include a GIS file and hard copy map depicting projects for which incidental take has been issued, the total acres affected by each project, the type and category of each project, and the correlating compensation lands, if any, that have been acquired for each project.

3. Annually from the date of issuance of this biological opinion, Caltrans shall report to the Service the following information:

   a. the projected start date of construction of each project, and

   b. the progress made to date on meeting each of the compensation requirements for each project.

4. Before construction starts on a project, the Service shall have final documents, including but not limited to, recorded conservation easements, PAR analyses, management plans, or proof of purchase of credits. Please see draft guidance from the Service, *Selected Review Criteria for Conservation Banks and Section 7 Off Site Compensation* dated August 4, 2004, or Service guidance that supercedes this document.

5. All relevant field survey data shall be submitted to the CDFG Natural Diversity Database, and to the Service within 30 calendar days of survey completion.

6. A post-construction report detailing compliance with the project design criteria described under the *Description of the Proposed Action* section of this biological opinion shall be provided to the Service within 30 calendar days of completion of the project.

7. Caltrans should notify the Service via electronic mail and telephone within one (1) working day of the death or injury to a San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, blunt-nose leopard lizard, and/or other listed species that occurs due to project related activities or is observed at the project site. Notification must include the date, time, location of the incident or of the finding of a dead or injured animal, and photographs of the specific animal. In the case of a dead animal, the individual animal should be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen or the Service takes

custody of the specimen. The Service contacts are the Chief of the Endangered Species Division (Central Valley) at 916/414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division at 916/414-6660. The California Department of Fish and Game contact is Mr. Ron Schlorff at 916/654-4262. In the case of an injured San Joaquin kit fox, the local Game Warden from the California Department of Fish and Game should be immediately contacted through the State Dispatcher at 916/445-0045.

8. Any contractor or employee who, during routine operations and maintenance activities inadvertently kills or injures a State listed wildlife species shall immediately report the incident to her or his supervisor or representative. The supervisor or representative must contact the California Department of Fish and Game immediately in the case of a dead or injured State listed wildlife species. The California Department of Fish and Game contact for immediate assistance is State Dispatch at (916) 445-0045.

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 to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service has developed the following conservation recommendations based, in part, on *The Recovery Plan for Upland Species of the San Joaquin Valley, California* (Service 1998).

1. Caltrans should minimize the potential for adverse effects to the San Joaquin woolly-threads, California jewelflower, and the Bakersfield cactus resulting from the project related activities by implementation of the conservation measures as described in the *Project Description* of this biological opinion.

2. Sightings of any sensitive animal species should be reported to the California Natural Diversity Database of the California Department of Fish and Game. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

3. Locate, map, and protect existing populations of the giant kangaroo rat, the San Joaquin kit fox, and the blunt-nosed leopard lizard (Recovery Plan Tasks 2.2.17 and 2.2.24).

4. Protect and create additional habitat for these species in key portions of their range (Recovery Plan Tasks 2.1.19 and 5.1.5).

5. Gather additional data on population responses to environmental variation at representative sites in their extant geographic range (Recovery Plan Tasks 3.2.21 and 3.2.22).

6. Determine appropriate habitat management and compatible land uses for the giant kangaroo rat, Tipton kangaroo rat, San Joaquin kit fox, and the blunt-nosed leopard lizard (Recovery Plan Task 4.5.7).

7. Contribute to the protecting of blocks of suitable habitat for Tipton kangaroo rats to minimize the effects of random catastrophic events. Provide linkage habitat between Creighton Ranch and Pixley-Allensworth Natural Areas along highway 43 in Tulare County. (Recovery Plan Task 5.1.3).

8. Conduct surveys for the San Joaquin antelope squirrel on the southwestern, southern, and southeast Valley edges and Kettleman Hills (Recovery Plan Task 3.2.22, 3.2.23, and 3.2.21).

9. Provide habitat for bats, including surfaces for bat roosts on the underside of bridges and other structures whenever possible.

10. There are five general measures for conserving San Joaquin antelope squirrels from the effects of a minor transportation project:

    a. Determine the presence of San Joaquin antelope squirrel burrows and sign.

        i. Pre-construction surveys within the project area should be conducted no more than 30 calendar days prior to the start of construction in accordance with the most current protocols approved by the Service and CDFG.

        ii. Surveys for burrows and other signs should be conducted by qualified biologists with demonstrated experience in identifying San Joaquin antelope squirrel burrows.

        iii. Pipes and culverts should be searched for San Joaquin antelope squirrels prior to being moved or sealed to ensure that an animal has not been trapped.

    b. A 50-foot buffer or exclusion zone should be established around active burrows and precincts.

    c. Project-related activities within the buffer zone should be prohibited to the greatest extent practicable.

    d. Project activities should be confined to daylight hours.

    e. Unless necessary for pedestrian or driver safety, the project site should not be lighted during night time hours.

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

REINITIATION NOTICE

This concludes formal consultation on the effects of Minor Transportation Projects on the San Joaquin kit fox, giant kangaroo rat, Tipton kangaroo rat, blunt-nosed leopard lizard, California jewelflower, San Joaquin woolly-threads, Bakersfield cactus, and the San Joaquin antelope squirrel. 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 concerning this biological opinion on the effects of Minor Transportation Projects in the San Joaquin Valley, please contact Susan Jones of this Field Office at the letterhead address or at telephone 916/414-6630.

Sincerely,

Chf Nagano

fn Ken Sanchez
Acting Field Supervisor

Enclosures
Figures 1-9 Caltrans Planned Transportation Projects and Special Status Species Occurrences
Figure 10 San Joaquin kit fox core populations, satellite populations, and linkages in the San Joaquin Valley
Figure 11 10-mile buffer around known San Joaquin kit fox occurrences in the San Joaquin Valley.
Figure 12 Effects of roads and traffic on persistence of animal populations (Ottawa-Carleton 2001)
Tables 1-7: Draft Future Minor Transportation Projects in Stanislaus, Merced, Madera, Fresno, Tulare, Kings, and Kern Counties.
Appendix 1: Draft Selected Review Criteria for Conservation Banks and Section 7 Off Site Compensation

cc:
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Appendix 1
Draft Selected Review Criteria for
Conservation Banks and Section 7 Off Site Compensation

This list is not a comprehensive list, but gives a substantial number of the basic considerations and requirements necessary to establish protection for properties designated as compensation for project impacts.

In many instances, 'Service-approval,' as stated below, may be replaced with 'Agency-approval,' where other government agencies are involved, such as in Conservation Banking (eg. U.S. Army Corps of Engineers, CDFG, U.S. Environmental Protection Agency).

Property Assurances and Conservation Easement

Title Report (Preliminary at proposal, and Final Title Insurance at recordation)

1. Who holds fee title to property (Bank Owner)?
2. Is the property owner also the Bank Owner/responsible party as compensation site owner?
3. Are there any liens or encumbrances (existing debts or easements) on the property?
4. Could any of these liens or encumbrances potentially interfere with either biological/habitat values or ownership?
    a. Review necessary supporting instruments to evaluate liens and encumbrances
5. A Subordination Agreement is necessary if there is any outstanding debt on the property. Review Subordination Agreement for adequacy - bank must agree to fully subordinate to each CE.
6. If existing easements can potentially interfere with the conservation values of the property, those portions of the land should be removed from the CE, and deducted from any credits or acres attributed to the compensation

Legal Description and Parcel Map

1. Ensure accuracy of map, location and acreage protected under CE.
2. Both the map and the legal description should explain the boundaries of the Bank and/or boundaries of each individual Bank phase or individual project compensation sites.

Conservation Easement (CE)

1. Should use USFWS CE template, dated November 2003;
2. Who will hold the easement?
    a. Must have third-party oversight by a qualified non-profit or government agency. Qualifications include:
        i. Organized under IRC 501(c)(3),
        ii. Qualifying under CA Civil Code § 815
        iii. Bylaws, Articles of Incorporation, and biographies of Board of Directors on file at, and approved by, USFWS
        iv. Meet requirements of USFWS, including 51% disinterested parties on the Board of Directors

3. If not using the USFWS template, applicant should submit a justification as to why another template is being substituted, and what specific objections they have to the template as provided, and may substantially delay processing if they require Solicitor review. Alternate CE's must be approved by the USFWS prior to recording.
4. Other (non-template) CE's should include, at a minimum, language to:
    a. Assure USFWS rights to enforce inspect and approve any and all uses and/or changes under the CE prior to occurrence (including land use, biological management or ownership).
    b. Reserve all mineral, air and water rights under CE as necessary to maintain and operate the Bank in perpetuity [USFWS § 2(D)]
    c. At a minimum, include USFWS as a third-party beneficiary with all rights of enforcement.
    d. Ensure all future development rights are forfeited.
    e. Ensure all prohibited uses contained in USFWS CE template are addressed.
5. There are probably many more specific concerns – should compare the content of each of the sections of the November 2003 USFWS CE to see where discrepancies lie, and to insert necessary language, particularly, but not exclusively, per:
    a. Rights of Grantee
    b. Remedies
    c. Injunctive Relief
    d. Enforcement Discretion
    e. Costs and Liabilities
    f. Taxes
    g. Hold Harmless
    h. No Hazardous Materials Liability
    i. Assignment and Transfer
    j. Amendment
    k. Funding
    l. Warranty
    m. Additional Interests

Property Assessment and Acknowledgement

1. A summary of all exceptions remaining on the title must be included, with a statement that the owner/Grantor accepts responsibility for all lands being placed under this CE, and assures that these lands have a free and clear title and are available to be placed under the CE.
2. USFWS will sign an acknowledgement of the receipt of this statement

Environmental Site Assessment – Phase I

1. Check for clear report
2. If there are issues – a proposal to address the issues should be included

Service Area

1. Service Area for a Conservation Bank is based upon biological criteria, and must be approved by USFWS.

2. Documents should then include a map designating the proposed/approved Service Area, and a text description of the same.

Restoration or Development Plan

1. Full plans for any habitat construction must be USFWS-approved, including all permits in place, prior to the start of construction.

Management Plan

1. Must be reviewed and approved by the USFWS for each individual Bank, or individual mitigation project, for target species baseline, adequacy of management and monitoring, and reporting requirements and schedules in perpetuity, etc.
2. Management Plan should also describe funding mechanisms for the long term funding of the property
3. Appendices should include biological surveys, wetland delineation and USACE verification letter, and any required permitting information
4. A copy of the final Management Plan should be recorded with the CE

Economic Analysis

1. Must be based upon the final, approved management plan.
2. Must include provision to adjust for CPI annually.
3. Must be based on appropriate, attainable, long-term interest rate.
4. Must address/account for all of the required funds (as below).

Performance Security, Contingency Security and Endowment Fund

All funds must be held, managed, accessed, expended and released according to agency-approved methods and procedures. There are a variety of requirements for each fund. Following is a general overview:

1. All funds must be held by qualified, Service-approved, non-profit organization or government agency [see requirements under CE, §2(a), above]
2. A full description of the trust account and investment methods must be agency-approved. All funds must be held according to minimum standards for assuring maximum success in earning potential, and with assurances for no loss of principal
3. Disbursements or releases from each of the funds must be for documented expenditures, as they occur
4. A full economic analysis must be included to demonstrate how each of the required funding amounts was determined. This analysis must be approved by the agencies as being full, complete and adequate
5. A schedule and plan (including target date and full amount on that date) for funding each of the accounts must be submitted for approval

Agreement Contract

This would include a "Conservation Bank Agreement," "Bank Enabling Instrument," "Operator Assurance," or other consolidating agreement that ties all of the associated documents together. Some general, basic (certainly not all-inclusive) concerns to include are:

1. Conservation Easement must be approved by any agencies involved prior to recording, and a recorded copy must be submitted to the agencies prior to the compensation taking effect in any way.
2. If not a Conservation Bank, individual project compensation should be addressed fully (within or by each document) as individual projects
3. Responsible party (property owner) must be identified (and a valid party to the contract) as responsible for all funding, management, monitoring, and reporting of Bank or Compensation Site, in perpetuity.
4. Transfer and Assignment of property should be according to §9.0 of USFWS Bank Agreement template, or approved by USFWS
5. Any agreement must include remedies for any disputes per §10.0 of the USFWS Conservation Bank Agreement.
6. Applications for individual compensation sites must not include any "leftover" pre-approved acreages for future projects. Any future projects must be addressed individually.

Enclosed Tables

Table 1. Draft Future Minor Transportation Projects in Stanislaus County

Table 2. Draft Future Minor Transportation Projects in Merced County

Table 3. Draft Future Minor Transportation Projects in Madera County

Table 4. Draft Future Minor Transportation Projects in Fresno County

Table 5. Draft Future Minor Transportation Projects in Tulare County

Table 6. Draft Future Minor Transportation Projects in Kings County

Table 7. Draft Future Minor Transportation Projects in Kern County

TABLE 1. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN STANISLAUS COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
1A711	0	99	4.50	5.50		MODIFY INTERCHANGE	2		
2A160	0	99	7.10	7.50		REHABILITATE CMS'S	1		
0f720	0	99	9.90	15.00	South Modesto Planting Rehab	HIGHWAY PLANTING.	2	7/1/04	9/1/05
0f730	0	99	15.00	23.30	Modesto/Salida Planting Rehab	HIGHWAY PLANTING.	2	4/1/04	7/1/05
0a671	0	99	15.10	17.00	MODESTO RAMP REHAB	REHABILIATE 15 RAMPS	2	10/1/03	3/1/06
47210	0	99	21.50	21.40	PELANDALE INTERCHANGE	MODIFY INTERCHANGE.	2	5/1/04	1/1/07
3A410	0	108	27.60	37.30	RIVERBANK OAKDALE WIDENING	WIDEN TO FOUR LANES WITH CONTINUOUS 2WAY LEFT TURN LANE	3	7/1/04	2/1/07
0c100	0	108	33.00	33.80	riverbank slope repair	SLOPE REPAIR	2		
28120	0	120	7.00	6.10	OAKDALE ROADWAY REPAIR	STRUCTURAL SECTION REPAIR.	1	12/1/02	10/1/03
34540	0	120	3.00	12.90	Oakdale Expressway	RECONSTRUCT INTERCHANGE	2	10/1/02	3/1/04
3a650	0	132	14.90	16.80	MODESTO 132 REHAB	ROUTE 132 REHAB & INTERSECTION IMPROVEMENTS.	2	3/1/03	7/1/05
0g420	K	5	15.90	15.90	I-5/Sperry Road	RECONSTRUCT EXISTING DIAMOND INTERCHANGE HAVING SINGLE-LN RAMPS.	2	10/1/07	10/1/09
0g770	K	33	0.50	14.50	Newman/Patterson CAPM Rehab.	REHABILITATE ROADWAY(CAPM)	1	7/1/03	3/1/05
0h760	K	99	22.00	24.70		FEASIBILITY STUDY OF LANDSCAPING BEAUTIFICATION NEEDS	1		
0f410	K	99	3.30	3.70	MAIN STREET I/C	RECONSTRUCT INTERCHANGE.	3	7/1/02	
2A430	K	99	4.02	4.60		BORE AND JACK STORM DRAIN LINE SLEEVE	2		
1A690	K	99	11.50	10.90	Mitchell RD/Service RD Interchange	MODIFY INTERCHANGE	2	5/1/03	
0h770	K	99	14.90	15.60	SR132 EAST/SR99 INTERCHANGE	FEASIBILITY STUDY OF 99/132 INTERCHANGE MODIFICATIONS	2		
3a740	K	108	22.40	26.50	Modesto SR 108 Rehab.	MCHENRY ROAD ROADWAY REHAB.	1	7/1/03	3/1/05

TABLE 1. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN STANISLAUS COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
0e460	K	108	33.10	34.50	8TH STREET LEFT TURN POCKET	WIDEN TO PROVIDE LEFT TURN CHANNELIZATION	2		
0A760	K	132	0.00	11.50		OPERATIONAL IMPROVEMENTS	3		
40490	K	132	15.00	16.80	modesto 132 rehab	ac overlay/ rehab	1		
43160	K	132	19.60	20.80	EMPIRE SEPARATION	CONSTRUCT RAILROAD GRADE SEPARATION	2	10/1/07	10/1/12
0c000		33	13.50	13.70		reconstruct highway	1		

[1]Acronyms

EA = Expenditure Authorization
PHASE = Phase of Project
0 & K = Pre-construction
SR = State Route
BEG = Beginning Postmile
END = Ending Postmile
NAME = Name of Project
DESCRIPTION = Description of the Project
CAT = Category
PA&ED = Project Approval and Environmental Document Date
RTL = Ready to List for Contracting Bids

TABLE 2. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN MERCED COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
2A480	0	5	15.40	15.70		CHANGEABLE MESSAGE SIGN	1		
2A480	0	5	10.00	10.40		CHANGEABLE MESSAGE SIGN	1		
1A070	0	59	27.20	27.70	Merced River (Snelling) Bridge Replac	REPLACE BRIDGE (SCOUR)	2	7/30/04	1/1/05
48231	0	99	15.20	16.20	R&V Street Planting Restoration	HIGHWAY PLANTING RESTORATION.	2	10/1/02	7/1/04
0j740	0	140	40.70	41.00	arboleda dr. flashing beacons	INSTALL FLASHING BEACONS.	1		
3a680	0	152	22.00	40.80	SAN LUIS CANAL CAP M	CAPM ON EASTBOUND PCC LANES """(GRINDING)"""	1	1/1/04	2/1/05
27980	0	165	11.70	26.90	WOLFSEN REHAB	AC OVERLAY AND WIDEN STRUCTURES	3	7/1/03	3/1/05
38150	0	165	26.90	30.00	STEVINSON REHAB	AC OVERLAY AND DIGOUTS	2	10/1/02	10/1/04
4773U	K	5	1.00	32.50	STA-5 RAMP REHAB	RAMP & BRIDGE APPROACH REHAB	2	10/1/05	7/1/08
0g410	K	5	17.40	17.60		CURVE IMPROVEMENT.	3		
0e940	K	33	17.00	26.50	MERCED 33@SANTA NELLA CAPM	CAPM	1		
3A670	K	59	10.39	14.80	MARIPOSA CREEK REHAB	AC OVERLAY PAVEMENT REHAB AND WIDENING	3	12/1/06	11/1/09
49430	K	59	14.10	14.50	Signals @ CHILDS Ave.	INSTALL TRAFFIC SIGNALS	1		5/1/00
0e590	K	59	15.30	15.80		intersection improvements	2		
0f650	K	59	22.60	23.30	"Oakdale Road Intersection Improvemen	INTERSECTION IMPROVEMENT.	2	12/1/07	6/1/09
3A460	K	99	0.00	11.00		CLOSE MEIDIAN CROSSOVERS	1		
3A720	K	99	17.60	24.50	FRANKLIN SLOUGH REHAB	AC OVERLAY AND WIDEN SHOULDERS	3	7/1/04	3/1/06
44250	K	99	22.30	23.30		MODIFY INTERCHANGE (100% LOCAL)	2		
0A860	K	140	34.50	35.80	El Capitan Rehab.	AC OVERLAY AND WIDEN SHOULDERS	3		12/2/00

TABLE 2. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN MERCED COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
35461	K	140	4.30	11.70	MUD SLOUGH REHAB	STRUCTURAL SECTION REPAIR AND WIDEN THREE BRIDGES	3		4/1/03
2a940	K	140	40.70	41.30	MERCED 140@ARBOLEDA DR□	CONSTRUCT LEFT TURN CHANNELIZATION AND FLASHING BEACONS	2		
0g450	K	152	17.00	19.60	Los Banos Access Management	STUDY ACCESS MANAGEMENT ALONG CORRIDOR.	1		
0c490	K	165	0.00	36.70		MAJOR INVESTMENT STUDY FOR ALL OF RTE 165.	1		
38220	K	165	0.00	11.70	HENRY MILLER REHAB	REHABILITATE THE EXISTING ASPHALT CONCRETE ROADWAY.	1	3/1/03	3/1/03
95213		99	28.80	0.00		disposal of excess land			

[1]Acronyms

EA = Expenditure Authorization
PHASE = Phase of Project
SR = State Route
BEG = Beginning Postmile
END = Ending Postmile
NAME = Name of Project
DESCRIPTION = Description of the Project
CAT = Category
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TABLE 3. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN MADERA COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
47740	0	41	11.20	40.80		PME CHIP SEAL 9.5 MM	1		
29390	0	41	24.80	25.30		CHANNELIZE INTERSECTION	2		
42010	0	41	3.10	9.30		AC OVERLAY (CAPM)	1		
47730	0	41	3.20	6.90	avenue 12 ar acol	AR ACOL - TYPE O-30 MM	1		
45640	0	41	35.60	36.20	OAKHURST SIDEWALKS	CONSTRUCT SIDEWALK	3		
32700	0	41	6.90	7.40	FRIANT-MADERA CANAL BRIDGE RAIL UPGRADE	UPGRADE BRIDGE RAIL AND WIDEN (RDP)	2		
40230	0	41	9.20	9.60		INSTALL SIGNALS	1		
47720	0	41	9.30	9.80	MADERA SIGNALS AT 41 & 145	LEFT TURN CHANNELIZATION AND LEFT TURN SIGNAL PHASING	2		
47940	0	99	11.30	12.30	2nd street exit improvements	LENGTHEN DECELERATION LENGTH	2		
41940	0	99	22.80	23.00	99/152/madera luminares installed	INSTALL LUMINARES	1		
42850	0	99	23.40	23.70		CONSTRUCT GUARDRAIL	1		
40720	0	99	8.90	10.40	GATEWAY INTERCHANGE	MODIFY INTERCHANGES	2	12/1/02	3/1/03
41410	0	99	9.70	10.30		BRIDGE DECK RESTORATION	2		
33610	0	145	12.30	25.50	AT&SF OVERLAY	AC OVERLY AND WIDEN SHOULDERS	3	2/1/04	1/1/06
40250	0	145	8.10	8.60	"AVE 13 SIGNALS"	INSTALL SIGNALS	1		
42430	0	145	8.90	9.10		CONSTRUCT CONCRETE CURB MEDIAN	4		
40850	0	233	1.86	2.50	ROBERTSON BLVD IMPROVEMENTS	"REPLACE CURB, GUTTER, SIDEWALKS" AND MINOR WIDENENING	3	7/1/06	7/1/08
44900	K	41	20.90	35.30	YOSEMITE SPRINGS CAPM	CAP-M	1	10/1/05	10/1/07
37350	K	41	27.70	28.00	COARSEGOLD BRIDGE UPGRADE	UPGRADE BRIDGE RAIL AND WIDEN	3	10/1/07	1/1/10
46040	K	41	3.20	11.50	MILLS CORNER CAPM	CAPITAL PREVENTIVE MAINTENANCE-CAPM	1	3/3/05	1/1/06
42790	K	41	7.70	8.40	Stream & Culvert Rehab	STREAM & CULVERT REHABIL	2		
41730	K	41	7.90	8.30	Replace Culverts	REPLACE CULVERTS	2		
21010	K	41	9.30	31.10		AC OVERLAY CAPM	1		

TABLE 3. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN MADERA COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
40730	K	99	10.30	10.90	"99/145 SEPARATION"	MODIFY SEPARATION	2		
48920	K	99	12.70	13.20	Ave 16 Interchange	RECONSTRUCT ON & OFF RAMPS; WIDEN OC	2		
45830	K	99	26.00	26.40	CHOWCHILLA REST AREA PARTNERING	SAFETY ROADSIDE REST	1	8/1/04	7/1/05
44780	K	99	9.74	10.30	South Madera Deck Rehab	REHAB BRIDGE DECK	2		
46130	K	145	8.00	11.00	DOWNTOWN MADERA REHAB	REHAB-GRIND & OVERLAY	1		
40040	K	145	9.68	10.20		ROADWAY REHAB AND RESTORATION TO A STATE OF GOOD REPAIR	1		
47870	K	233	1.80	3.50	Robertson Blvd. Rehab	AC OVERLAY - REHAB	1	1/1/06	10/1/07

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EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
46630	0	33	61.40	62.30		AC REPLACEMENT	1		
34263	0	41	17.00	19.00	"ROUTE 41/99 LANDSCAPING"	LANDSCAPING	2		
33090	0	41	23.80	29.50		UPGRADE IRRIGATION	2		
26320	0	41	31.70	33.40		FREEWAY ROUTE ADOPTION STUDY (MRR)	1		
45310	0	41	33.30	33.40	San Joaquin River Bridge relinquishment	RELINQUISHMENT OF SAN JOAQUIN BR.	1		
46280	0	99	21.40	22.40	99/180 Plant Restore	HIGHWAY PLANTING AND RESTORATION	2	10/1/03	9/1/05
42910	0	145	33.60	35.10	church ave curb ramps	RECONSTRUCT CURB RAMPS (TITLE 24 COMPLIANCE)	1		
37790	0	168	16.00	16.30		INSTALL CHANGEABLE MESSAGE SIGN	1		
42980	0	168	23.70	24.70		SHOULDER WIDENING	3		
44360	0	168	33.80	36.10	tollhouse rd dike replacement	REPLACE STRUCTURAL SECTION AND DIKE	1		
42700	0	168	65.50	0.00	stream and culvert rehabilitation	STREAM & CULVERT REHAB	2		12/1/99
45140	0	180	0.00	23.40	WESTSIDE EXPRESSWAY	RTE ADOPTION STUDY FOR A NEW ROADWAY SEGMENT	1	10/1/05	
48700	0	180	125.10	127.10	KINGS CANYON RETAINING WALLS	CONSTRUCT RETAINING WALLS	2		
42050	0	180	24.60	27.30	MENDOTA EAST REHAB	AC OVERLAY AND WIDEN SHOULDERS 40'	3	7/1/03	3/1/06
47230	0	180	81.00	83.00	wahtoke creek bridge scour	BRIDGE SCOUR MITIGATION	2		
34234	0	180	55.40	56.60	Roeding Park Landscape	HIGHWAY PLANTING	2	7/1/03	3/1/04
34244	0	180	60.30	63.10	Sunnyside Landscape	HIGHWAY PLANTING (MITIGATION)	2	3/1/04	7/1/05
42830	0	269	8.64	9.10		INSTALL CURB RAMPS (TITLE 24 COMPLIANCE)	1		
48600	K	5	48.60	65.80	Little Panoche CAPM	CAPITAL PREVENTIVE MAINTENANCE (CAPM)	1	10/1/02	7/1/03
46110	K	5	48.80	56.00	Little Panoche Rehab	"REHABILITATE PAVEMENT, AC OVERLAY" "DRAINAGE IMPROVEMENTS, UPGRADE MBGR"	2	7/1/04	9/1/07
48380	K	41	20.00	33.30	Fre/Mad 41 Fiber Optics	FIBER OPTIC SYSTEM	1	4/1/05	4/1/06
43210	K	41	25.40	26.50	SHIELDS/MC KINLEY RAMP METER	INSTALL RAMP METERING SYSTEMS	2	4/1/05	7/1/07
44420	K	41	30.60	31.70	FRIANT ROAD AUX LANE	RAMP AND FREEWAY WIDENING	3		
46730	K	41	31.50	32.30	FRIANT / AUDUBON SOUNDWALL	CONSTRUCT SOUNDWALL	2	3/6/02	12/1/04
39820	K	41	33.30	33.60	"SAN JOAQUIN RIVER BRIDGE RAIL"	BRIDGE RAIL UPGRADE	2		3/1/02

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
46260	K	41	29.30	30.70	Buckwheat Planting Restoration	HIGHWAY PLANTING RESTORATION	2	10/1/04	3/1/06
44770	K	41	29.60	30.50	HERNDON AUXILIARY LANE	CONSTRUCT NB AUXILIARY LANE.	3	2/1/05	1/1/07
46180	K	41	31.30	0.00		OPERATION IMPROVEMENT-RAMP STORAGE I	2		
40490	K	41	33.00	33.30	FRESNO FIBER OPTICS	INSTALL FIBER OPTIC SYSTEM	1		7/1/02
45990	K	43	0.00	9.30	Highland Avenue CAPM	AC OVERLAY	1		
48390	K	99	16.90	31.60	Route 99 Fiber Optics	FIBER OPTIC SYSTEM	1	4/1/05	4/1/06
39210	K	99	20.80	24.40	ROEDING AUXILARY LANE	CONSTRUCT NB AND SB AUXILARY LANES	3	10/1/07	8/1/12
46140	K	99	26.30	26.80	NB Ramp Upgrade	ADDITIONAL LANE FOR OFF-RAMP	2	10/1/04	1/1/06
46270	K	99	28.10	31.50	Island Park Landscape	NEW HIGHWAY PLANTING	2	1/1/04	12/1/04
45870	K	99	7.10	10.70	SELMA REHAB	"PCCP PANEL REPLACEMENT, GRINDING" AND JOINT SEALING (CAPM)	1	10/1/04	9/1/06
32050	K	99	0.20	0.00		CONSTRUCT SOUND WALLS ON BOTH SIDES (DMR)	1		5/1/03
42040	K	145	25.10	29.10	MADERA AVENUE REHAB	AC OVERLAY AND WIDEN TO 40'	3	10/1/05	8/1/07
39790	K	145	34.10	35.20	KERMAN OVERLAY	AC OVERLAY	1	11/1/04	7/1/06
33370	K	168	58.10	58.80	Tamarack Creek Rail & Widen	UPGRADE BRIDGE RAIL AND WIDEN (FFM)	2		
45230	K	168	0.00	6.60	Chestnut/Herndon Fiber Optic	INSTALLATION OF FIBER OPTIC COMMUNICATION SYSTEM	1	1/1/02	
1ml20	K	168	29.00	29.70		realign nonstandard curves, widen shoulders	3		
45350	K	168	29.00	29.20	Prather Curve Re-Al	CURVE REALIGNMENT	3		
43230	K	168	42.00	42.70	DISTRICT 6 WEATHER STATIONS	INSTALL WEATHER STATIONS	1	4/1/05	12/1/06
46380	K	180	35.00	36.60	MENDOTA PASSING LANES	ADD PASSING LANES	3		
30370	K	180	54.70	54.80	Marks Avenue Intersection Improvement	"WIDEN SHOULDERS, SIGNALIZATION," CHANNELIZATION & RAISE PROFILE	3	2/1/03	7/1/04
48800	K	180	57.10	60.00	DOWNTOWN 180 MEDIAN BARRIER	INSTALL DOUBLE THRIE BEAM BARRIER	1		

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TABLE 5. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN TULARE COUNTY

	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	L
47210	0	43	10.10	19.90	Deer Creek to Tule River Guardrail Upgr	UPGRADE GUARDRAILS	1		
49010	0	63	9.20	10.60	N. Visalia B & M	LANDSCAPE/STREETSCAPE	2	8/12/02	2/1/03
46880	0	63	9.60	9.30	FERGUSON/DOUGLAS SIGNALS	INSTALL TRAFFIC SIGNALS	1		
40940	0	63	8.70	8.90	CURB RAMPS WOODLAKE/VISALIA	CURB RAMPS	1		1/1/00
41660	0	65	17.10	17.60		CONSTRUCT LEFT TURN LANES	3		
47710	0	99	53.00	53.80	MENDOCINO AVE GUARDRAIL UPGRADE	UPGRADE GUARDRAIL	1		
47900	0	99	12.10	13.10	PIXLEY HIGHWAY PLANTING	NEW HIGHWAY PLANTING	2		
48440	0	99	17.70	32.40	cms installation fresno-tulare	INSTALL 4 CMS	1		
47190	0	99	3.00	3.60	avenue 24 bridge rehab.	BRIDGE REHAB	2		
43170	0	99	5.60	19.30	EARLIMART & TIPTON LANDSC/	REPLACE PLANTING AND IRRIGATION	2	5/1/03	7/1/04
41680	0	137	21.90	22.40	137 & 152 SIGNALS	INSTALL SIGNALS W/PROTECTED LEFT-TURN PHASING	2		
42930	0	190	22.00	22.50	guard rail	CONSTRUCT GUARDRAIL	1		3/1/00
33920	0	198	15.10	18.90	VISALIA EAST OVERLAY	AC OVERLAY AND WIDEN	3	2/1/04	7/1/05
33930	0	198	21.40	26.70	LEMON COVE WIDENING	AC OVERLAY AND WIDEN	3	1/1/03	1/1/04
42420	0	198	33.00	35.00		BRIDGE & ROADWAY WIDENING	3		
42370	0	198	4.80	5.50	PLAZA INTERCHANGE	MODIFY INTERCHANGE	2	7/1/03	10/1/06
45850	0	198	40.60	40.90	Three Rivers Bike Lane	CONSTRUCT BIKE LANES	3	7/1/03	12/1/04
47640	0	198	10.10	10.10	COURT ST VISALIA SIGNALS	RAMP WIDENING AND INSTALL TRAFFIC SIGNALS AT THE OFF-RAMP	2		
54700	0	198	14.60	15.00		paint protective coating on bridge	2		
47160	0	198	18.80	19.20	198& 65 signals and left turn lanes	"INSTALL TRAFFIC SIGNALS, LENGTHEN" EXIS	2		
48320	0	198	19.70	20.10	EXETER 198 & 245 RESURFACE	SIGNAL LIGHTS/INTERSECTION REALIGN	2		
47180	0	198	3.80	4.30	Plaza OH Bridge painting	RE-PAINT BRIDGE	2		
41910	0	216	2.40	2.80	Macauliff rd/ visalia signals	INSTALL SIGNALS	2		10/1/99
44800	K	63	19.80	30.10	CUTLER OROSI OVERLAY	AC OVERLAY (CAPM)	1	9/11/00	9/1/05
42090	K	65	0.00	3.20	DUCOR OVERLAY AND WIDENING	AC OVERLAY AND WIDEN SHOULDERS	3	7/1/05	2/1/08
49020	K	99	26.00	27.00		BRIDGE REPLACEMENT	2		
43760	K	99	27.70	31.20	TULARE LANDSCAPE	HIGHWAY PLANTING RESTORATION.	2	12/1/04	12/1/05
45940	K	99	34.00	42.00	TAGUS-GOSHEN REHAB	"CRACK SEAT, AC OVERLAY"	1	10/1/05	1/1/07
48740	K	99	36.10	0.00	Caldwell Interchange	RECONSTRUCT INTERCHANGE	2		
47150	K	99	41.10	41.10	Betty Drive Interchange	RECONSTRUCT INTERCHANGE	2		
47470	K	99	45.70	51.80	Traver Median Barrier	CONSTRUCT THRIE BEAM MEDIAN BARRIER	1	9/1/03	3/15/04
45960	K	99	48.10	53.90	TRAVER-KINGSBURG REHAB	"AC OVERLAY, REHAB"	1	10/1/05	1/1/07
45980	K	99	52.70	54.00		"CRACK SEAT, AC OVERLAY"	1		

TABLE 3: DRAFT FUTURE MINOR TRANSPORTATION PROJECTS ... TULARE COU...

	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
43190	K	99	53.50	53.90	90	IRRIGATION UPGRADE AND REPLACEMENT PLANTING	2	7/29/07	12/1/02
44020	K	99	63.90	41.50	Goshen Beautification	ROADWAY ENHANCEMENTS	2	3/18/00	12/1/11
46120	K	137	15.30	16.60	DOWNTOWN TULARE REHAB	PAVEMENT REHAB (RR)	1		7/1/06
43440	K	137	17.50	19.00		WIDEN ROADWAY	3		
46150	K	190	0.00	8.00	LAIRDS CORNER REHAB	AC OVERLAY AND SHOULDER WIDENING	3		7/1/09
44000	K	190	16.20	15.20	TIPTON PASSING LANE	CONSTRUCT PASSING LANE	3		
41210	K	190	16.40	16.90	MAIN ST. INTERCHANGE	MODIFY INTERCHANGE	2	10/1/05	1/1/09
33740	K	190	21.00	26.40	LAKE SUCCESS REHAB	AC OVERLAY	1	7/1/02	7/1/02
37740	K	190	21.00	22.00		UPGRADE 2 INTERSECTIONS/ RECONST GAURDRAILS	2		
42380	K	190	23.90	24.40		RAISE OR REPLACE BRIDGE	2		
47000	K	190	32.70	33.20	NORTH TULE RIVER BRIDGE	BRIDGE REPLACEMENT	2	12/1/07	3/1/09
32362	K	190	45.10	45.60	MOORE HOUSE SLOPE PROTECTION	ROADWAY WIDENING & SLOPE PROTECTION	3	10/1/05	10/1/07
43940	K	198	10.00	10.50	tul 198 widening & improvement	WIDEN AND SIGNALIZE OFF-RAMP	2		
43960	K	198	10.70	11.30	Ben Maddox Way O.C.	WIDEN AND SIGNALIZE OFF-RAMP	2	6/1/03	3/1/05
43130	K	198	11.68	12.40	LOVERS LANE/COUNTRY RD BR. REHAB	REPLACE BRIDGE DECK AND WIDEN BRIDGE	2	1/1/03	1/1/03
45930	K	198	36.30	36.50	Best Western Realignment	ROADWAY REALIGNMENT	3	3/1/03	4/14/03
43920	K	198	8.75	9.40		WIDEN AND CHANNILIZE	3		
43930	K	198	9.30	10.50	tul 198 widening & improvement	CONSTRUCT AUXILIARY LANE AND WIDEN FRONTAGE ROAD	3		
43970	K	198	11.70	12.30	tul 198 widening & improvements	CHANNELIZE INTERSECTION	2		
44670	K	216	1.96	11.70	LOVER'S LANE OVERLAY	AC OVERLAY (CAPM)	1	9/11/00	9/1/05
44810	K	245	0.00	12.00	WOODLAKE CAPM	AC OVERLAY (CAPM)	1	9/21/00	10/1/05
36150	K	245	20.60	21.50		REPLACE BRIDGE FOR PERMIT UPGRADE	2		
P21		99	39.70	40.30		ROADSIDE ENHANCEMENT	2		
P14		198	4.80	5.30		WIDEN BRIDGE AND MODIFY RAMPS	2		

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TABLE 6. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN KINGS COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
48530	0	5	87.30	87.00	KKT FREEWAY EXIT NUMBER SIGNS	INTERCHANGE EXIT NUMBER SIGNS ON FREEWAYS	1		
43050	0	33	0.00	7.80	DEVIL'S DEN REHAB	AC OVERLAY AND WIDEN SHOULDERS	3	37895	38626
41590	0	41	11.50	20.10	KETTLEMAN CITY REHAB	AC OVERLAY AND WIDEN SHOULDER	3	38353	39114
41600	0	41	41.70	44.70	HANFORD/ARMONA Rehab	REHAB ROADWAY AND WIDEN SHOULDERS	3	38078	38991
47920	0	41	36.70	37.20	JERSEY AVE & 41 SIGNALS	"LEFT TURN LANE, LIGHTING"	2		
41280	0	43	21.00	21.50	FARGO AVE CHANNELIZATION	LEFT TURN CHANNELIZATION	2		
45500	0	43	19.43	19.90	grangeville signal and left turn	INSTALL SIGNAL WITH LEFT TURN PHASING CARD	1		
47480	0	43	22.50	22.90	Flint Avenue Intersection Improve	SIGNALIZATION AND CHANNELIZATION	2		
45840	K	41	4.20	6.00	Avenal Ranch Passing Lanes	CONSTRUCT PASSING LANES	3	39264	
44320	k	41	27.20	30.60	5	IIP			
49000	K	198	9.20	17.90	Lemoore/Hanford Chip Seal	AC CHIP SEAL	1		
46220	K	198	14.80	15.00	Hanford-Armona Bridge Rehab	REHAB 3 BRIDGE DECKS	2	38261	38718
46220	K	198	17.50	18.00	Hanford-Armona Bridge Rehab	REHAB 3 BRIDGE DECKS	2	38261	38718

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TABLE 7. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN KERN COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
48570	0	5	10.10	13.30	grapevine install extinguishable message sign	INSTALL EXTINGUISHABLE MESSAGE SIGN (EMS)	1		
47780	0	5	10.20	15.80		PCC PANEL REPLACEMENT	1		
42990	0	5	13.52	14.00		STRENGHTEN BRIDGE	2		
41990	0	5	8.30	9.10		TRUCK ESCAPE CHEMICAL DISCHARGE STORAGE TANK INVESTIGATION	1		
47760	0	5	42.90	52.30		PCC CRACK/JOINT SEALING	1		
46290	0	5	54.10	54.60	Buttonwillow SRRA Rehab	SRRA REHAB HIGHWAY PLANTING RESTORATION	2	3/25/04	1/1/06
44750	0	14	20.48	21.80	CAL CITY SIGNAL	INSTALL TRAFFIC SIGNALS	2		
40910	0	14	35.40	35.90		SLOPE PROTECTION	2		7/1/99
27230	0	14	35.50	37.10	SOUTH REDROCK REHAB	RAISE GRADE, AC OVERLAY, WIDENING	3		
43020	0	14	35.50	37.10	SOUTH REDROCK REHAB	"RAISE GR., AC OVERLAY, WIDENING"	3	1/1/05	1/1/07
47790	0	33	33.10	46.00		"KER 33-DIGOUTS, KER-58 ACOL-30 MM"	2		
42120	0	43	0.10	9.20	KERN RIVER REHAB	AC OVERLAY AND WIDEN SHOULDERS	3	7/1/03	7/1/05
42780	0	43	16.50	25.00	routes 43 and 155 wheelchair ramps at various l	CURB RAMP CONSTRUCTION	3		11/1/99
33830	0	46	32.60	37.20	KURT ROAD REHAB	AC OVERLAY AND WIDEN	3	7/1/03	12/1/05
47800	0	46	51.20	57.70		RESURFACE ASPHALT CONCRETE	1		
35330	0	46	0.00	20.00	ANTELOPE VALLEY REHAB	AC OVERLAY AND WIDEN	3		
46360	0	58	21.00	77.30	CALIENTE REHAB	"COLD PLANING, REPLACE PCC," AC OVERLAY	1	1/1/05	1/1/06
42820	0	58	51.00	51.70	GIBSON ST. WIDENING	WIDEN ROADWAY	3		
48500	0	58	66.00	69.00	neumarkle road bridge scoUr remediation	BRIDGE SCOUR REMEDIATION	2		
47240	0	58	77.00	89.30	broome rd dike construction	CONSTRUCT AC DIKES AT VARIOUS LOCATIOI	2		
41320	0	58	81.00	81.50	keene weigh station bypass□	MAKE IMPROVEMENTS	3		12/1/99
47430	0	58	9.80	10.00	KERN 58 MESSAGE SIGN□	INSTALL CHANGEABLE MESSAGE SIGNS	1		
47430	0	58	64.90	65.20	KERN 58 MESSAGE SIGN□	INSTALL CHANGEABLE MESSAGE SIGNS	1		
46300	0	58	139.00	136.50	Boron SRRA Rehab	REHAB EB AND WB SAFETY ROADSIDE REST AREAS	1	8/1/04	1/1/06
34940	0	58	52.30	0.00		FREEZE DAMAGE REPLACEMENT AND UPGRADE IRRIGATION SYSTEM	2		
45120	0	65	0.00	25.20	FOOTHILL EXPRESSWAY - SOUTH	CONSTRUCT PASSING LANES AND INTERSECTION IMPROVEMENT-CONDUCT ES	3	10/1/04	7/1/05

TABLE 7. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN KERN COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
46410	0	99	20.00	29.60	Pacheco CAPM	REPLACE SLAB & GRIND (CAP-M)	1	2/1/03	3/1/04
42810	0	99	21.00	21.70	WHITE LANE INTERCHANGE	MODIFY INTERCHANGE	2	1/1/03	3/1/03
41970	0	99	21.30	21.80	WHITELANE SOUNDWALL	CONSTRUCT SOUNDWALL	1	1/1/03	3/1/03
45160	0	99	21.60	27.10	Planz Road Irrigation	IRRIGATION UPGRADE AND HWY PLANTING RESTORATION.	2	4/1/03	10/1/04
47200	0	99	22.60	22.70	Ming Ave Bridge Rail	REPLACE BRIDGE RAIL	2		
43350	0	99	30.50	31.10	7TH STANDARD ROAD WIDENING	MODIFY INTERCHANGE	2	3/1/03	2/1/05
42400	0	99	56.50	57.00	CECIL AVENUE IMPROVEMENTS	WIDEN BRIDGE	2	7/1/05	7/1/07
32210	0	166	9.00	24.60	OLD RIVER RD OVERLAY	AC OVERLAY AND WIDEN SHOULDERS	3	10/1/03	11/1/05
42970	0	178	0.40	0.00		INSTALL SIGNAL	1		
41840	0	178	1.60	2.00	"L" ST. BAKERSFIELD SIGNALS	INSTALL SIGNALS AND CURB RAMPS	1		
39710	0	178	53.30	57.00	KELSO OVERLAY	AC OVERLAY AND WIDEN SHOULDERS	3	8/1/04	3/1/07
42230	0	178	6.30	13.40	COMANCHE REHAB	AC OVERLAY/WIDENING	3	10/1/03	3/1/05
41470	0	178	72.80	73.10	Walker Pass Drainage	RAISE GRADE AND CONSTRUCT A WATER CUTOFF WALL	2		
48680	0	178	1.80	5.60	OSWELL STREET ALIGNMENT	"TWO SINGLE THRIE BEAM, DOUBLE THRIE" BEAM MEDIAN BARRIER	1		
47520	0	184	7.80	8.30	58&184 traffic signals	INSTALL TRAFFIC SIGNALS	1		
42630	0	184	8.60	9.00	mills and breckenbridge road left turn construc	CONSTRUCT LEFT TURN LANES	2		
43850	0	202	7.30	7.80	golden hills blvd signals/tehachipi	INSTALL SIGNALS.	1		
47690	0	223	20.60	21.00	ARVIN SIGNALS AT CAMPUS DRIVE	INSTALL SIGNAL AND LENGTHEN TURN CHANNELIZATION	2		
48980	K	5	15.00	30.70	SOUTH KERN CAPM	AC OVERLAY	1		
44870	K	5	19.40	62.80	COPUS RAMP REHAB	RAMP REALIGNMENT AND RESURFACING	2	10/1/04	2/1/06
46070	K	5	4.60	10.40	GRAPEVINE REHAB	PANEL REPLACEMENT & SHOULDER WORK	3	10/1/06	2/1/08
44370	K	5	5.00	9.40	OUTSIDE TRUCK ESCAPE RAMP	RETROFIT RAMP	2	10/1/06	7/1/08
44880	K	5	52.50	64.00	FRE 65 Corridor Study	CRACK SEAT AND OVERLAY	1		
48730	K	5	8.30	0.00	Median Truck Escape Ramp Investigation	STUDY FOR SCOPING REPAIRS TO EX. HAZARDOUS WASTE STORAGE FACILITY	1		

TABLE 7. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN KERN COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
43220	K	5	86.50	87.00	VARIOUS COUNTIES CMS	INSTALL CHANGEABLE MESSAGE SIGNS	1	8/1/04	2/1/06
40800	K	14	0.00	12.80	ROSEMOND PCC	GROOVE PCC PAVEMENT & PLACE CAPM	1		
40810	K	14	12.80	20.80	MOJAVE CAPM	CAPM	1		
30400	K	14	26.00	46.20	JAWBONE/RED ROCK CAPM	RESURFACE ROADWAY (CAPM)	1		
39320	K	14	46.20	50.80	LITTLE DIXIE WASH REHAB	AC OVERLAY & WIDEN SHOULDERS	3	9/1/01	9/1/01
46450	K	33	14.70	17.90	Taft South Rehab	REHABILITATE ROADWAY AND WIDEN SHOULDERS	3	5/1/07	1/1/09
46460	K	33	19.60	34.30	TAFT-MCKITTRICK REHAB	REHABILITATE ROADWAY AND WIDEN SHOULDERS	3	3/1/07	6/1/08
46000	K	43	16.10	25.10	SHAFTER-WASCO Rehab	REHABILITATE PAVEMENT AND WIDEN SHOULDERS	3		
46370	K	58	21.70	27.20	Buttonwillow West CAPM	COLD PLANE AND OVERLAY (CAPM)	1		
46010	K	58	24.00	53.30	Bakersfield Auxiliary Lane	CONSTRUCT 3 AUXILIARY LANES	3	10/1/07	12/1/09
40100	K	58	31.60	48.40		CHANNELIZATION	2		
43460	K	58	47.80	48.40	calloway road channelization	CHANNELIZATION	2		
42750	K	58	90.70	101.50		PLACE CAPM ON NB & SB LANES	1		
46470	K	58	70.80	84.80	Caliente Truck Climbing Lanes	CONST TRUCK CLIMBING LANES	3		
43450	K	99	20.90	21.60	WHITE LANE AUXILIARY	INSTALL AUXILLARY LANE	3	10/1/05	9/1/07
38230	K	99	21.00	21.50	"PLANTZ ROAD OFF RAMP"	MODIFY SOUTHBOUND OFF-RAMP	2		
46011	K	99	22.70	53.30		CONSTRUCT AUXILIARY LANES	3		
46012	K	99	22.70	53.30		CONSTRUCT AUXILIARY LANES	3		
45060	K	99	25.86	26.10	BUCK OWENS DRIVE RAMP IMPROVEMENTS	WIDEN OFF-RAMP IMPROVEMENTS	2	7/1/06	7/1/08
48450	K	99	27.30	27.80	Hageman Road Flyover	EXTENSION AND CONNECTION TO RTE 204	3		
40080	K	99	28.20	28.70		BRIDGE RAIL UPGRADE	1		
45910	K	119	0.00	5.80	Taft East Rehab	"PAVEMENT REHAB, AC OVERLAY AND" SHOULDER WIDENING	3		
45890	K	119	19.90	31.20	Pumpkin Center East Rehab	"PAVEMENT REHAB AND WIDEN SHOULDER," "SLOPE CORRECTION, REALIGNMENT"	3		
42390	K	155	0.00	1.50	GARCES HIGHWAY 4-LANE	ROADWAY AND BRIDGE WIDENING	3		
31880	K	166	9.00	14.80		AC OVERLAY AND WIDEN	3		
48990	K	178	1.80	6.10		AC OVERLAY	1		
35560	K	178	16.50	17.00	POWER HOUSE REHAB	"REALIGN, WIDEN AND GUARDRAIL"	3		
42240	K	178	45.50	47.70	LAKE ISABELLA REHAB	AC OVERLAY AND WIDEN TO 32'	3	1/1/06	1/1/08
42260	K	184	5.10	12.10	HERMOSA REHAB	AC OVERLAY AND WIDEN TO 40'	3	10/1/06	10/1/11

TABLE 7. DRAFT FUTURE MINOR TRANSPORTATION PROJECTS IN KERN COUNTY

EA[1]	PHASE	SR	BEG	END	NAME	DESCRIPTION	CAT	PA&ED	RTL
42270	K	204	3.60	6.30		"GRIND WITH SLAB REPLACEMENT, AND" GRIND AND REPLACE AC SURFACE	1		
46420	K	204	3.70	5.10	Garces Circle CAPM	REPLACE SLAB & GRIND (CAP-M)	1	4/23/02	7/1/06
44890	K	204	4.88	5.30		STRUCTURE REHAB	2		
46310	K	204	5.80	6.70	Buck Owens Planting Rehab	HIGHWAY PLANTING RESTORATION	2	4/1/06	9/15/07
46020	K	223	20.20	21.20	ARVIN REHAB II	REHABILITATE PAVEMENT	1	1/1/05	7/1/07
39660	K	395	0.00	14.50	PEARSONVILLE REHAB	REHABILITATE ROADWAY AND CHANNELIZE	2		

[1]Acronyms

EA = Expenditure Authorization
PHASE = Phase of Project
SR = State Route
BEG = Beginning Postmile
END = Ending Postmile
NAME = Name of Project
DESCRIPTION = Description of the Project
CAT = Category
PA&ED = Project Approval and Environmental Document Date
RTL = Ready to List for Contracting Bids

Enclosed Figures

Figure 1. Caltrans Planned Transportation Projects and Special Status Species Occurrences [San Joaquin Valley]

Figure 2. San Joaquin County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 3. Stanislaus County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 4. Merced County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 5. Madera County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 6. Fresno County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 7. Kings County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 8. Tulare County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 9. Kern County Caltrans Planned Transportation Projects and Special Status Species Occurrences

Figure 10 San Joaquin kit fox core populations, satellite populations, and linkages in the San Joaquin Valley.(oversize, provided separately)

Figure 11 San Joaquin kit fox known occurrences in the San Joaquin Valley (oversize, provided separately)

Figure 12 Effects of roads and traffic on persistence of animal populations (Ottawa-Carleton 2001)

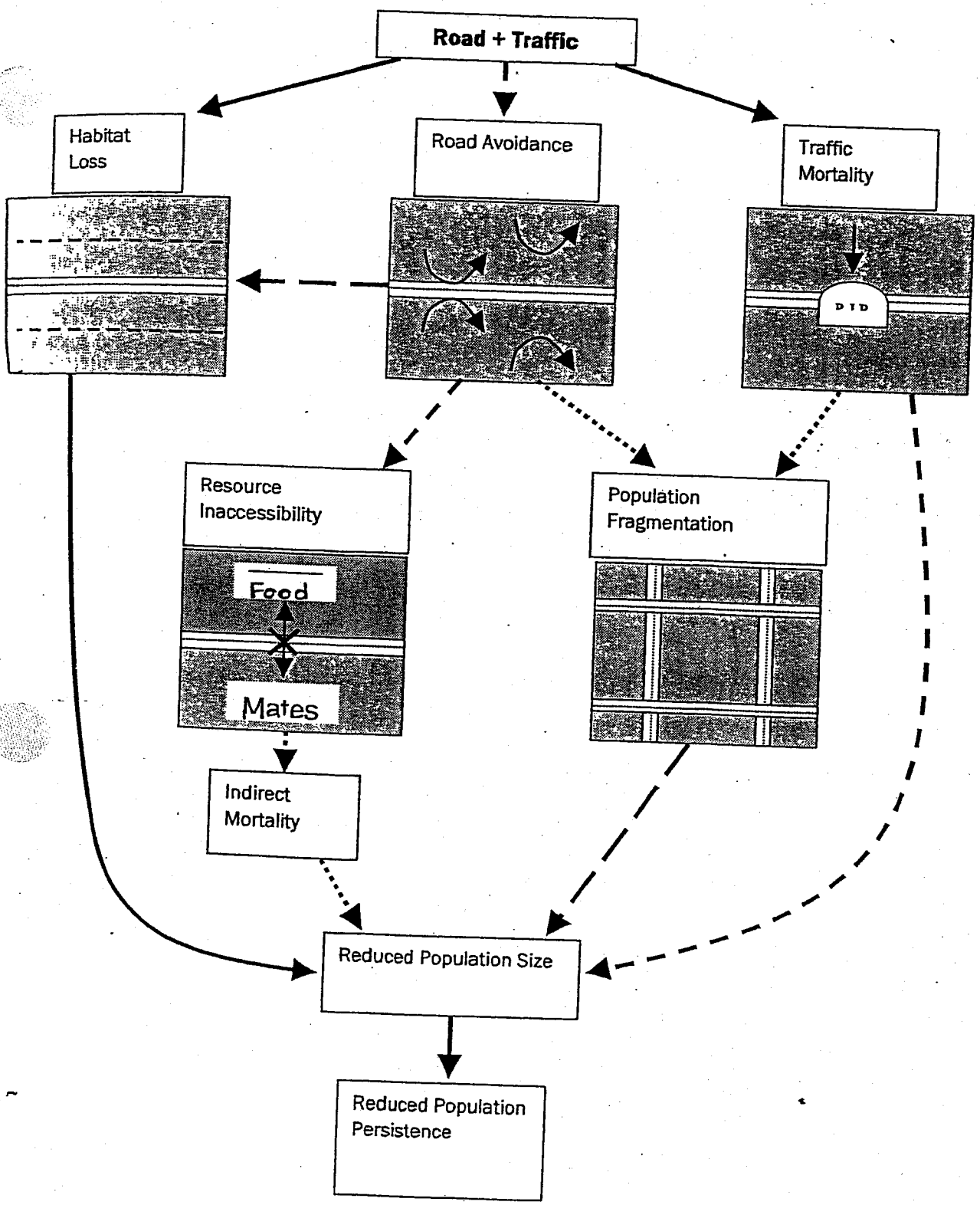
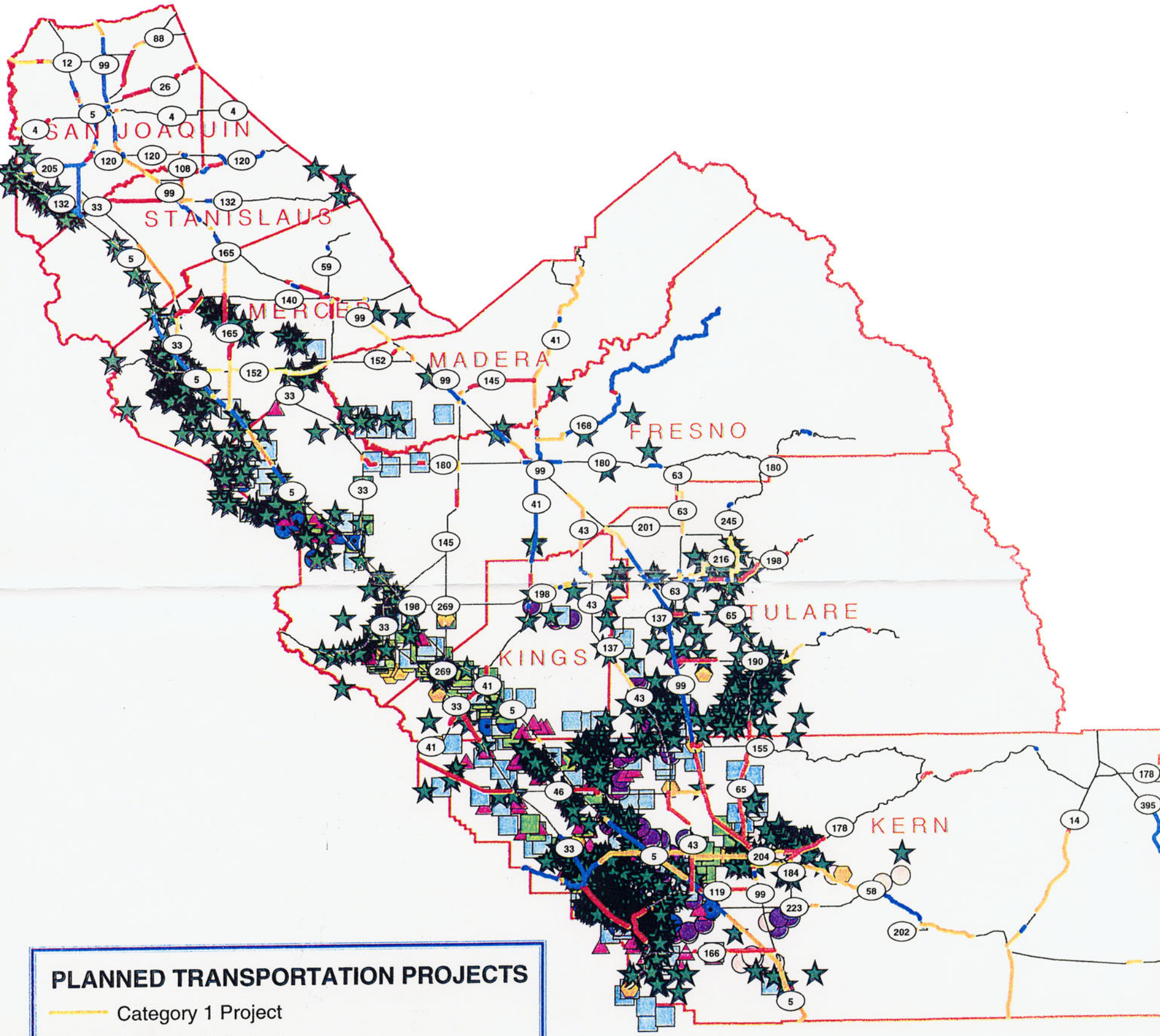


Fig. 1. Effects of roads and traffic on persistence of animal populations. Solid lines represent good evidence for the effect, dashed lines moderate evidence for the effect and dotted lines represent weak evidence, i.e., areas where further research should be a priority.

Figure 1. Caltrans Planned Transportation Projects and Special Status Species Occurrences



PLANNED TRANSPORTATION PROJECTS

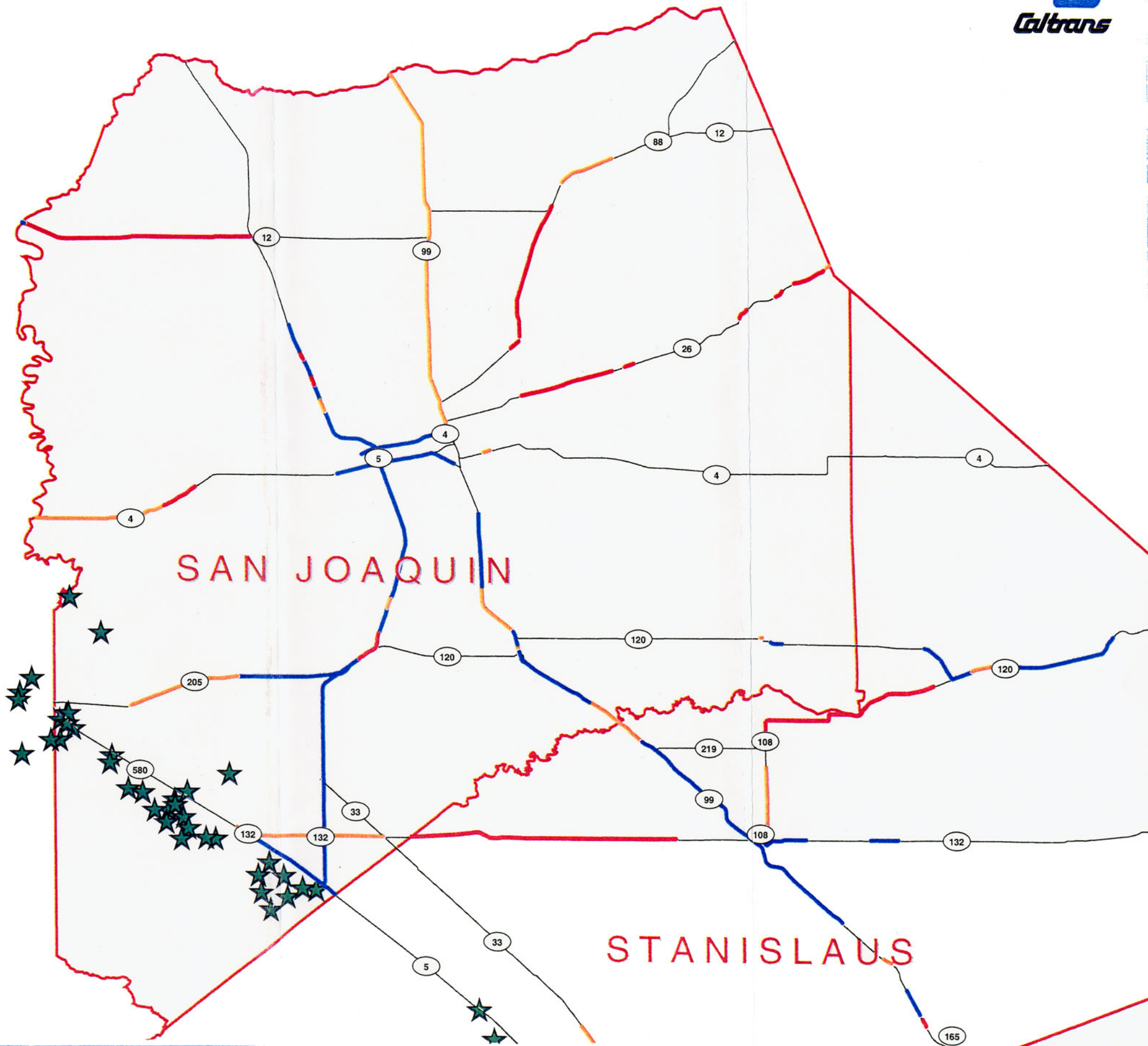
- Category 1 Project
- Category 2 Project
- Category 3 Project
- SAN JOAQUIN KIT FOX

California Natural Diversity Database

- BAKERSFIELD CACTUS
- BLUNT-NOSED LEOPARD LIZARD
- CALIFORNIA JEWEL-FLOWER
- GIANT KANGAROO RAT
- SAN JOAQUIN WOOLLYTHREADS
- SAN JOAQUIN ANTELOPE SQUIRREL
- TIPTON KANGAROO RAT

Figure 2. San Joaquin County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

Caltrans



PLANNED TRANSPORTATION PROJECTS

- Category 1 Project
- Category 2 Project
- Category 3 Project
- SAN JOAQUIN KIT FOX

California Natural Diversity Database

- BAKERSFIELD CACTUS
- BLUNT-NOSED LEOPARD LIZARD
- CALIFORNIA JEWEL-FLOWER
- GIANT KANGAROO RAT
- SAN JOAQUIN WOOLLYTHREADS
- SAN JOAQUIN ANTELOPE SQUIRREL
- TIPTON KANGAROO RAT

Figure 3. Stanislaus County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

Caltrans

SAN JOAQUIN

STANISLAUS

MERCED

PLANNED TRANSPORTATION PROJECTS

- Category 1 Project
- Category 2 Project
- Category 3 Project
- SAN JOAQUIN KIT FOX

California Natural Diversity Database

- BAKERSFIELD CACTUS
- BLUNT-NOSED LEOPARD LIZARD
- CALIFORNIA JEWEL-FLOWER
- GIANT KANGAROO RAT
- SAN JOAQUIN WOOLLYTHREADS
- SAN JOAQUIN ANTELOPE SQUIRREL
- TIPTON KANGAROO RAT

Figure 5. Madera County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

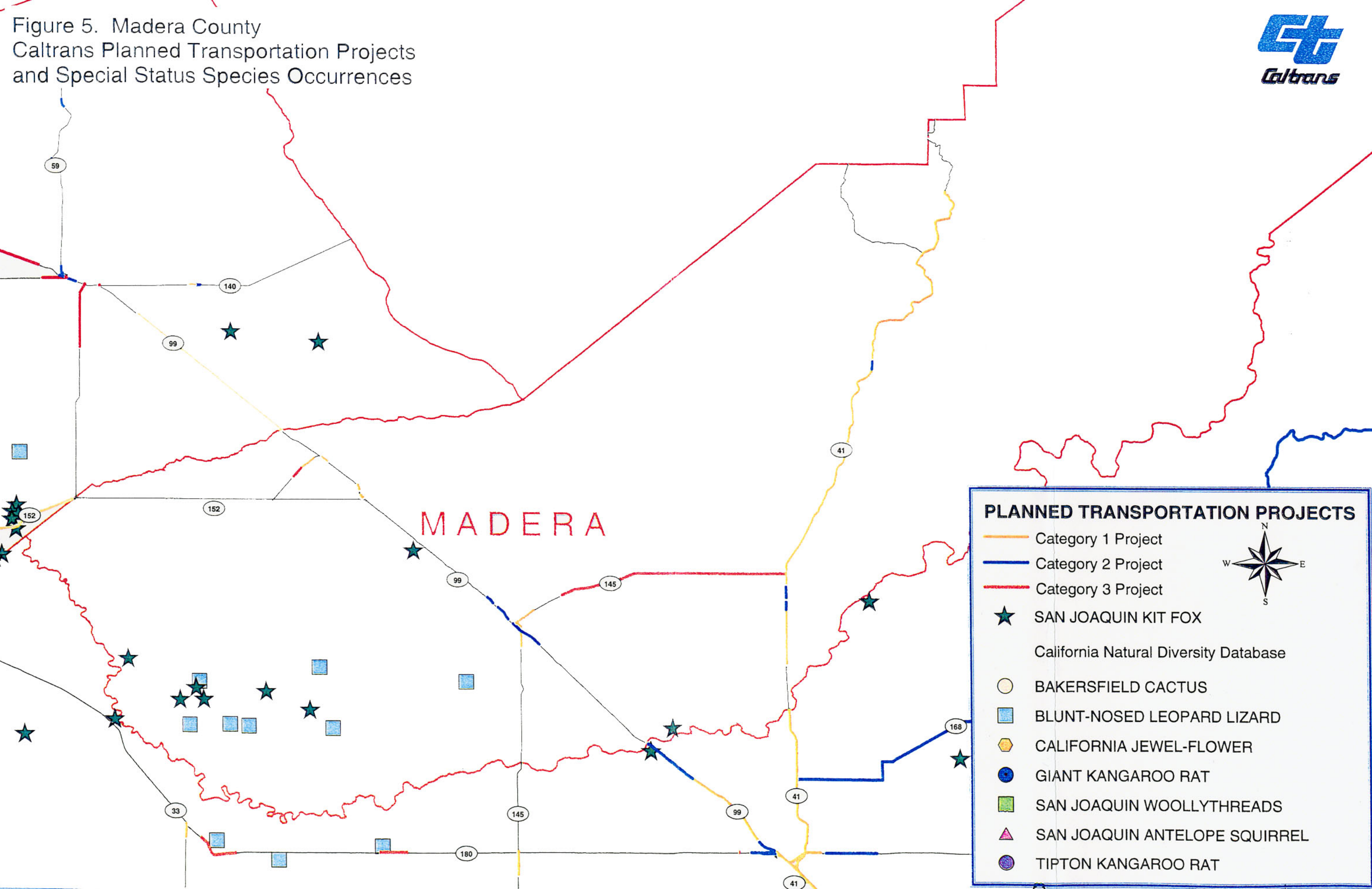


Figure 6. Fresno County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

Caltrans

MADERA

FRESNO

KINGS

PLANNED TRANSPORTATION PROJECTS

- Category 1 Project
- Category 2 Project
- Category 3 Project

N W E S

- SAN JOAQUIN KIT FOX

California Natural Diversity Database

- BAKERSFIELD CACTUS
- BLUNT-NOSED LEOPARD LIZARD
- CALIFORNIA JEWEL-FLOWER
- GIANT KANGAROO RAT
- SAN JOAQUIN WOOLLYTHREADS
- SAN JOAQUIN ANTELOPE SQUIRREL
- TIPTON KANGAROO RAT

Figure 7. Kings County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

KINGS

PLANNED TRANSPORTATION PROJECTS

- Category 1 Project
- Category 2 Project
- Category 3 Project
- SAN JOAQUIN KIT FOX

California Natural Diversity Database

- BAKERSFIELD CACTUS
- BLUNT-NOSED LEOPARD LIZARD
- CALIFORNIA JEWEL-FLOWER
- GIANT KANGAROO RAT
- SAN JOAQUIN WOOLLYTHREADS
- SAN JOAQUIN ANTELOPE SQUIRREL
- TIPTON KANGAROO RAT

Figure 8. Tulare County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

Caltrans

TULARE

PLANNED TRANSPORTATION PROJECTS

Category 1 Project (14)
Category 2 Project (20)
Category 3 Project (8)
total = 42

N
W E
S

SAN JOAQUIN KIT FOX

California Natural Diversity Database

BAKERSFIELD CACTUS
BLUNT-NOSED LEOPARD LIZARD
CALIFORNIA JEWEL-FLOWER
GIANT KANGAROO RAT
SAN JOAQUIN WOOLLYTHREADS
SAN JOAQUIN ANTELOPE SQUIRREL
TIPTON KANGAROO RAT

Figure 9. Kern County
Caltrans Planned Transportation Projects
and Special Status Species Occurrences

Caltrans

KERN

PLANNED TRANSPORTATION PROJECTS

- Category 1 Project
- Category 2 Project
- Category 3 Project

N W E S

- SAN JOAQUIN KIT FOX

California Natural Diversity Database

- BAKERSFIELD CACTUS
- BLUNT-NOSED LEOPARD LIZARD
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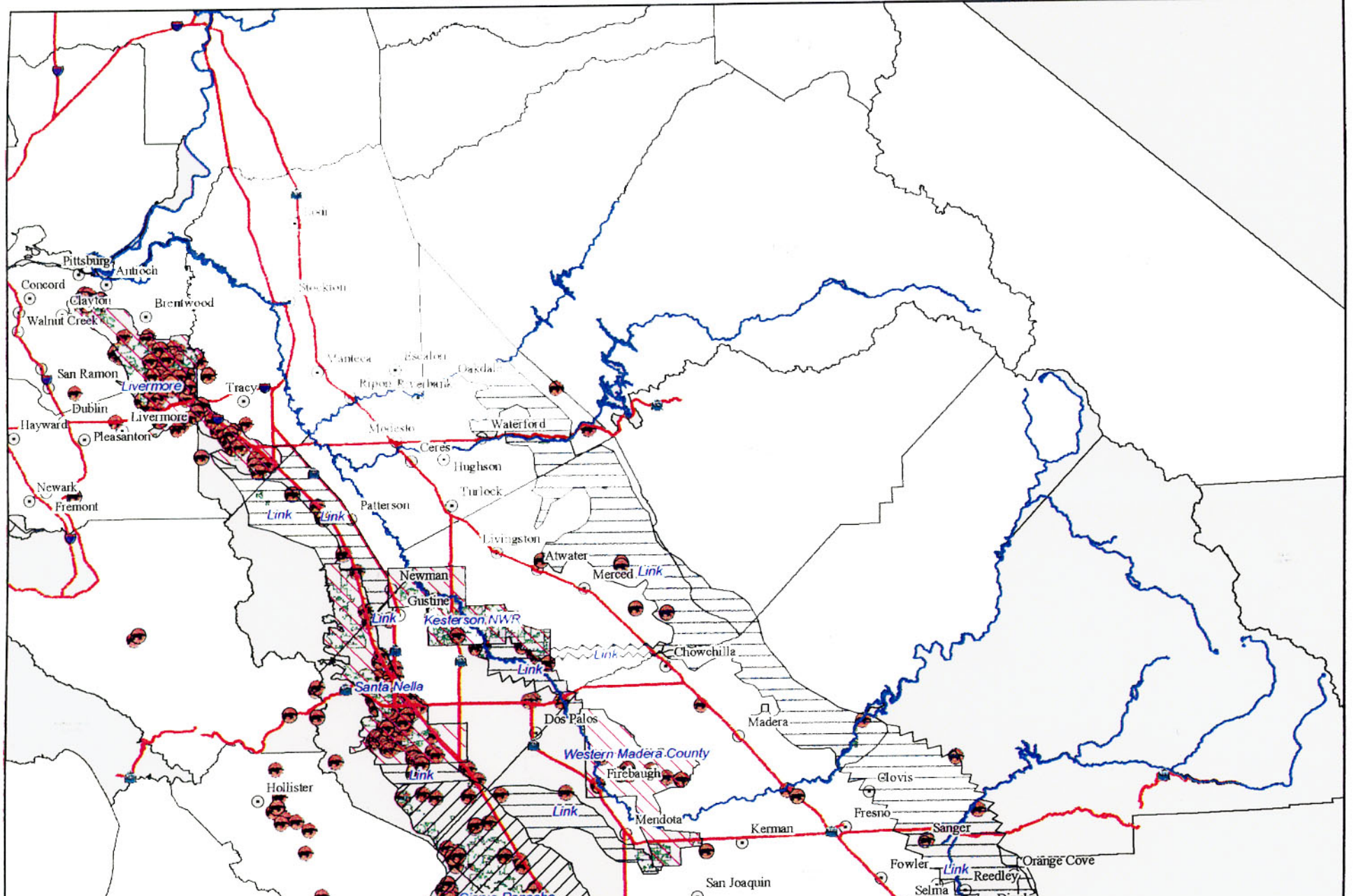

Figure 10. San Joaquin Kit Fox core populations, satellite populations, and linkages in the San Joaquin Valley.

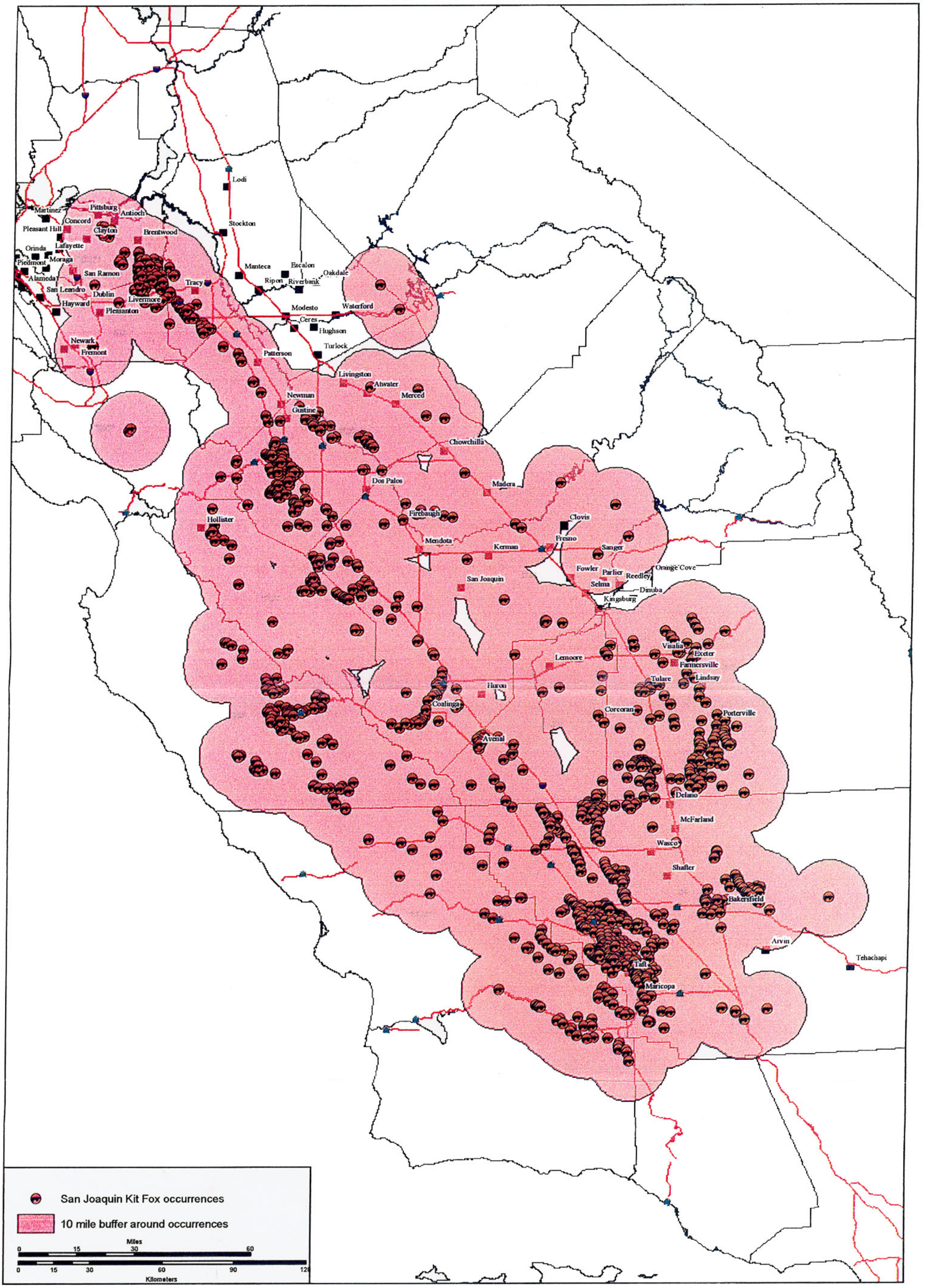

Figure 11. 10 mile buffer around known San Joaquin Kit Fox occurrences in the San Joaquin Valley.