United States Department of the Interior

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

In reply refer to:
81420-2008-F-1338-3

AUG 09 2010

Mr. Gerardo C. Rios
Chief, Air Permits Office
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: Biological Opinion for the Proposed Avenal Energy Power Center, LLC, Kings and Fresno Counties, California

Dear Mr. Rios:

This letter is in response to your July 10, 2008, request for formal section 7 consultation by the U. S. Environmental Protection Agency (EPA) on the proposed Avenal Energy Power Center Project (project) in Kings and Fresno Counties, California. The U.S. Fish and Wildlife Service (Service) received your request on July 14, 2008. You requested concurrence that this project would Likely Adversely Affect the federally-endangered San Joaquin kit fox (kit fox) *(Vulpes macrotic mutica)*; but would Not Likely to Adversely Affect the federally-endangered San Joaquin woolly-threads (*Monolopia congdonii*); federally-endangered California jewelflower *(Caulanthus californicus)*; federally-endangered blunt-nosed leopard lizard *(Gambelia sila);* and the federally-endangered Tipton kangaroo rat *(Dipodomys nitratoides nitratoides)*. A draft biological opinion was provided to you on July 1, 2009, and comments were discussed on December 23, 2009. Per EPA regulation 40 CFR § 52.21(r), project construction as defined in 40 CFR § 52.21(b)(9)) must generally begin within 18 months of approval of the applicants Prevention of Significant Deterioration (PSD) Permit or the permit becomes invalid. A new permit would constitute a new Federal action and therefore would require a new biological opinion. This document represents the Service's biological opinion on the effects of the action on federally-endangered San Joaquin kit fox (kit fox) *(Vulpes macrotic mutica)*; federally-endangered San Joaquin woolly-threads (*Monolopia congdonii*); federally-endangered California jewelflower *(Caulanthus californicus)*; federally-endangered blunt-nosed leopard lizard *(Gambelia sila);* and the federally-endangered Tipton kangaroo rat *(Dipodomys nitratoides nitratoides)*. This document is issued pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The San Joaquin woolly-threads and California jewelflower are often associated with chenopod scrub, as well as foothill and San Joaquin valley grasslands. The blunt-nosed leopard lizard is

found in sparsely vegetated alkali and desert scrub. The Tipton kangaroo rat is found in arid grasslands, saltbush scrub or iodine bush shrubland associations. According to the document *Avenal Energy Project, LLC Application for Certification to the California Energy Commission, section 6.6 February, 2008,* TRC Solutions (biological assessment) (TRC 2008), the proposed power generating facility, all associated linear features (gas and water pipelines, power lines), and any areas temporarily disturbed during the building of the proposed project will occur on disturbed lands that have been used for agriculture or roads for fifty years. Disturbed lands such as these are highly unlikely to support San Joaquin woolly-threads, California jewelflower, blunt-nosed leopard lizard, or Tipton kangaroo rat. The Service concurs, therefore, that the project is not likely to adversely affect the federally-endangered San Joaquin woolly-threads, federally-endangered California jewelflower, federally-endangered blunt-nosed leopard lizard, and the federally-endangered Tipton kangaroo rat.

The Service also concurs with your determination that the proposed project will adversely affect the San Joaquin kit fox. No critical habitat for the kit fox has been designated by the Service; therefore, no critical habitat will be affected.

This biological opinion is based on: (1) *Avenal Energy Project, LLC Application for Certification to the California Energy Commission, section 6.6 February, 2008,* TRC Solutions (biological assessment); (2) a letter containing additional avoidance and minimization measures from the applicant to the Service dated August 18, 2008; (3) discussion during a February 18, 2009, public meeting between the applicant, the California Energy Commission (CEC), California Department of Fish and Game (CDFG), and the Service; (4) the *Recovery Plan for Upland Species of the San Joaquin Valley, California 1998*; (5) an electronic mail (email) from the applicant to the Service, dated March 3, 2009, with attachments revising the project description and containing additional San Joaquin kit fox avoidance measures; (6) other electronic mail and telephone conversations between EPA, the applicant, and the Service; and (7) other information available to the Service. A complete administrative record of this consultation is on file in the Sacramento Fish and Wildlife Office. Please refer to file number 81420-2008-F-1338 when requesting information concerning this consultation.

Consultation History

November 8, 2006: Brian Peterson of the Service, Mr. Joseph Stenger of TRC solutions, Mr. Michael Bumgardner of Bumgardner Biological Consulting, and Ms. Annette Tenneboe of the CDFG met to discuss minimization measures for the proposed project.

December 13, 2006: The CEC rejected the applicant's 'application for certification' (AFC). The project is dropped for consideration for a permit by CEC.

March 7, 2008: The applicant sent to the Service a copy of a new Application for Certification filed with the CEC on February 25, 2008. This application was significantly altered from the original proposal filed with the CEC in 2006 but the location for the power plant was the same as in the original filing.

April 11, 2008:	Susan Jones and Shelley Buranek of the Service met with the applicant, Mr. Michael Bumgardener of Bumgardener Biological Consulting, Mr. Joseph Stenger of TRC solutions, and Ms. Jane Luckhardt of Downey Brand Attorneys, LLP.
April – June, 2008:	The Service exchanged several email messages on proposed project implementation with Ms. Laurel Cordonnier of the CEC, Ms. Tracey Gilliland of Avenal Power Center, LLC (applicant), and Jane Luckhardt of Downey Brand Attorneys, LLP.
May 12, 2008:	The applicant filed for a Prevention of Significant Deterioration (PSD) permit with the EPA as required by Part C of the Clean Air Act and Title 40 of the Code of Federal Regulations (CFR) §52.21 for the proposed construction and operation of the project in the City of Avenal, Kings County, California. A copy of a permit application was received by the Service.
June 24, 2008:	Susan Jones and Shelley Buranek of the Service met with Tracey Gilliland and Jim Rexroad of Avenal Power Center, LLC, Jane Luckhart of Downey Brand Attorneys, LLC, and Justin Sloan of the CDFG regarding the distance of the project facilities from the San Luis Canal – California Aqueduct. The Canal is used as a travel corridor for the endangered San Joaquin kit fox.
June 30, 2008:	The California Union for Reliable Energy (CURE) submitted a Freedom of Information Act (FOIA) request to the Service for all documents pertaining to the proposed project.
July 10, 2008:	The Environmental Protection Agency sent the Service a request for formal consultation on the proposed project. The request was received on July 14, 2008.
July – August, 2008:	The Service exchanged emails with the CEC, and CDFG regarding the need for avian flight diverters on proposed project power lines.
August 15, 2008	Avenal Power Center requested a meeting with Service.
September 03, 2008:	CURE submitted a second FOIA request for all documents pertaining to proposed project.
September 08, 2008:	The Service sent a request to EPA for further information on project fence lines, construction activities, and applicant's calculation of disturbance acreage.
October 27, 2008:	The Service received a letter from EPA responding to our request for further information.
Oct. – Nov. 2008:	The Service exchanged several emails with Ms. Laurel Cordonnier of the CEC, and Mr. Justin Sloan of the CDFG regarding minimization issues.
February 2, 2009:	The CEC released the preliminary staff assessment for the proposed project.

February 18, 2009:	Shelley Buranek and Susan Jones of the Service attended a CEC public workshop on the proposed project.
March 3, 2009:	The Service received an email from the applicant with the final project description and the final minimization measures for the San Joaquin kit fox, including a resolution to the setback distance from the Canal.
May 11, 2009:	The EPA requested a draft biological opinion from the Service.
July 1, 2009	The Service provided the EPA a draft biological opinion.
December 22, 2009	Service received final comments on draft biological opinion from EPA.
December 23, 2009	Shelley Buranek, Susan Jones and Kenneth Sanchez of the Service discussed EPA's comments on the draft biological opinion with Shirley Rivera and Julie Walters of EPA, and Tracey Gilliland and Jim Rexroad of Avenal Power Center, LLC.

BIOLOGICAL OPINION

Description of Proposed Action

Environmental Setting

The proposed project is located in an agricultural region along the western edge of the San Joaquin Valley, in the northeast corner of the City of Avenal, Kings County, California. The project is located approximately two miles east of Interstate 5, approximately eight miles south of the City of Huron, sixteen miles east of the City of Coalinga, and six miles northeast of the commercial and residential districts of the City of Avenal. The proposed project site constitutes the majority of the northeast quarter of Section 19, Township 21 South, Range 18 East, Mt. Diablo Base and Meridian. The Kings County Assessor's Parcel Number (APN) is 36-170-035.

The proposed project site is a 148-acre parcel surrounded by open farmland except for the City of Avenal water treatment facility to the northeast. The San Luis Canal (Canal) portion of the California Aqueduct abuts the northeast corner of the parcel. The parcel, currently in agricultural production, is zoned industrial by the City of Avenal and owned by Avenal Power Center, LLC.

Action Area

The action area is the 148 acres parcel, the 6.4 miles of power line route through agricultural lands from the proposed project to the Pacific Gas and Electric Gates substation near Interstate Highway 5, the 2.5 mile gas pipeline route and associated right-of-way along Avenal Cutoff Road and 34 ½ Avenue, the 2.7 miles of water pipeline routes to the adjacent water treatment plant and two ground wells located on adjacent agricultural properties and the portion of the San Luis Canal that abuts the parcel. Although, no kit fox sightings have occurred on the project site, and the closest known kit fox occurrence was approximately ½ mile away from the project site within the Canal right of way. The proposed project site is located approximately three miles to the southeast of kit fox satellite population number five and approximately two miles to the northeast of satellite population number six.

Project Description

The proposed project consists of construction and operations of a 600 megawatt (MW) combined-cycle electric power generating plant, including power block, switchyard, air-cooled condenser, zero liquid discharge facility, and storm water retention basin. Additional permanent facilities will include; parking facilities, a new 230 kilovolt (kV) transmission lines with 120 foot high poles (6.4 miles total length), three 4-inch diameter buried water pipelines (2.7 miles total length), and a 20-inch diameter gas pipeline (2.5 miles total length). The 148-acre parcel will be contained within a perimeter fence that allows wildlife passage onto and through the property. The security fencing around the power block will exclude wildlife (wildlife exclusionary fencing). All facilities will be set back from the Canal by 300 feet as measured from the edge of the applicant's property line and maintained using the recommended buffer management guidelines outlined in avoidance, minimization and mitigation measures section.

The purpose for constructing a new power plant in the San Joaquin Valley is to provide additional energy to the power grid for electricity consumption. Construction of the proposed project is estimated to begin in 2010 and be completed within twenty-seven months. Ground disturbing activities outside of the wildlife exclusionary fencing will be completed within 24 months. The power plant is estimated to have a 30-year production life. Plant construction will typically occur between 6:30 a.m. and 4:00 p.m.. Plant operation may occur 24 hours a day.

The proposed project will affect 84.3 acres of habitat in such a way as to make these acres either permanently or temporarily unsuitable for kit foxes. There will be 36 acres of permanent disturbance and 48.3 acres of temporary construction related disturbance. Project facilities within security fencing that will exclude wildlife and the construction of adjacent drainage swales will account for approximately 31.9 acres of the permanent disturbance. The remaining 4.1 acres of permanent disturbance will result from onsite road access to the plant (2.9 acres), and footings for the power line towers (1.2 acres) between the site and the Pacific Gas and Electric's Gates Substation. The portion of the 148 acre parcel that is not permanently disturbed will be leased for agriculture, except for approximately 4.1 acres between the security fence and Canal that will be managed for San Joaquin kit fox passage.

Construction Details

Construction will typically occur between the hours of 6:30 a.m. and 4:00 p.m., but additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities. Construction site activities will include clearing of vegetation; site grading; storm water control; laying gravel and road-based materials for temporary roads, establishing equipment laydown, parking, and work areas; leveling the project site; and constructing the plant facilities. During construction, a security fence will be installed around construction areas including laydown areas. For road construction or repair, the applicant will use a road sealant that is not toxic to wildlife and plants. The duration of temporary construction disturbance will be less than 24 months. All temporary disturbed areas will be restored within the first 24 months of an area first being disturbed. This includes the removal of the gravel and road-base material in

the temporary equipment laydown, parking, and work areas. Access to the construction site will be via Avenal Cutoff Road.

The gas pipeline will be installed for most of its route beneath the existing rights-of-way for Avenal Cutoff Road and 34 ½ Avenue. In these areas, the construction and operation of the pipeline will occur within the existing 80-foot wide Avenal Cutoff Road right-of-way and the 60-foot wide 34 ½ Avenue right-of-way. Typical pipeline installation activities will include hauling and stringing of the pipe; welding, trenching and laying the pipe; backfilling the trench; connecting new pipe to the existing pipeline; and cleaning up and restoring the construction area. Construction of the pipeline is expected to take four months.

The construction of the power lines will include positioning approximately 43 tubular, steel-pole towers between the power plant and the Gates Substation. These towers do not utilize anchor guy wires. The designated power line route is through existing farmlands. Construction will take approximately three months.

Water pipeline installation will include trenching, hauling and stringing of pipe along the routes, and welding, hydrostatic testing, backfilling, and restoring the surface grade. Construction of the water pipelines are expected to take five months to complete.

Operation Details

The power plant will be a combined-cycle unit and will include two natural gas fired combustion turbine generators and dry low nitrous oxide combustors to produce electricity. Hot exhaust for each turbine engine will be captured by a dedicated heat recovery steam generator. The hot exhaust along with the input of feed-water will transfer and condense the exhaust heat to the water to create superheated steam. This superheated steam will be used to generate further electricity through a steam turbine generator. Once through the steam turbine generator, the steam will be condensed to water and recycled through the system, limiting the average amount of water used by the project to approximately 20 acre-feet per year.

Water Supply

The City of Avenal will provide the proposed project water supply from the water treatment plant on the City parcel contiguous with the Site. Raw city water along with backup supplies obtained from local agricultural wells will be treated onsite. Water from a backup supply will be used only under limited circumstances, such as interrupted canal flows, events of elevated canal turbidity, or dry years when the City's State Water Project water may be curtailed. Water withdrawn from agricultural wells will be offset 100 percent through agricultural conservation measures so there will be no net increase in groundwater pumping. Water delivery from the water treatment plant and from the agricultural wells will be through approximately 2.7 miles of 4-inch underground pipes. Water will be filtered to remove suspended solids to acceptable levels. Water will be further treated through evaporation and crystallization and an electric deionizer with the resulting salt-cake product trucked to a non-hazardous landfill. Expected annual water consumption will average 20 acre-feet per year with a maximum annual use of 104 acre-feet per year.

Contaminants and Containment

Storm water runoff from possible oil and chemical storage areas will be contained and then routed through an oil/water separator. All the collected storm water from the plant site will be recycled back through the filter and distillation process (the zero liquid discharge facility). There will be no storm water discharge from the plant. Sanitary sewerage will be sent to an onsite septic tank and leach field. Clean storm water runoff will be collected and drained to a storm water retention basin for evaporation or percolation.

Accidental spillage, maintenance operations, and wash down areas will be contained with curbing and appropriately sloped areas around chemical storage and feed areas. Sumps will be provided in the secondary containment areas to facilitate removal of liquids using portable pumps. Liquids removed from sumps will be characterized and recycled or disposed of at a licensed facility in accordance with applicable regulations. Hazardous materials including aqueous ammonia (two 27,000 gallon tanks), petroleum products, flammables, compressed gases, acids and caustics, water treatment and cleaning chemicals, ethylene glycol, paint and solvents are characterized as hazardous waste and will be removed using portable pumps for disposal at a licensed facility. Storage and handling of these materials will be in accordance with the applicable laws, ordinances, regulations and standards. Bulk hazardous materials will be provided with secondary containment to prevent leaks and spills. Hazardous waste generated in small quantities will be disposed of in accordance with Federal and State regulations. Examples include waste oil, used oil filters, chemical wash solutions, spent solvents, spent paint materials, waste sand blast, spent batteries, and spent fluorescent light tubes. Nonhazardous waste including scrap metal, plastic insulation material wood pallets, salt cakes, empty containers, etc will be disposed of through a local waste disposal company or recycled.

Noise

Noise is measured on a logarithmic scale, expressed in decibels (dB). Noise is typically measured on the A-weighted scale (dBA) which has been shown to correlate with human response to sound and is the most widely used descriptor for community noise assessments (Harris 1991). Typical examples of various outdoor and indoor noises and their A-weighted values are listed in Table 1. The current ambient residual (L90) noise level measured over a 25 hour period at the eastern boundary of the property, near the Canal, was 30 to 43 dBA. The prominent sources for this noise at this location were listed as farming operations, water treatment facility, distant traffic, frogs, crickets and aircraft flyby.

The loudest noise during construction of the power plant is expected to be heavy equipment such as bulldozers, front end loaders, and trucks with sound pressure levels typically ranging up to 68 dBA at a distance of 500 feet and 58 dBA at a distance of 1,500 feet. The overall aggregate construction noise as measured from a distance of 50 feet is expected to range up to 95 dBA. Operational noise measured from the center of the plant to the edge of the Canal, a distance of 1070 feet will be a maximum of 63 dBA.

Table 1 Typical Sound Levels Measured in the Environment and Industry

Example Noise Source	A-weighted Sound Level in Decibels (dBA)
Shotgun at shooters ear	140
Civil defense siren (100 feet)	130
Jet takeoff (200 feet)	120
Loud rock music	110
Pile driver	100
Ambulance siren (100 feet)	90
Pneumatic drill (50 feet), or noisy restaurant	80
Busy traffic; hair dryer	70
Normal conversation (5 feet)	60
Light traffic (100 feet); or rainfall	50
Distant bird calls; or average library	40
Soft whisper (5 feet); or rustling leaves	30
Normal breathing	10

Minimization and Avoidance Measures

Minimization and avoidance measures are designed to reduce, ameliorate, and/or avoid potential adverse effects on the kit fox. These measures are an integral part of the proposed action. They have been developed through coordination between the applicant and agency staff, including the Service, EPA, CDFG, and CEC. The applicant and/or their designated representative have committed to implement and complete these measures to minimize projects effects on the San Joaquin kit fox. These avoidance and minimization measures that follow are expected to augment other project related environmental commitments, such as those established within the CEC staff assessment, best management practices (BMPs), and mitigation measures that would be required under separate Federal and State laws, regulations, and executive orders.

1) To assist in the recovery of the San Joaquin kit fox, the applicant has proposed to purchase credits in a Service approved conservation bank such as Kreyenhagen Hills or the Kern Water Bank at a ratio of 0.3 to 1 for temporary disturbance and 1.1 to 1 for permanent disturbance. Total acres purchased will be 54.1; (48.3 acres temporary disturbance x 0.3 = 14.5; plus 36 acres permanent disturbance x 1.1 = 39.6). These credits shall be purchased prior to onset of ground breaking activities.

2) The recommendations, listed in the U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance (USFWS 1999) enclosed with this biological opinion shall be implemented.

3) The applicant will retain the services of a Service approved biologist who will be responsible for overseeing project environmental protection measures and will be the point of contact for the project. All encounters with listed species during construction and operation of the proposed project will be reported to the biologist, who will record the following information: species name; location (narrative and maps), and dates of

observations; general condition and health, including injuries and state of healing; diagnostic markings; including identification numbers or markers; and location moved from and to (if appropriate).

4) The biologist may hire onsite biological monitors to oversee compliance with all biologically related laws, orders or regulations contained within this biological opinion or other applicable Federal or State documents.

5) The biologist and or biological monitors will oversee construction of the proposed project and have the authority to stop work if they observe or determine there will be an unauthorized adverse impact to San Joaquin kit fox or other Federal or State threatened or endangered species.

6) Prior to the initiation of any site preparation/construction activities, all construction personnel will be trained and provided with training materials.

   a) Signup sheets for training sessions, identifying the construction personnel and the contractor/company they represent, will be provided to the Service with the post-construction compliance report.

   b) The training materials will include:

      i) a description of the natural history of the San Joaquin kit fox and its habitat;

      ii) the general measures that are being implemented to conserve this species as they relate to the project;

      iii) the penalties for noncompliance; and

      iv) the boundaries (work area) within which the project must be accomplished.

To ensure that employees and contractors understand their roles and responsibilities, training materials shall be provided in languages other than in English as necessary.

7) Project related vehicles shall observe a 20 mph speed limit in all project areas, except on county roads and State and Federal highways. This provision is particularly important at night when kit foxes are most active. To the extent possible, nighttime construction should be minimized. Off-road vehicle travel outside of designated project areas will be prohibited.

8) A litter control program shall be instituted at each project site. All workers will ensure that 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 construction area at least once a week from the project site.

9) No canine or feline pets or firearms shall be permitted on construction sites to avoid harassment, injuring, or killing of kit fox. Federal, state or local law enforcement officers, and security personnel are exempt from the firearm provision.

10) All construction activity shall be confined to the project site, including temporary access roads, haul roads, and staging areas specifically designated and marked for these purposes. At no time shall equipment or personnel be allowed to adversely affect areas outside the

construction site without authorization from the Service. Project personnel will drive only on existing roads outside of construction limits.

11) Because dusk and dawn are the times when kit foxes are most actively foraging, workers will avoid noisy work, such as operation of heavy equipment, between sunset and sunrise, when this provision does not materially affect construction productivity.

12) If construction lighting is necessary, and for all power plant operations, lighting shall be designed, installed, and maintained to prevent side casting of light toward wildlife habitat including the Canal.

13) \Maintenance and construction excavations greater than 2 feet deep shall either be covered, filled in at the end of each working day, or have earthen escape ramps no greater than 200 feet (61 meters) apart to prevent entrapment of any kit fox. Before such holes or trenches are filled, they should be thoroughly inspected for trapped animals. If at any time a trapped or injured kit fox is discovered, the procedures under number 21 of this section must be followed.

14) In the case of trapped animals, escape ramps or structures should be installed immediately to allow the animal(s) to escape, or the Service should be contacted for advice.

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

16) The following measures shall also be implemented to conserve kit foxes and their dens from the effects of the proposed project:

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

      i) Preconstruction surveys within the project area shall be conducted by a Service-approved biologist 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) Throughout the construction period, pipes and culverts shall be searched for kit foxes prior to being moved or sealed to ensure that an animal has not been trapped.

   b) Identify the type of den (natal or non-natal) and its status (occupied or unoccupied) based on the extant Service guidance. Types of dens are as follows:

      i) 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.

      ii) Potential den: any natural den or burrow within the range of the species that has

entrances of appropriate dimensions (4–12 inches) to accommodate San Joaquin kit foxes. The applicant will survey and investigate using photo-detection equipment, track plate, or other methods to determine species utilization. If no information is collected that indicates use by other species, the den will be treated as a potential kit fox den.

iii) Pupping den: any known San Joaquin kit fox den (as defined) used by kit foxes to whelp and/or rear their pups.

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

c) Identify and execute appropriate action(s) regarding notification, buffers, excavation, and fill:

i) 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:

(1) Unoccupied natal dens shall be surrounded by a 200 foot buffer and the Service shall be contacted.

(2) Occupied and unoccupied non-natal dens shall be surrounded with a 100 foot buffer.

(3) When occupied dens have been found on or near the project site, ground disturbing activities shall be restricted during the period of December 1 to July 31 as follows.

(4) Between December 1 to May 1, project activities within 1000 feet of occupied natal dens are prohibited. The 1000 foot buffer zone shall be delineated with a temporary fence or other suitable barrier that does not prevent dispersal of the fox. Alternately, the project construction area can be delineated with temporary fence, flagging or other barrier.

ii) If a natural den cannot be avoided Service shall be notified for instructions on how to proceed.

d) Provide the findings of the preconstruction surveys to the Service in written report form prior to commencing construction.

17) Only Service approved biologists holding valid permits issued pursuant to section 10(a)(1)(A) of the Act will be allowed to trap, capture, or move listed species for which they have a permit to do so. Any relocation plan will be approved by the Service prior to the release of any listed species.

18) Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. will be contoured if necessary, and revegetated to promote restoration of the areas to pre-project conditions. An area subject to "temporary" disturbance means any area that is disturbed during the project, but that after project completion will not be subject to further disturbance and has the potential to be revegetated.

19) Any contractor, employee, or agency personnel who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to their representative. This representative shall contact the CDFG and the Service immediately in the case of a dead, injured, or entrapped kit fox. The CDFG contact for immediate assistance is State Dispatch at 916-445-0045. They will contact the local warden or biologist.

20) The Sacramento Fish and Wildlife Office and CDFG will be notified in writing within three working days of the accidental death or injury to a San Joaquin kit fox during project related activities. Notification must include the date, time, and location of the incident or of the finding of a dead or injured animal and any other pertinent information. The Service contact is the San Joaquin Valley Branch Chief of the Division of Endangered Species, at the addresses and telephone numbers given below. The CDFG contact is Mr. Ron Schlorff at 1416 9th Street, Sacramento, California 95814, 916-654-4252.

Buffer Zone Requirements

The 300 foot buffer zone between the proposed project security fence and the Bureau of Reclamation's Canal right-of-way is intended to minimize effects of the proposed project on San Joaquin kit fox use of the Canal. Therefore the applicant will manage the area between the security fence and the canal as follows:

1) If grassland continues as the dominant vegetation community within the buffer zone, it must be mowed 1 to 4 times each spring (i.e., during the peak of the grass growing season [March to May]) to maintain the height of the grass at between 4 and 10 inches. Grass height will not be mowed to less than 4 inches, and the mower blade shall be set so that it does not hit the ground.

2) Monitoring must occur once every 2 weeks from March 1 to May 31 to determine if mowing is needed to meet the above grassland height criterion.

3) If the grassland is succeeded by a native San Joaquin Valley vegetation community (e.g., valley saltbush scrub), no mowing will occur.

4) Other ground or vegetation disturbing activities must be prohibited within the buffer zone.

5) Trash removal must be conducted once every 3 months in the buffer zone.

6) Human activities that are not associated with maintaining suitable habitat for San Joaquin kit fox must be prohibited within the buffer zone.

7) Use of night lighting within the buffer zone must be prohibited or minimized to the extent necessary for security purposes.

8) The perimeter fence must be constructed as a wildlife compatible fence (i.e., fence that allows unhampered wildlife movement through the fence). Note that the internal security fence will be constructed to preclude human access into the plant and therefore cannot be constructed as a wildlife compatible fence.

Status of the Species

The Service listed the San Joaquin kit fox as an endangered species on March 11, 1967 (Service 1967) and the State of California listed kit fox as a threatened species on June 27, 1971. *The*

Recovery Plan for Upland Species of the San Joaquin Valley, California (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 humans have altered. 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; 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). Kit foxes often den adjacent to, and forage within, agricultural areas (Bell et. al.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 and Egoscue 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 and Egoscue 1992). Although some yearling female kit foxes will produce young, most do not reproduce until age 2 years (Spencer and Egoscue 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 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 8 kilometers (5 miles) (Scrivner *et al.*1987), dispersal distances of up to 122 kilometers (76.3 miles) have been documented for the San

Joaquin kit fox (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). However, the depth and complexity of their dens suggest that they possess good digging abilities, and researchers observed kit fox dens 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 1984), with the average slope at den sites ranging from 0 to 22 degrees (California Department of Fish and Game 1980; O'Farrell 1984; Orloff *et al.*1986). Natal and pupping dens generally occur 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 1984).

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 and McCue 1981). Natal dens may be reused in subsequent years (Egoscue 1962). O'Farrell (1984) speculated that natal dens are located in the same location as ancestral breeding sites (O'Farrell 1984). Active natal dens are generally 1.9 to 3.2 kilometers (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 1984). 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, Morrell (1972), found kit foxes used up to 39 dens within a denning range of 129

to 195 hectares (320 to 482 acres) (Morrell 1972). O'Farrell (1984) in the southern San Joaquin Valley reported an average den density of one den per 28 to 37 hectares (69 to 92 acres).

Kit fox use dens 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). At the Naval Petroleum Reserve, individual kit foxes used an average of 11.8 dens per year (Koopman *et al.* 1998).

The diet of the San Joaquin kit fox varies geographically, seasonally, and annually, based on temporal and spatial variation in abundance of potential prey. Known prey species of the kit fox include white-footed mice *(Perornyscus* spp.), insects, California ground squirrels, kangaroo rats *(Dipodomys* spp.), San Joaquin antelope squirrels, black-tailed hares *(Lepus ca4fornicus),* 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 audubonizi),* ground-nesting birds, and pocket mice *(Perognathus* spp.).

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 1.2 animals per square kilometer (3.11 per square miles) in optimal habitats in good years (Service 1998). At the Elk Hills in Kern County, density estimates varied from 0.7 animals per square kilometer (1.86 animals per square mile) in the early 1 980s to 0.01 animals per square kilometer (0.03 animals per square mile) in 1991 (Service 1998). Kit fox home ranges vary in size from approximately 2.6 square kilometers to 31.2 square kilometers (1 to 12 square miles) (Spiegel and Disney1996; Service 1998). Knapp (1979) estimated that a home range in agricultural areas is approximately 2.5 square kilometers (1 square mile). Individual home ranges overlap considerably, at least outside the core activity areas (Morrell 1972; Spiegel and Disney1996).

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. The following paragraphs further describe threats that are seriously affecting the kit fox.

Loss of Habitat

Less than 20 percent of the habitat within the historical range of the kit fox remained when the Service listed the subspecies 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 1995). 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 Conservation 1994). The counties specifically noted as having the highest wildland conversion rates included Kern, Tulare, Kings and Fresno. Kit fox occupy all of these counties. 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 (Service 2000b). Virtually all of the kit fox habitat lost was plowed and converted to irrigated cropland.

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 native habitat. During this period, approximately 101,700 acres were converted to urban land use within the Conservation Program Focus area (California Department of Conservation 1994, 1996, 1998, 2000). 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 1993). 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 graminivorous 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). Similarly, isolated populations arc 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 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 *(Taxidea taxus),* 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 (Spencer et al 1992). 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 (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 (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. Macdonald and Voight (1985) observed a similar time lag in disease transmission and subsequent population reductions in Ontario, Canada, although in this instance, the transmission was from red foxes to striped skunks.

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 be exposed to

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. Aboveground 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 is 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 two 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 three 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 (Service 2000b).

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) chiorophacinone 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 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, however, exist in an environment drastically different from the historic one and extensive habitat fragmentation has resulted 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. Preliminary genetic assessments indicate that historic gene flow among populations was quite high, with effective dispersal rates of at least one to four 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 reducing fecundity, juvenile survival, and lifespan (Lande 1988, Frankham and Ralls 1998).

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. 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, San Luis 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.

Environmental Baseline

There has never been a comprehensive survey of San Joaquin kit foxes or their habitat in western Kings County. What is known comes from incidental sightings, local surveys, and aerial photos. There are sightings of San Joaquin kit foxes in western Kings County(CDFG 2008). Given the biology and ecology of the animal (San Joaquin kit foxes have been documented to move ten 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 action area include 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 and old orchards for both local movement and long distance dispersal. The Avenal Power Center, LLC, proposed power plant project is within ten miles of multiple kit fox incidental sightings, (Figure 1), and the project area contains habitat components that can be used by the kit fox for feeding, resting, mating, other essential behaviors, or as movement corridors.

The proposed project location is approximately three miles from kit fox satellite population number five and two miles from satellite population number six. The proposed project site serves

as a corridor to these satellite populations via the Canal which is immediately adjacent to the project site. The Canal is a potential dispersal corridor for kit foxes. Movement between population such as that which may occur along the Canal is critical for maintaining genetic and demographic exchange as well as to prevent local extinctions of foxes and to allow recolonization of lands where foxes are extirpated or lands where habitat has been restored (Cypher, Phillips and Kelly, 2007). There are twenty-two San Joaquin kit fox sightings within ten miles of the project location, ten of these are along the California aqueduct right of way, with three sightings along the aqueduct within a mile of the project location. These CNDDB reports include kit fox sightings within one mile to the northwest and one mile to the southeast of the project site along the Canal (CDFG 2008). While the Canal acts as a barrier for kit fox movement west to east, kit foxes can traverse across bridges and "overshoots" that cross the Canal. Additionally, the Canal acts as a corridor for kit fox travelling north/south and the Canal provides one of the few relatively safe Interstate Highway 5 crossings in this portion of the kit fox range.

Effects of the Proposed Action

The San Joaquin kit fox will be harmed and harassed by the construction, operation and maintenance of the Avenal Energy LLC Power Plant.

Harm will result from the conversion of 36 acres of agricultural lands (34.8 acres for the power plant and 1.2 acres for the transmission line towers) to a fenced industrial facility. This 34.8 acre parcel is degraded San Joaquin kit fox habitat due to over 25 years of farming but still has habitat value for foraging, sheltering, and passage. This parcel retains habitat value due to several factors. 1) Kit foxes often den adjacent to, and forage within, agricultural areas (Bell et al. 1994). 2) This particular parcel is adjacent to the California aqueduct right of way, a potential travel corridor for kit fox. There are twenty-two San Joaquin kit fox sightings within ten miles of the project location, ten of these are along the California aqueduct right of way, with three sightings along the aqueduct within a mile of the project location. 3) This parcel is within five miles of two San Joaquin kit fox satellite recovery areas (satellite area five and six). The current agriculture use of this parcel allows kit fox to forage, construct dens, and travel to adjacent areas. Once the proposed power plant is constructed, all opportunities for the San Joaquin kit fox to use this parcel for these activities will be eliminated.

Harassment of kit fox will result from the construction of the power plant. For 24 months there will be temporary construction activities on an additional 48.3 acres surrounding the project footprint, along pipeline routes, and along the new utility corridor. Daytime noise levels may increase from a baseline of 30 dBA to over 100 dBA. Daytime movement of heavy equipment will vibrate the ground. Security lighting will decrease the natural dark. Temporary fencing and placement of construction equipment piles will block access. There will be an increase in the number of humans at the site along with an increase in daytime vehicle traffic along Avenal cut-off road. Construction of trenching to lay pipeline may destroy potential kit fox burrows, or temporarily displace kit fox from the 48.3 acres of temporary construction areas. Kit fox displaced from the temporary construction area may move into unfamiliar areas which will increase their risk of predation and increase the difficulty of finding required resources such as food and shelter. Any kit fox that remain in the areas may experience disruption of normal

behavior including foraging due to a reduction of the availability of the prey base, sheltering due to destruction of burrows, and dispersal due to a reduced ability to travel over the 48.3 acres temporary construction site. Additionally, kit fox remaining in the temporary construction areas will be at a greater risk of predation due to an increase in night lighting, and destruction of any sheltering burrows.

The operation of this power plant, specifically the placement of the power plant adjacent to the California aqueduct (Canal), could have a long-term effect on the recovery of the kit fox. As mentioned above the Canal right of way may function as a travel corridor and dispersal path for the San Joaquin kit fox. The travel corridor along this portion of the Canal is narrowed due to the City of Avenal water treatment plant. Construction of the proposed project along the Canal and adjacent to the Avenal water treatment plant will further narrow this travel corridor, and further reduce the visibility along the Canal. Reduction of corridor width and visibility could expose kit fox to increased predation or partially impede dispersal of kit fox between kit fox core recovery areas six and five. In order to minimize the effects of this pinch point, the applicant will implement, as described in the project description, a 300 foot buffer adjacent to the Bureau of Reclamation Canal right of way. This buffer will partially minimize the effect of this development on the potential for the Canal to serve as a travel corridor for the kit fox. The development of this project will contribute to the local and range-wide trend of habitat loss, fragmentation, and degradation, which are principal causes of the decline of the kit fox by the conversion of 36 acres of agriculture lands to industrial use and the temporary loss of an additional 48.3 acres during construction activities. The applicant has proposed in this project description to partially offset this habitat loss through the acquisition of pre-approved minimization acreage of 54.1 acres in either the Kern Water Bank Conservation Bank or Kreyenhagen Hills Conservation Bank. Purchase of these minimization acres will also assist in meeting recovery goals outlined in the Service's Recovery Plan (Service 1998). However, harassment to individuals and loss of San Joaquin kit fox habitat resulting from the construction and operation of this power plant are inherent in this activity and unavoidable.

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. The action area includes the kit fox corridor along the Canal. 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.

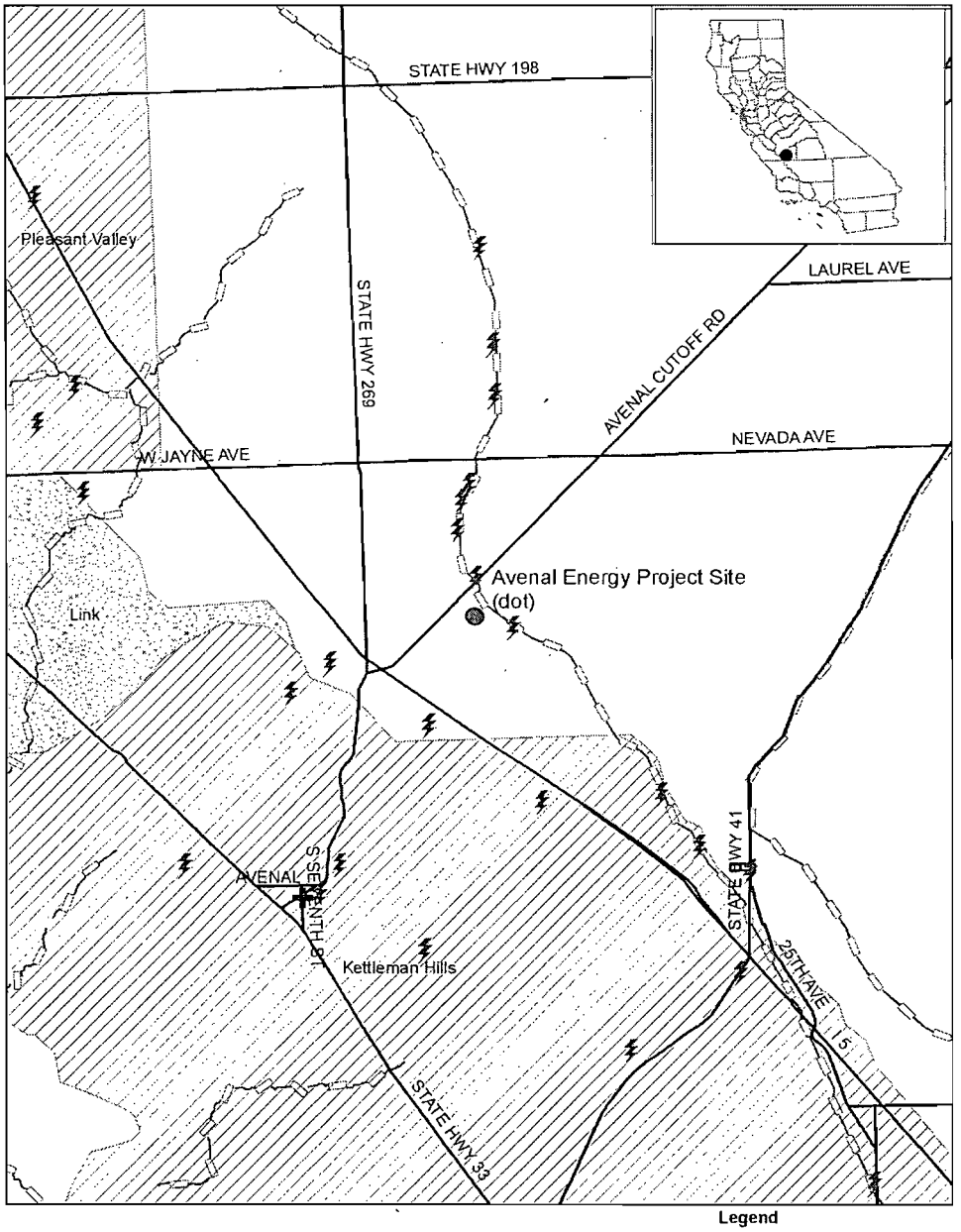

Figure 1 . Map showing proposed Avenal Energy power facility, kitfox location (CNDDB), and kit fox recovery areas

Conclusion

After reviewing the current status of the San Joaquin kit fox, the environmental baseline, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the proposed Avenal Power Center power plant project is not likely to jeopardize the continued existence of the San Joaquin kit fox. Critical habitat for the San Joaquin kit fox has not been proposed or designated, therefore, none will be affected by the proposed project.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as 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 measures described in this incidental take statement are non-discretionary. The Environmental Protection Agency must ensure that the applicant undertakes these measures or makes them binding conditions of any authorization provided to contractors for the exemption under 7(o)(2) to apply. If the applicant (1) fails to adhere to the terms and conditions of the incidental take statement (consistent with revisions to its PSD permit application incorporating these terms and conditions), and/or (2) EPA fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates incidental take of the San Joaquin kit fox will be difficult to detect or quantify for the following reasons: when this mammal is not foraging, mating, or conducting other surface activity, it inhabits dens or burrows; the animal may range over a large territory; it is primarily active at night; it is a highly intelligent animal that is often extremely shy around humans; and the finding of an injured or dead individual is unlikely because of their relatively small body size.

Therefore, the Service estimates harm to the kit fox in the form of permanent loss of 36 acres of habitat and the temporary disturbance of an additional 48.3 acres of kit fox habitat. Upon

implementation of the following reasonable and prudent measures, incidental take associated with the Avenal Energy Project on these acres in the form of harm or harassment to San Joaquin kit foxes from loss or alteration of habitat, excavation of unoccupied dens and burrows, and loss of forage/prey will become exempt from the prohibitions described under section 9 of the Act for direct impacts. Other forms of incidental take including mortality are not authorized in this biological opinion. Harassment, harm, and the displacement of individuals due to the construction, maintenance and operations of the power plant, and the associated pipeline and power lines project will be exempt from the prohibitions described under section 9 of the Act, provided that such harm or harassment: 1) is the result of bona fide project activities; and 2) that all terms and conditions specified below are fully implemented.

Effect of the Take

The Service determined that this level of anticipated take is not likely to result in jeopardy to the San Joaquin kit fox at this time. Critical habitat for the San Joaquin kit fox has not been proposed or designated, therefore none will be affected by the proposed project.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the effects of the proposed Avenal Energy Project power plant project on the San Joaquin kit fox:

1. All conservation measures proposed in the biological assessment and additional correspondence and restated in this biological opinion must be fully implemented.

2. Prior to PSD permit issuance, the applicant will submit a revised PSD permit application that includes the terms and conditions contained within this biological opinion. Including the terms and conditions of the biological opinion within the applicant's PSD permit application requires the applicant to adhere to those terms and conditions to remain in compliance with the PSD permit requirements.

3. The EPA shall forward to the Service a copy of the applicants' revised application containing the provisions of the biological opinion for the Service to review.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the applicant will comply and EPA will ensure that the applicant complies with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

1. To implement reasonable and prudent measure number one, Avenal and all contractors and subcontractors shall complete the following conditions:
    a. Implement the avoidance and minimization measures contained in the biological opinion project description.

b. If requested, allow Service personnel accompanied by the project biologist or an EPA representative to conduct an inspection of the project site to review project effects to the San Joaquin kit fox and its habitats.

2. To implement reasonable and prudent measure number two and three, the EPA shall ensure that Avenal complies with the following:
   a. Any changes to the project description as described in the biological assessment and clarifying emails shall be submitted for review and approval by the Service prior to implementing those changes.
   b. Any new owners or operators of Avenal Energy must agree to the Terms and Conditions of this biological opinion to remain in compliance with the PSD permit requirements for the Avenal Power Plant. New owners or operators must agree to the commitments made by Avenal Power Center, LLC.
   c. Avenal shall comply with the Reporting Requirements below.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take on a species that might result from the proposed action. If, during the course of the action, applicants or their contractors exceed the amount of take authorized then such incidental take will represent new information requiring review of the reasonable and prudent measures provided.

Reporting Requirements

Avenal shall comply with the following reporting requirement which apply to this project.

1. The reporting measures outlined in the Project Description of this biological opinion or approved revisions shall be complied with, as well as the following additions:
   a. In the case of take or suspected take of listed wildlife species not exempted in this opinion, the Service is to be notified within 24 hours.
   b. Contact information:
      i. The Service Contact is Branch Chief, San Joaquin Valley Branch, Endangered Species Division at (916) 414-6600. The address is the Sacramento Fish and Wildlife Office, 2800 Cottage Way, W-2605, Sacramento, California 95825.
      ii. The CDFG contact for immediate assistance is State Dispatch at (916) 445-0045 (24 hours) or the Fresno Region 4 Office at (559) 222-3761.
   c. All relevant field survey data will be submitted to the CDFG Natural Diversity Database and to the Service within 90 days of survey completion.
   d. Avenal shall provide to the Service copies of all Monthly Compliance Reports by the Designated Biologist as required by Condition of Certification BIO-6 of the Avenal Energy Final Commission Decision of the California Energy Commission on December 16, 2009.

2. The Service must be notified within sixty (60) calendar days of the date of the completion of construction activity. This report shall detail (i) dates that construction occurred; (ii) pertinent information concerning the success of the project in meeting compensation and other conservation measures; (iii) an explanation of failure to meet such measures, if any; (iv) known project effects on the San Joaquin kit fox, if any; (v) occurrences of incidental take of the San Joaquin kit fox, if any; and (vi) other pertinent information

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 implement recovery actions, to help implement recovery plans, to develop information, or otherwise further the purposes of the Act.

The Service requests notification of the implementation of any conservation recommendations in order to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats. We propose the following conservation recommendations:

1. The EPA should assist the Service in developing and implementing recovery actions identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998), specifically the protection of habitat in the Coalinga and Avenal (satellite populations number 5 & 6) population area.

2. The EPA should participate in the planning for a regional habitat conservation plan for the San Joaquin kit fox and other listed and sensitive species.

4. Sightings of any listed or 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 where the animals were observed also should be provided to the Service.

REINITIATION - CLOSING STATEMENT

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

If you have any questions regarding this biological opinion on the Avenal Power Center, LLC power plant project, please contact Shelley Buranek or Susan Jones the Chief of the San Joaquin Valley Branch at the letterhead address or at telephone (916) 414-6600.

Sincerely,

for Susan K. Moore
Field Supervisor

Enclosure:
Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance (USFWS 1999)

cc:
Justin Sloan, California Department of Fish and Wildlife, Fresno, California.
Rick York, California Energy Commission, Sacramento California
Jim Rexroad, Avenal Power Center, LLC. Houston, Texas

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