

**U.S. FISH AND WILDLIFE SERVICE  
SAN JOAQUIN KIT FOX SURVEY PROTOCOL  
FOR THE NORTHERN RANGE**

Prepared by the Sacramento Fish and Wildlife Office  
June 1999

“The purposes of the Endangered Species Act of 1973, as amended, are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved . . . and to provide a program for the conservation of such endangered and threatened species.” (The Endangered Species Act of 1973, as amended)

The language contained in the Endangered Species Act of 1973, as amended (Act), requires the U.S. Fish and Wildlife Service (Service) to not only protect individual animals, but has the further obligation of providing listed species with functioning ecosystems so protections provided by the Act are no longer necessary. For the Service to achieve this goal and to allow the project applicant to proceed with their project in a timely manner, the Service has developed the U.S. Fish and Wildlife Service San Joaquin Kit Fox Survey Protocol for the Northern Range where foothill grasslands, oak savannah, and adjacent agricultural lands are the primary kit fox habitats.

To avoid unnecessary expenditures and delays for projects located within the northern range of the San Joaquin kit fox, the project applicant, along with a qualified biologist, must conduct an early evaluation with the Service.

**EARLY EVALUATION REQUIREMENTS**

To enable the Service to evaluate the project's impacts to the San Joaquin kit fox the following information is required:

1. A brief description of the proposed project and a map. The project description needs to include the project name, county where the project is located, the estimated area (acreage) of the project site, and an estimate of acres of potential San Joaquin kit fox habitat (see appendix II). The map must show the precise location of the project site, the location of known kit fox dens and/or sightings on the project site, and delineate kit fox habitat. The map should be either an original or high quality copy of a U.S. Geological Survey topographic map (exact scale, 7.5 minute, 1"=24,000 ft., including township and range).
2. Compile sighting records within a ten-mile radius of the boundaries of the project site. Both the Service and the California Natural Diversity Data Base (CNDDDB) shall be contacted for sighting records;
3. Describe vegetation communities found on the project site using CNDDDB classification;

4. Describe the continuity of the vegetative communities between the project site and the ten-mile radius;
5. Habitat suitability of the project site to be assessed by completing one set of walking transects (e.g., evaluate prey base and denning potential);
6. An analysis of adverse effects of the project on kit foxes, if any;
7. Provide recommendations for mitigating the adverse effects of the project on kit foxes, where applicable; and
8. An analysis of cumulative effects (appendix II), if any.

Upon receiving all of the above information, the Service will evaluate the information as to whether or not the project site represents kit fox habitat, the quality of the habitat, and the value of that habitat to the recovery of the kit fox (see appendix II). The Service will set forth its reasoning for such determination in writing within 30 days. If it is determined that the project will not result in take (see appendix II), the project applicant may proceed with the project. If the Service determines that take will occur as the project is currently presented, the project applicant should initiate discussions with the Service to determine appropriate project modifications to protect kit fox, including avoidance, minimization, restoration, preservation, or compensation. Project modifications to protect kit fox include efforts to moderate, reduce or alleviate the impacts of a proposed activity, including a) avoiding the impact by not taking a certain action or parts of an action; b) minimizing impacts by limiting the degree or magnitude of the action; c) rectifying the impact by repairing, rehabilitating or restoring the affected environment; d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; e) compensating for the impact by replacing or providing substitute resources or environments. The project applicant must obtain Service concurrence that no take of kit fox will occur, as defined in section 9 of the Act. The Service recognizes that there are cases where early evaluation of the project site may be inconclusive. In that case, the applicant may choose (1) to enter into discussions with the Service on appropriate project modifications or (2) complete the balance of the protocol level survey.

If kit fox or kit fox sign are found using the survey protocol presented here, the project applicant will need to consult with the Service to determine appropriate project modifications and permit requirements to protect kit fox.

If kit fox or kit fox sign are NOT found using this survey protocol, but kit fox sightings or occurrences are documented within a 10-mile radius, the Service will interpret the results, and appropriate project modifications, if necessary, will be discussed with the applicant. Factors the Service will consider in interpreting such cases include the number and dates of kit fox sightings, distance of such sightings from the project site, the continuity of habitat or vegetative types between kit fox sightings and the project site, habitat suitability within the project site (e.g., prey

base and denning potential), available results of surveys in the project vicinity, and the opinions of other kit fox experts. If, based on such information, the Service determines that a project site represents kit fox habitat, it will, if requested by the applicant or the applicant's representative, set forth its reasoning for such determination in writing.

If this survey protocol (and early evaluation process) is implemented as described, and if negative results are obtained and no kit fox sightings are within a 10-mile radius, and the Service concurs in writing, the Service will not require project modifications to reduce effects on kit fox. The protocol level surveys are described below.

**SURVEY PROTOCOL**

The hilly terrain and tall grasses of the northern range make it extremely difficult to identify small canids using spotlights. In addition, the large home range of kit fox in the northern range decreases the likelihood of detecting a kit fox in a particular area at a particular moment in time. As kit foxes have proven difficult to detect in such areas, this protocol includes more intensive survey efforts than utilized in the southern range of the San Joaquin kit fox. This survey protocol applies to all natural lands and other vegetative communities as follows:

1. native or nonnative grasslands and associated scrub;
2. oak savannah adjacent to grasslands;
3. agricultural lands on the San Joaquin Valley floor within 3 miles of foothill grasslands or extensive valley grasslands;
4. lands that are dryland farmed; and
5. ruderal land that is associated with above-described areas.

The survey protocol should be used within the aforementioned habitats in the San Joaquin kit fox range north of the following boundary: the western intersection of the Merced/Fresno county lines, then along the Merced/Fresno county lines to the intersection of the Merced/Madera county line and State Route 152, then east along State Route 152 to the intersection of State Route 99, and then an imaginary line directly east from that intersection.

The Service can provide a list of quads where San Joaquin kit fox habitat exists. The quad list is not necessarily inclusive and the Service should be contacted for guidance concerning other land use types that may be inhabited by San Joaquin kit foxes.

Once initiated, surveys conducted pursuant to this protocol may be suspended prior to completion if: (a) upon closer inspection or new information the project site represents kit fox habitat, or (b) kit fox are positively identified within the project site or within 2 miles of the boundaries of the project site. If kit fox are identified, the Service must be notified immediately and a California Natural Diversity Data Base form must be completed and mailed.

Below are general requirements of all surveys; details are contained in appendix I. Adjustments to this protocol may only be made with Service concurrence.

1. One walking transect to detect known, natal, and potential kit fox dens (appendix II) must be conducted on all areas within the project site in the previously described vegetative communities. Walking transects must be conducted such that 100% visual

coverage of the project areas is achieved. Typically, this requires transect widths of 30 to 100 feet depending on the height of vegetative cover and other visual obstructions. To identify opportunities and “hot spots” for later spotlighting and camera/scent stations, walking transects of at least 50% of the project site must be conducted prior to initiation of spotlighting. The remainder of the walking transects must be completed prior to the placing of camera and scent stations. At least one walking transect survey must be conducted between May 1 and September 30.

2. Spotlighting of the project vicinity must be conducted for a minimum of 10 nights within a 15 day period (weather permitting). “Project vicinity” means the actual project site plus an area encompassing a 2-mile radius around the project site. Prior to accessing private property, the surveyor must obtain permission. However, if permission cannot be obtained, spotlighting of the project site and publicly accessible routes within the 2-mile radius must be conducted. Spotlighting must be conducted so that coverage of the project vicinity is maximized and is consistent with good professional judgment. Areas where canids were observed, but not identified need to have additional camera and scent stations placed in the vicinity within 24 hours.
3. Spotlighting surveys cannot be conducted in the same area where camera and scent stations are in place, except as mentioned above. Camera stations must be established within the project area at a minimum density of eight per 640 acres (1 square mile -- or at a similar density for project sites larger or smaller than 640 acres) and maintained for a minimum of 10 consecutive nights. At least one camera station must be established for project sites smaller than 80 acres. When the number of camera stations on the project acreage does not divide evenly, the required number of stations must be rounded up. Consecutive nights of surveys may be interrupted if weather conditions are inappropriate, provided that 10 nights of effort are completed as promptly as practicable.
4. Concurrently with camera stations, scent stations must be established within the project area at a minimum of eight per 640 acres and maintained for a minimum of 10 consecutive nights (weather conditions permitting). The number of scent stations required for project areas larger or smaller than 640 acres should be rounded up. On project sites larger than 640 acres, camera and scent stations may be rotated as necessary to obtain complete coverage (i.e., where the number of available cameras is not sufficient to simultaneously cover the entire site).

Camera and scent stations must be established in accordance with methods that maximize the success of attracting and detecting kit foxes, and that is consistent with good professional judgment.

5. Surveys must be conducted between May 1 and November 1 using the methods described above.

6. Results of these surveys together with other pertinent information must be compiled into a survey report or biological assessment and submitted to the Service for review and comment. The report must contain the following mandatory elements:
  - a. the early evaluation information and results;
  - b. a description of specific methodologies utilized during the project survey and any adjustments from the survey protocol;
  - c. survey results and a map showing the location of camera and scent stations;
  - d. any other available environmental documents such as draft environmental impact reports or biological assessments; and
  - e. an appendix containing the resumes of all biologists who assisted with the project surveys.

### **REQUIRED QUALIFICATIONS OF BIOLOGISTS**

Biologists conducting the early evaluation and field surveys described in this protocol must have demonstrable experience in kit fox biology, identification, and survey techniques. The senior biologist should have a university degree in wildlife biology or a related science, at least 360 hours of field experience in traditional kit fox survey techniques (den surveys, camera and scent stations, and spotlighting) including a minimum of 48 hours of spotlighting experience, and have seen a kit fox during a spotlighting survey within five years of conducting the present survey or can provide comparable experience. The assisting biologist(s) needs to have 30 hours of spotlighting experience, be able to identify coyote, red fox and gray fox in a spotlight, and needs to have seen a kit fox either in the wild, at a zoo or as a museum mount. Other qualifications are not necessarily excluded by this condition, provided the surveyor can demonstrate to the Service good professional judgment and experience.

Resumes submitted to the Service must include specific information concerning kit fox survey experience, experience surveying for other canids, other professional experience, and education. The Service suggests that the biologist contact the Service if there are any questions regarding their qualifications.

### **ADDITIONAL INFORMATION, LIMITATIONS, AND CAVEATS**

With respect to this survey protocol, the following apply:

1. Surveys are to be conducted only after the early evaluation process has been completed. Surveys are only to be conducted with prior approval of the Service, and that the Service, along with the applicant, has determined that surveys are appropriate.

2. Specific circumstances may justify or necessitate modification of this survey protocol on a case-by-case basis. Such modifications are allowable under this protocol if: (a) the applicant or its representative explains to the Service in writing why modifications of the protocol are necessary; and (b) the Service concurs with such adjustments in writing.
3. The Service recognizes that certain types of projects (e.g., linear projects such as pipelines, phased projects, and projects involving small land areas) may raise special issues with respect to the implementation of this protocol. These applicants must consult with the Service prior to initiating surveys.
4. The Service reserves the right to reject kit fox surveys conducted under this protocol as inadequate if:
  - a. specific methods described under the Survey Protocol are not implemented and prior written exception to the protocol was not obtained;
  - b. surveyor qualifications are demonstrably inadequate or inconsistent with the description under Required Qualifications of Biologists; or
  - c. survey methods are conducted in a manner that is demonstrably inconsistent with the Survey Protocol.
5. The applicant should consult the California Department of Fish and Game to determine their responsibilities under the California Endangered Species Act.
6. The applicant shall not be required to conduct additional kit fox surveys for 2.5 years (30 months) from the date of completion of protocol surveys. If by the end of this 2.5 year period, (1) a grading permit has not been issued for any project requiring such a permit, or (2) project construction (i.e., actual ground disturbing activities) has not been initiated, or (3) other specific project activities at issue with respect to this protocol have not been initiated, then the Service must be contacted as all understandings and agreements described above shall have terminated.
7. IF THE APPLICANT CONDUCTS THE PRESCRIBED SURVEYS WITHOUT FINDING ANY KIT FOX, AND KIT FOXES ARE LATER DETERMINED TO OCCUPY THE PROJECT SITE, ALL PROJECT ACTIONS LIKELY TO RESULT IN INCIDENTAL TAKE OF KIT FOXES SHALL CEASE IMMEDIATELY AND THE SERVICE SHALL BE CONTACTED IMMEDIATELY FOR FURTHER GUIDANCE.

**APPENDIX I: Mandatory Requirements for Surveys**

These requirements have been adapted from the California Department of Fish and Game, Region 4, Approved Survey Methodologies. This appendix details mandatory requirements set forth in the survey protocol.

1. Spotlighting shall be conducted:
  - a. for a minimum of two hours within a one sq. mile area, and adjusted appropriately for larger or smaller areas.
  - b. The routes should be varied so that specific locations are not spotlighted at the same time each session.
  - c. Whenever eye shine or animal movement is detected, the vehicle should be stopped and the animal identified using binoculars (minimum 7x35, light gathering styles preferred) or spotting scopes. If the animal is considered an “unidentified canid”, a surveyor’s flag or other form of marking shall be placed there to expedite returning to the spot for timely placement of an additional 2 camera and 2 scent stations for 3 consecutive nights.
  - d. Any sightings of kit foxes, other predators, and prey species should be noted for mapping.
  - e. Spotlighting shall be conducted using at least two observers with spotlights. Spotlights must be 400,000 candlelight or brighter. The Service recommends 800,000 candlelight.
  - f. Vehicles must be driven no more than 10 mph and shall be operated on existing roads only.
2. Walking transects shall be conducted as follows:
  - a. Survey for dens, sign (tracks, scat, prey remains), and prey availability. It is essential that locations of dens, sign, and prey availability be mapped (e.g., ground squirrel colonies). Scat can now be determined to species. Contact the Service for more information.
  - b. Transect width must be adjusted based on vegetation height, topography, etc., to facilitate the detection of dens and other sign.
  - c. When a den, appropriate ground squirrel burrow, or badger excavation, etc. is discovered, the biologist should determine its status (appendix II) and map the



location. Most dens which are occupied by kit foxes show no sign. Den status can usually be determined with 3 days of dusting with a tracking medium.

3. Scent stations shall be managed as follows:

- a. Scent stations must measure a minimum of one square yard, and may be either metal, aluminum, or other appropriate surface, covered with appropriate tracking medium. The tracking medium must be kept in a condition which allows the tracks of small canids to be detected. The use of track boxes in areas of heavy dew or fog may prolong the effectiveness of the tracking medium. Track boxes can be used with prior approval by the Service.
- b. Track plates must be secured to the ground by spikes or other means (such as wood backing) to prevent wobbling, being blown away or otherwise disturbed.
- c. Scent stations must be checked each morning and animal visitations recorded. All tracks of small canids and unidentifiable canid tracks should be lifted or photographed and included in the report.
- d. Scent stations shall be re-baited as necessary to encourage nighttime visitation. If a small can is used, such as a cat food can, then it should be nailed into the ground or somehow secured so an animal cannot walk off with it.
- e. Scent stations should be placed in a manner that will foster visitations by carnivores (e.g., adjacent to existing wildlife trails or near dens).
- f. Grass and brush should be cleared from around scent stations to prevent windblown grasses or bushes brushing the track plates and destroying tracks.
- g. If a scent station results in a visitation by an unidentified canid, an additional camera should be set up at the scent station for a minimum of four additional nights and the vacated camera station should be converted to a scent station.

4. Camera stations shall be managed as follows:

- a. Camera stations can be baited trigger cameras and/or infrared beam trip cameras. Cameras must be set to allow triggering or tripping by small canids.
- b. Camera stations should be set so as to foster visitations by small canids, but limit triggering or tripping by domestic livestock.

- c. Cameras with motor driven drives must be used to allow multiple photographs to be taken per night. If infrared beams are used, the beam delay should not exceed 30 seconds.
  - d. Bait and batteries shall be checked on a daily basis.
  - e. When theft of cameras is a concern, the cameras can be concealed in bee boxes or by other means.
  - f. Grass and brush should be cleared from around camera stations to prevent windblown grasses or bushes triggering the shutter release.
5. Surveyors must fill out and send to the California Natural Diversity Data Base (CNDDDB) all observations of the presence of San Joaquin kit foxes (e.g., sightings, carcasses, scat, tracks). A CNDDDB form is available as appendix III.

**APPENDIX II: Definitions**

“Take” - Section 9 of the Endangered Species Act of 1973, as amended (Act) prohibits the “take” of any federally listed endangered species by any person (an individual, corporation, partnership, trust, association, etc.) subject to the jurisdiction of the United States. As defined in the Act, take means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” Thus, not only is a listed animal protected from activities such as hunting, but also from actions that damage or destroy its habitat.

“Harm” - is defined in the Act to include significant habitat modification or degradation that results in death or injury to a listed species by interfering with essential behavioral patterns such as breeding, foraging, or resting.

“Harass” - is defined in the Act as actions that create the likelihood of injury to listed species to such an extent as to disrupt normal behavior patterns which include, but are not limited to, breeding, foraging, or resting.

“Cumulative Effects” - The cumulative or incremental environmental impact of the effect of the action together with impacts of past, present, and reasonably foreseeable future actions. The action area includes all areas to be affected directly or indirectly by the action, not merely the immediate area involved in the action.

“Dens” - San Joaquin kit fox dens may be located in areas of low, moderate, or steep topography. Den characteristics are listed below, however, the specific characteristics of individual dens may vary and occupied dens may lack some or all of these features. Therefore, caution must be exercised in determining the status of any den. Typical dens may include the following: (1) one or more entrances that are approximately 5 to 8 inches in diameter; (2) dirt berms adjacent to the entrances; (3) kit fox tracks, scat, or prey remains in the vicinity of the den; (4) matted vegetation adjacent to the den entrances; and (5) manmade features such as culverts, pipes, and canal banks.

“Known den” - Any existing natural den or manmade structure that is used or has been used at any time in the past by a San Joaquin kit fox. Evidence of use may include historical records, past or current radiotelemetry or spotlighting data, kit fox sign such as tracks, scat, and/or prey remains, or other reasonable proof that a given den is being or has been used by a kit fox. The Service discourages use of the terms “active” and “inactive” when referring to any kit fox den because a great percentage of occupied dens show no evidence of use, and because kit foxes change dens often, with the result that the status of a given den may change frequently and abruptly.

“Potential Den” - Any subterranean hole within the species' range that has entrances of appropriate dimensions for which available evidence is insufficient to conclude that it is being used or has been used by a kit fox. Potential dens shall include the following: (1) any suitable

subterranean hole; or (2) any den or burrow of another species (e.g., coyote, badger, red fox, or ground squirrel) that otherwise has appropriate characteristics for kit fox use.

“Natal or Pupping Den” - Any den used by kit foxes to whelp and/or rear their pups.

Natal/pupping dens may be larger with more numerous entrances than dens occupied exclusively by adults. These dens typically have more kit fox tracks, scat, and prey remains in the vicinity of the den, and may have a broader apron of matted dirt and/or vegetation at one or more entrances.

A natal den, defined as a den in which kit fox pups are actually whelped but not necessarily reared, is a more restrictive version of the pupping den. In practice, however, it is difficult to distinguish between the two, therefore, for purposes of this definition, either term applies.

“Atypical Den” - Any manmade structure which has been or is being occupied by a San Joaquin kit fox. Atypical dens may include pipes, culverts, and diggings beneath concrete slabs and buildings.

“Habitat” - Habitat refers to the resources and conditions present in an area that; (1) produces occupancy (including foraging areas and dispersal corridors, etc.); or (2) provides potential for occupancy (e.g., listed species who are so reduced in numbers that they cannot use some areas of habitat, but would do so if their numbers were greater and/or they had the opportunity); or (3) was historically occupied; and (4) are important to the survival, reproduction, and/or recovery of the species.

“Habitat Quality” - The quality of the habitat should be considered a continuous variable, ranging from low to medium to high quality habitats, based on the ability to provide resources for survival, reproduction, and recovery, respectively.

“Habitat Value” - The value of the habitat refers to the importance of the habitat to the recovery of the kit fox. This should be considered a continuum with indefinite boundaries or acreage; low, medium, and high.