

San Joaquin Kit Fox

San Joaquin Kit Fox (*Vulpes macrotus mutica*)

Management Status

Heritage Status Rank: G4S2/3

Federal: Endangered, March 11, 1967 (32 Federal Register 4001)

State: Threatened, June 27, 1971

Other: None

General Distribution

The historic range of San Joaquin kit fox included most of the San Joaquin Valley as well as low-elevation basins and ranges along the eastern side of the central Coast Ranges. By 1930 this range was reduced by more than half, with the largest populations occurring in the southern and western portions of the San Joaquin Valley. Today, San Joaquin kit fox occurs in the remaining native valley and foothill grasslands and chenopod scrub communities of the valley floor and surrounding foothills from southern Kern County north to Los Baños, Merced County. Smaller, less dense populations may be found farther north and in the narrow corridor between Interstate 5 and the Interior Coast Ranges from Los Baños to Contra Costa County. The taxon's range also includes portions of Monterey, Santa Clara, and San Benito Counties and the upper Cuyama River watershed in northern Ventura and Santa Barbara and southeastern San Luis Obispo Counties (Brown and others 1997, U.S. Fish and Wildlife Service 2001).

Distribution in the Planning Area

San Joaquin kit fox potentially occurs on the Los Padres National Forest in the upper Cuyama Valley watershed and along the eastern slope of the La Panza Range. There are currently no known denning sites on National Forest System lands in southern California. Further, no reliable estimate exists for numbers of San Joaquin kit fox using National Forest System lands for foraging. The taxon is most likely a transient visitor on National Forest System lands in southern California because little high-quality denning habitat is available (U.S. Fish and Wildlife Service 2001).

Systematics

The genus *Vulpes* contains 10–13 species, depending on the authority consulted (McGrew 1979). San Joaquin kit fox is one of eight recognized subspecies of kit fox (*Vulpes macrotis*). Two other subspecies, *V. m. macrotis* and *V. m. arsipus*, occur in southern California (Samuel and Davis 1982). However, Waithman and Roest (1977) synonymized *arsipus* with *mactotis*.

Natural History

Habitat Requirements

San Joaquin kit fox inhabits a variety of habitats, including grasslands, scrublands, vernal pool areas, alkali meadows and playas, and an agricultural matrix of row crops, irrigated pastures, orchards, vineyards, and grazed annual grasslands (Williams and others 1998). They prefer habitats with loose-textured soils and are primarily found in arid grasslands and open scrublands that are suitable for digging, but they occur on virtually every soil type (Egoscue 1962, Grinnell and others 1937, Hall 1946, McGrew 1979, Morrell 1972).

Dens are generally located in open areas with grass or grass and scattered brush, and seldom occur in areas with thick brush (Morrell 1972). Preferred sites are relatively flat, well-drained terrain (Roderick and Mathews 1999, Williams and others 1998). They are seldom found in areas with shallow soils resulting from high water tables (McCue and others 1981) or impenetrable bedrock or hardpan layers (Morrell 1972, O'Farrell and Gilbertson 1979, O'Farrell and others 1980). However, kit fox may occupy soils with high clay content where they can modify burrows dug by other animals, such as ground squirrels (*Spermophilus beecheyi*) (Orloff and others 1986). These foxes will den within small parcels of native habitat that is surrounded by intensively maintained agricultural lands (Knapp 1978) and adjacent to dryland farms (Orloff and others 1986, Williams and others 1998).

Reproduction

Kit fox can, but do not necessarily, breed in their first year of adulthood (Morrell 1972). Sometime between February and late March, two to six pups are born per litter (Cypher and others 2000, Egoscue 1956, Morrell 1972, Zoellick and others 1987). Reproductive success in kit fox is correlated with prey abundance (Egoscue 1975). Population growth rates generally vary positively with reproductive success, and kit fox density is often positively related to both the current and previous years' prey availability (Cypher and others 2000). Prey abundance is generally strongly related to the previous year's effective (October–May) precipitation.

Survival

Kit fox in the wild can live as long as 8 years, but such longevity is rare (Williams and others 1998). In captivity, kit fox can live up to 10 years (McGrew 1979). Annual survival rates of juvenile kit foxes in the wild generally range from 21 percent to 41 percent (Berry and others 1987, Ralls and White 1995), while that of adults is approximately 50 percent (Berry and others 1987, Egoscue 1975, Morrell 1972,

Ralls and White 1995). Coyotes (*Canis latrans*) and other predators (red fox [*Vulpes vulpes*], domestic dogs, bobcats [*Felis rufus*], and large raptors) constitute the primary cause of mortality for adult and juvenile foxes (Cypher and others 2000, Berry and others 1987, Hall 1983, O'Farrell and others 1987, Ralls and White 1995, White and others 2000), and vehicles are usually the secondary cause (Cypher and others 2000).

Dispersal

Pups emerge above ground at approximately 1 month of age, and some disperse after 4–5 months, usually July–September. In a study of 209 dispersing juveniles, Koopman and others (2000) found that 33 percent dispersed from their natal territory; significantly more males (49 percent) than females (24 percent) dispersed. The percentage of male dispersal was weakly related to mean annual litter size, whereas the percentage of female dispersal was weakly and inversely related to annual small-mammal prey abundance. Most of the dispersing juveniles (65 percent) died within 10 days of leaving their natal range. However, survival tended to be higher for dispersing males than for males that remained within their natal area. There was no difference in survival for dispersing and philopatric females. Non-dispersing offspring of both sexes may remain with their parents through the following year and help raise the next litter (White and Ralls 1993), but this behavior is not always observed (Koopman and others 2000).

Daily/Seasonal Activity

Kit fox are primarily nocturnal and is active year-round. However, they are commonly seen during the day in the late spring and early summer.

Diet and Foraging

The diet of San Joaquin kit fox varies with season and geographic area, depending on local availability of prey. In the southern portion of the range, approximately one-third of the diet consists of kangaroo rats, pocket mice, white-footed mice, and other nocturnal rodents. Kit fox also feed on ground squirrels, black-tailed hares, San Joaquin antelope squirrels, cottontails, ground-nesting birds, insects, and vegetation (grasses) (Egoscue 1963, Laughrin 1970, Morrell 1972).

Territoriality/Home Range

Home ranges vary from less than 1 square mile (2.59 square kilometers) to approximately 12 square miles (31.08 square kilometers) (Knapp 1978, Morrell 1972, Spiegel and Bradbury 1992, White and Ralls 1993, Zoellick and others 1987). The home ranges of pairs or family groups of kit foxes generally do not overlap (White and Ralls 1993).

Predator-Prey Relations

San Joaquin kit fox are preyed upon by coyotes, nonnative red foxes, domestic dogs, eagles, and large hawks (Berry and others 1987, Hall 1983, O'Farrell and others 1987, Ralls and White 1995).

Inter- and Intraspecific Interactions

Kit fox modify and use dens created by ground squirrels, badgers, and coyotes. Interspecific competition probably occurs between red fox and kit fox because both require similar den sites and prey. Red fox is also believed to prey on kit fox. The expansion of red fox into central California may therefore play a role in the continued decline of San Joaquin kit fox populations. Coyotes aggressively dominate red foxes, and pursue and hunt gray and kit foxes (U.S. Fish and Wildlife Service 1998).

Adult pairs remain together year-round. Young begin dispersing in August or September; occasionally offspring will remain with parents and help raise the subsequent litter (U.S. Fish and Wildlife Service 1998).

Population and/or Habitat Status and Trends

On National Forest System Lands

No known denning; probably transient use during foraging by some individuals.

Beyond National Forest System Lands

Current populations are believed to have declined 20–34 percent from estimated pre-1930 levels (Morrell 1975, U.S. Fish and Wildlife Service 1983, Williams and others 1998). The largest extant populations of San Joaquin kit foxes are in the Elk Hills and the Buena Vista Naval Petroleum Reserve in Kern County, and the Carrizo Plain Natural Area (CPNA) in San Luis Obispo County. In the southern San Joaquin Valley, San Joaquin kit foxes also appear to make extensive use of habitat fragments in an urbanizing environment (U.S. Fish and Wildlife Service 1998).

Threats and Conservation Considerations

In 1998, a recovery plan for upland species of the San Joaquin Valley was completed (Williams and others 1998); this plan included a revised recovery strategy for the San Joaquin kit fox. The goal of the recovery plan is to maintain a viable metapopulation of San Joaquin kit fox on private and public lands throughout the plan's geographic range. This goal includes preservation of existing core and satellite populations. Core populations are found in the Carrizo Plain Natural Area in San Luis Obispo County; the natural lands of western Kern County, including the Naval Petroleum Reserves, the Lokern Natural Area, and adjacent natural lands inhabited by San Joaquin kit fox; and the Ciervo-Panoche Natural Area of western Fresno and eastern San Benito Counties. Camp Roberts and Fort Hunter Liggett also provide important habitat for San Joaquin kit fox in the Salinas and Pajaro river watersheds. Additional lands in the San Joaquin Valley that support San Joaquin kit fox or have the potential to support it include

refuges and other lands managed by the California Department of Fish and Game, California Department of Water Resources, Center for Natural Lands Management, Lemoore Naval Air Station, Bureau of Reclamation, and U.S. Fish and Wildlife Service, as well as various private lands within the taxon's range.

Loss, fragmentation, and degradation of habitat by agricultural, urban, and industrial development continue to decrease the extent and carrying capacity of remaining habitat throughout the taxon's range. Livestock grazing is not thought to be directly detrimental to San Joaquin kit fox (Morrell 1975, Orloff and others 1986), but it may affect the number of prey species available, depending on the intensity of grazing (Williams and others 1998). In some areas, livestock grazing may benefit San Joaquin kit fox by reducing shrub cover and maintaining grassland habitat.

Continued fragmentation of habitat is a serious threat to this species. Increasing isolation of populations and social groups through habitat degradation and barriers to movement, such as aqueducts and busy highways, can limit dispersal to and colonization of existing and former habitat. Such isolation favors inbreeding depression in populations; it also renders smaller populations susceptible to extirpation from stochastic environmental events such as drought, flood, fire, and periodic declines in prey abundance.

The use of pesticides to control rodents and other pests also threatens San Joaquin kit fox in some areas, either directly through poisoning or indirectly through reduction of prey abundance. Invasion of fragmented, occupied kit fox habitat by coyotes, red foxes, and feral dogs can contribute to increased mortality of kit fox.

The following is a list of conservation practices that should be considered for the San Joaquin kit fox:

- Additional survey work is needed to determine the extent to which San Joaquin kit fox utilize areas on the Los Padres National Forest.
- Occupied areas should receive site-specific management attention.
- Follow the U.S. Fish and Wildlife Service Standardized Recommendations for Protection of the San Joaquin Kit Fox prior to or During Ground Disturbance prepared by the Sacramento Fish and Wildlife Office, June 1999 and summarized below.
 - All surveys, den destructions, and monitoring described in this document must be conducted by a qualified biologist.
 - The configuration of exclusion zones around the kit fox dens should have a radius measured outward from the entrance or cluster of entrances.
 - Disturbance to all San Joaquin kit fox dens should be avoided to the maximum extent possible.
 - Construction And Operational Requirements below:
 1. Project-related vehicles should observe a 20-mph speed limit in all project areas, except on county roads and State and Federal highways. To the extent possible, night-time construction should be minimized. Off-road traffic outside of

- designated project areas should be prohibited.
2. All excavated, steep-walled holes or trenches more than 2 feet deep should be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks.
 3. 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 should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way.
 4. All food-related trash items such as wrappers, cans, bottles, and food scraps should be disposed of in closed containers and removed at least once a week from a construction or project site.
 5. No firearms shall be allowed on the project site.
 6. To prevent harassment, mortality of kit foxes or destruction of dens by dogs or cats, no pets should be permitted on project sites.
 7. Use of rodenticides and herbicides in project areas should be restricted.
 8. A representative shall be appointed by the project proponent who will be the contact source for any employee or contractor who might inadvertently kill or injure a kit fox or who finds a dead, injured or entrapped individual.
 9. An employee education program should be conducted for any project that has expected impacts to kit fox or other endangered species.
 10. Upon completion of the project, all areas subject to temporary ground disturbances, including storage and staging areas, temporary roads, pipeline corridors, etc. should be re-contoured if necessary, and revegetated to promote restoration of the area to pre-project conditions.
 11. 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.
 12. Any contractor, employee, or military or agency personnel who inadvertently kills or injures a San Joaquin kit fox shall immediately report the incident to their representative.
 13. The Sacramento Fish and Wildlife Office and California Department of Fish and Game 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.

Evaluation of Current Situation and Threats on National Forest System Lands

The San Joaquin Valley, as well as low-elevation basins and ranges along the eastern side of the central Coast Ranges, has undergone intensive agricultural development, a primary threat to the habitat of this and other San Joaquin species. Being at higher elevations with more dense vegetation, the San Joaquin kit fox is most likely a transient visitor on National Forest System lands in southern California because little high-quality denning habitat is available (U.S. Fish and Wildlife Service 2001).

Based upon the above analysis the San Joaquin kit fox has been assigned the following threat category:

2. Potential habitat only in the Plan area.

Viability Outcome Statements

The San Joaquin kit fox only has potential habitat on National Forest System lands. It is, therefore, not possible to describe the effects of the alternatives without making a host of unsupportable assumptions. Highly speculative analysis of this sort does not provide for a meaningful comparison of alternatives. Any predictions on viability would be similarly uninformative and unreliable. Therefore, no such analysis is presented for the San Joaquin kit fox. The threat category of 2 remains the same through all alternatives.

The San Joaquin kit fox is listed under the Endangered Species Act of 1973, as amended, as endangered, which assures that any new project proposed in or near its habitat will undergo considerable analysis and be subject to consultation with the U.S. Fish and Wildlife Service at the site-specific level.

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