

# 5.3.16 San Joaquin Kit Fox (Vulpes macrotis mutica)



San Joaquin Kit Fox Photo Credit: U.S. Fish and Wildlife Service

#### Status

- Federally Endangered
- State Threatened

### **Ecological Requirements**

- RCIS Regions: San Antonio Valley, Mid-Inner Coast Range
- RCIS Natural Communities: Annual Grassland, Valley Oak Woodland, Blue Oak Woodland (CDFW 2020; USFWS 1998a)
- Use and modify dens constructed by other mammals and human-made structures (culverts, roadbeds, etc.) for breeding and shelter (USFWS 1998a)
- Prefer loose-textured sandy soils in open areas for burrowing and to support a suitable prey population (CDFW 2020; USFWS 1998a)
- Can be found in heavily modified habitats such as irrigated pastures, vineyards, and grazed grasslands, and are known to live in and adjacent to towns (USFWS 1998a)
- Nocturnal carnivore that requires a stable prey base consisting of kangaroo rats, California ground squirrels, insects, etc. (USFWS 1998a, 2010)



- Requires large areas (average home range in Monterey County is 5,782 acres) of relatively undisturbed habitats with adequate connectivity (USFWS 2010)
- Threats include vehicle-impact mortality, disease (e.g., canine distemper, parvovirus, and sarcoptic mange), and predation (USFWS 2010).
- Full species account available: USFWS *Recovery Plan for Upland Species of the Upland San Joaquin Valley, California* (USFWS 1998a)
- RCIS Conservation Target: High (wide ranging species, requires large home range)

### **Associated Non-Focal Species**

• American badger (*Taxidea taxus*)

## **Climate Change Vulnerability Assessment**

San Joaquin kit fox (SJKF) is estimated to have an Overall Climate Change Vulnerability Score of "Less Vulnerable" under low emission scenarios (RCP4.5), and of "Moderately Vulnerable" under high emission scenarios (RCP8.5) (Stewart et al. 2016), as shown in Table 5-24.. By 2070–2099, approximately 26 to 99 percent of known occurrence locations may remain suitable, and potential suitable dispersal area could increase by approximately 13 to 33 percent (Stewart et al. 2016) (Table 5-24.). Species distribution models show stability and increases in habitat suitability for San Joaquin kit fox in the southern portions of the RCIS area. However, climate change will exacerbate threats listed in Table 5-25.

Climate Change Scenario	Species Distribution Model Results- Occurrence Locations Remaining Suitable	Species Distribution Model Results- Area Remaining Suitable	Climate Change Vulnerability Score- Exposure	Climate Change Vulnerability Score- Sensitivity and Adaptive Capacity	Climate Change Vulnerability Score- Overall Vulnerability Score
Low Emission (RCP4.5) Warm and Wet	99.13%	118.04%	Moderately Vulnerable	Less Vulnerable	Less Vulnerable

## Table 5-24. San Joaquin Kit Fox Climate Vulnerability Ranking



Climate Change Scenario	Species Distribution Model Results- Occurrence Locations Remaining Suitable	Species Distribution Model Results- Area Remaining Suitable	Climate Change Vulnerability Score- Exposure	Climate Change Vulnerability Score- Sensitivity and Adaptive Capacity	Climate Change Vulnerability Score- Overall Vulnerability Score
Low Emission (RCP4.5) Hot and Dry	92.15%	132.61%	Moderately Vulnerable	Less Vulnerable	Less Vulnerable
High Emission (RCP8.5) Warm and Wet	75.73%	131.80%	Highly Vulnerable	Less Vulnerable	Moderately Vulnerable
High Emission (RCP8.5) Hot and Dry	26.01%	114.53%	Highly Vulnerable	Less Vulnerable	Moderately Vulnerable

Source: Stewart et al. 2016

The goals, objectives, and actions shown in Table 5-25. aim to protect, enhance, and restore present day suitable habitats for San Joaquin kit fox, as well as habitats that may become suitable in the future because of projected climate changes. Actions also address population stability, such as supporting sustainable prey populations and decreasing sources of road mortality, which may allow individuals to move to newly suitable habitats in the future.

A summary of natural communities where this species occurs is presented in Chapter 4. Figure 5-12 shows the range and modeled habitat for the San Joaquin kit fox.



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Figure 5-12. San Joaquin Kit Fox Range and Modeled Habitat

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### San Joaquin Kit Fox Conservation Priorities, Goals, Objectives, and Actions

All RC goals, objectives, and action apply to San Joaquin kit fox. Table 5-25. summarizes specific goals, objectives, and actions for the species.

### **Conservation Priorities**

- Protect habitat from Camp Roberts and Fort Hunter Liggett (Salinas–Pajaro Region) to U.S. Fish and Wildlife Service-designated core populations in the Carrizo Plain Natural Area and San Joaquin Valley (SJKF 1.1.2).
- Enhance habitat in the Salinas–Pajaro region to provide linkages from Camp Roberts and Fort Hunter Liggett to the Carrizo Plain and San Joaquin Valley (SJKF Objective 1.2).

### Table 5-25. San Joaquin Kit Fox Goals, Objectives, and Actions

Goal	Objective	Threats	Co-Benefits	Action
SJKF Goal 1. Promote persistence of San Joaquin kit fox population in the RCIS area through protection, restoration, and enhancement of habitat and habitat corridors. SJKF Goal 2: Support stability and recovery of San Joaquin kit fox populations in the	SJKF Objective 1.1: Protect known occurrences and allow expansion by protecting 107,000 acres of suitable habitat. Measure progress toward achieving this objective in the acres of habitat and adjacent/equivalent acres protected.	<ul> <li>Habitat loss, degradation, fragmentation</li> <li>Climate change</li> </ul>	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> <li>Recreation</li> <li>Connectivity</li> <li>Climate change resilience</li> </ul>	SJKF 1.1.1 Acquire parcels with known breeding occurrences and suitable habitat for San Joaquin kit fox and adjacent dispersal habitat through fee title purchase or conservation easement. Focus acquisitions on large blocks of land that are at least 10,000 acres in size (USFWS 2010).



Goal	Objective	Threats	Co-Benefits	Action
RCIS area through measures to reduce direct mortality.				
SJKF Goal 1.	SJKF Objective 1.1:	• Habitat loss, degradation, fragmentation	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> <li>Recreation</li> <li>Connectivity</li> </ul>	SJKF 1.1.2: Acquire parcels to protect broad dispersal corridors (landscape linkages) through large landscape blocks supporting known breeding occurrences of San Joaquin kit fox and adjacent dispersal habitat through fee title purchase or conservation easement (USFWS 1998a, 2010). Focus acquisitions on areas near Camp Roberts and Fort Hunter Liggett (Salinas-Pajaro Region) connecting to U.S. Fish and Wildlife Service-designated core populations in the Carrizo Plain Natural Area and San Joaquin



Goal	Objective	Threats	<b>Co-Benefits</b>	Action
				Valley, to enhance habitat connectivity (USFWS 1998a).
SJKF Goal 1.	SJKF Objective 1.2: Enhance occupied and suitable San Joaquin kit fox habitat in the RCIS area. Measure progress toward achieving this objective in acres of habitat and adjacent/equivalent acres enhanced and occupied by San Joaquin kit fox. Habitat enhancements should focus on the Salinas–Pajaro Region, centered on Camp Roberts and Fort Hunter Liggett, and corridors from this region to the Carrizo Plain and San Joaquin Valley (USFWS 1998a, 2010).	• Decreased prey population	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> <li>Working lands</li> </ul>	SJKF 1.2.1: Support stable mammalian and insect prey populations by reducing small mammal eradication efforts (e.g., reducing rodenticide use) and modifying grazing practices (USFWS 2010).



Goal	Objective	Threats	Co-Benefits	Action
SJKF Goal 1.	SJKF Objective 1.2:	• Habitat loss, degradation, fragmentation	• Connectivity	SJKF 1.2.2: Conduct movement studies of San Joaquin kit fox to identify areas to improve population connectivity (USFWS 2010).
SJKF Goal 1.	SJKF Objective 1.2:	<ul> <li>Climate change</li> <li>Transportation infrastructure construction</li> <li>Renewable energy projects</li> <li>Decreased habitat connectivity</li> </ul>	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> <li>Connectivity</li> <li>Climate change resilience</li> </ul>	SJKF 1.2.3: Design new infrastructure projects, such as renewable energy facilities, to ensure maintenance of enough prey base, den sites, and habitat connectivity (USFWS 1998a).
SJKF Goal 1.	SJKF Objective 1.2:	<ul> <li>Habitat loss, degradation, fragmentation</li> <li>Decreased habitat connectivity</li> </ul>	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> <li>Working lands</li> </ul>	SJKF 1.2.4: Manage suitable vegetation structure (e.g., mowing, revegetation with low- growing and less dense native plants, controlled grazing) to encourage San Joaquin kit fox occupancy.



Goal	Objective	Threats	<b>Co-Benefits</b>	Action
SJKF Goal 1.	SJKF Objective 2.1: Reduce predation- related mortality. Measure progress toward achieving this objective by the reduction of predation-related San Joaquin kit fox deaths detected, compared to present day.	<ul> <li>Predation/competition from other canids (primarily coyotes)</li> </ul>	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> </ul>	SJKF 2.1.1: When designing creation, restoration, or enhancement projects, consider creating different levels of vegetation cover, to prevent competition (and possible predation) from coyotes and red fox (USFWS 2010). Because dense shrub cover leads to increased vulnerability of San Joaquin kit fox to coyote detection and because the two species consume similar prey but in different proportions, reduce resource competition by supporting sustainable prey populations, which will reduce predation on the San Joaquin kit fox. (USFWS 2010).



Goal	Objective	Threats	Co-Benefits	Action
SJKF Goal 1.	SJKF Objective 2.2: Minimize vehicle- related mortality. Measure progress toward achieving this objective by the reduction of vehicle- related San Joaquin kit fox deaths detected.	Transportation infrastructure construction; vehicle- impact mortality	<ul> <li>Other focal/ non-focal species</li> <li>Biodiversity</li> <li>Connectivity</li> </ul>	SJKF 2.2.1: Develop and install wildlife crossing infrastructure improvements in transportation corridors with high number of vehicle-related San Joaquin kit fox interactions.
SJKF Goal 1.	SJKF Objective 2.3: Minimize pathogen- related mortality. Measure progress toward achieving this objective by the reduction of pathogen-related San Joaquin kit fox deaths detected.	• Disease (e.g., canine distemper, parvovirus)	None	SJKF 2.3.1: Fund disease monitoring, surveillance, and testing of San Joaquin kit fox carcasses that are detected whose cause of death is attributed to pathogens such as canine distemper, parvovirus, and sarcoptic mange.

Sources: CDFW 2015, 2020; USFWS 1998a, 2010