

**PANOCH VALLEY SOLAR PROJECT**

**SAN JOAQUIN KIT FOX**  
**PROJECT SPECIFIC TRAVEL CORRIDORS,**  
**HABITAT CONNECTIVITY,**  
**AND CONSERVATION MEASURE REVIEW**  
**NOVEMBER 14, 2013**

**1.0 Introduction**

The following information provides options for San Joaquin kit fox (*Vulpes macrotis mutica*) (SJKF) travel corridors and adjacent habitat connectivity through the Panoche Valley Solar Farm project (PVS), as well as additional enhancements and species specific conservation measures proposed by the project. This information is based on existing project team correspondence and analysis, review of potential resource avoidance areas for the project, review of the scientific literature, and discussion with SJKF experts Dr. Brian Cypher and Scott Phillips (California State University). SJKF travel corridors are a significant permitting issue for projects in California including several solar energy projects such as the proposed PVS.

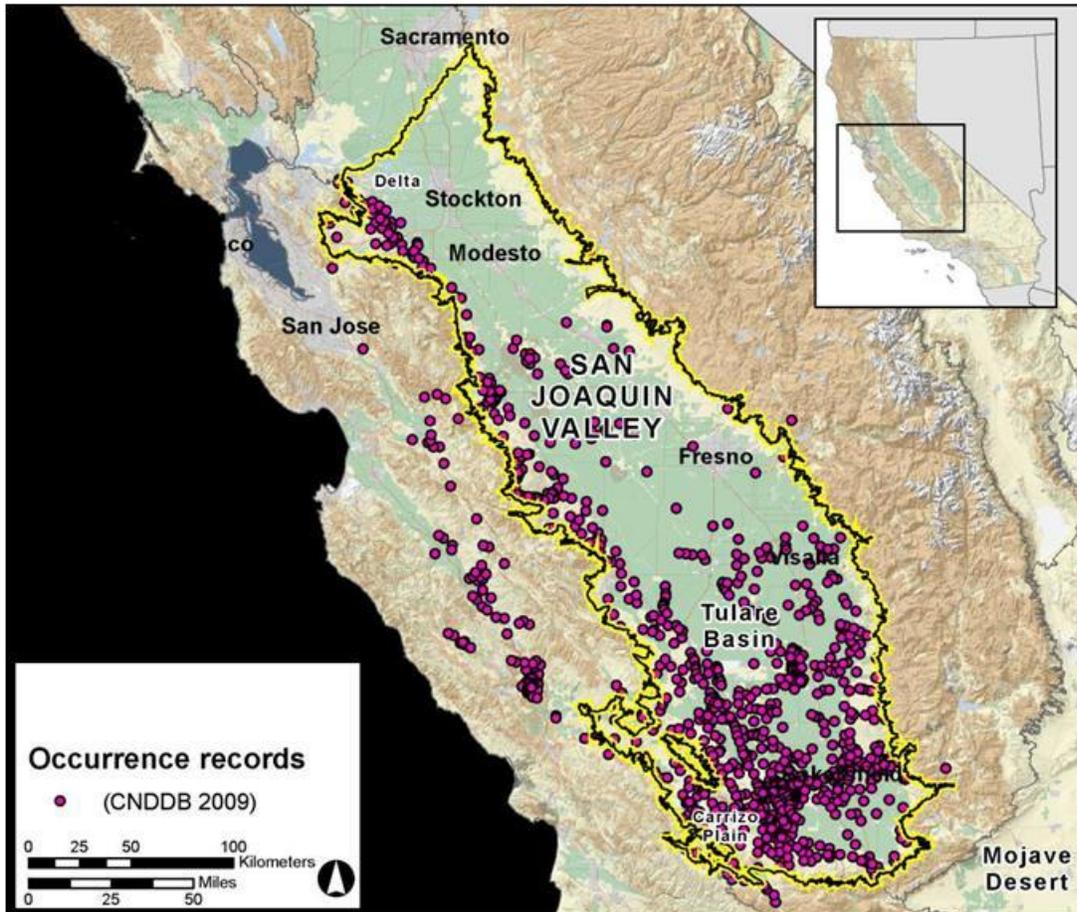
**2.0 Background**

***Distribution and Range***

The federally endangered and state threatened SJKF historically inhabited the majority of the San Joaquin Valley from southern Kern County north to San Joaquin County and east to Stanislaus County (USFWS 1998). Currently the SJKF inhabits some areas of suitable habitat on the San Joaquin Valley floor and in the surrounding foothills (i.e., gradual slopes) of the coastal ranges, Sierra Nevada, and Techachapi Mountains from southern Kern County north to Contra Costa, Alameda, San Joaquin County on the west and Stanislaus County on the east side of the valley (USFWS 1998) (Figure 1). The species can also be found in larger scattered natural areas in Kern, Tulare, Kings, Fresno, Madera, and Merced counties. SJKF also occur westward into the interior coastal ranges in Monterey, San Benito and Santa Clara counties, and in San Luis Obispo, Ventura, Santa Barbara counties (USFWS 1998).

***Habitat***

The primarily crepuscular and nocturnal SJKF is an arid land-adapted species and typically occurs in desert-like habitats in California (Cypher et. al., 2006). Such areas have been characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structure (USFWS 1998). The SJKF currently inhabits alkali scrub-shrub, Valley sink scrub and arid native and annual grasslands throughout the level terrain of the San Joaquin Valley floor (USFWS 2010). The SJKF are also found in habitats modified by humans including grasslands and scrublands with active gas/oil fields, wind energy farms, and agricultural matrices of row crops, orchards, and grazed annual grasses (USFWS 1998). Areas of rugged terrain (i.e., lands with greater than 10% slope) tend to be of lower suitability for SJKF (Cypher et al., 2009).



**Figure 1. Current Range of the SJKF (Cypher et. al., 2009)**

Within this range, the SJKF has been associated with areas having open, level, sandy ground that is relatively stone-free to depths of about 0.9 to 1.4 meters (3.0 to 4.5 feet). The SJKF utilizes subsurface dens (typically existing burrows), which may extend to 1.8 meters (6 feet) or more below ground surface, for shelter and for reproduction (Laughrin 1970). SJKF are absent or scarce in areas where soils are shallow due to high water tables, impenetrable hardpans, or proximity to parent material, such as bedrock (USFWS 1983). The SJKF also does not den in saturated soils or in areas subjected to periodic flooding (USFWS 2010). No Critical Habitat has been designated for the SJKF by the USFWS.

The Ciervo-Panoche Natural Area of western Fresno and eastern San Benito counties is listed as one of the three distinct core SJKF population areas (USFWS 1999). This population is 160 km (100 miles) northeast of the other two core populations (i.e., Carrizo Plain Natural Area and the natural areas of western Kern County). The natural lands, within the Ciervo-Panoche, are listed in the SJKF Recovery Plan (USFWS 1999) as an important habitat protection and recovery area.

Recent studies have supported early observations that SJKF appear to be strongly linked ecologically to kangaroo rats (both for prey and burrows). In natural areas, kit fox density and population stability are highest in areas with abundant kangaroo rats (Cypher 2006; USFWS 2010). Kit fox are also known to consume other small mammal species, including rabbits and hares: *Lepus* and *Sylvilagus* spp.), ground squirrels (*Ammospermophilus* and *Spermophilus* spp.), and insects (Cypher and Brown 2006; USFWS 2010).

The known SJKF habitat, within the PVS project area, consists of native/non-native grassland and associated wash habitat along Panoche and Las Aquilas Creeks. SJKF are known to occur and have been documented on the entire project site, as well as the Valadeao Ranch (VRCL) and Silver Creek Ranch Conservation Lands (SCRCL). Potential SJKF dens were found throughout the Project footprint, SCRCL, and VRCL during recent sampling efforts (2006-2013). These efforts found 37.69 potential dens per km<sup>2</sup> on the Project Area and 45.27 potential dens per km<sup>2</sup> on the VRCL. Reconnaissance level surveys on the SCRCL also identified numerous potential SJKF sign, including tracks, scat, and potential dens, as well as observing five individual SJKF while on site. In addition, results of the 2010 scat-sniffing dog surveys indicated that numerous SJKF inhabited both the Project footprint and the VRCL. Based on this survey, a total of 9 SJKF were documented within the project footprint and another 13 documented on the VFCL and VRCL.

### **3.0 Discussion**

Upon review of the literature, there is little information available concerning site-specific SJKF travel corridors, any associated attributes, and design features. Most of the energy projects within the San Joaquin Valley have specific management (e.g., BMPs), mitigation, and monitoring plans associated with this species but little in the way of the installation of project-related travel corridors and project scale habitat connectivity. In light of this lack of site-specific travel corridor information, SJKF experts Drs. Cypher and Phillips (California State University) were contacted by PVS on June 14, 2013. The following discussion reflects this information and should provide adequate SJKF throughways across the PVS project footprint and into adjacent habitats. Species specific conservation measures are also discussed.

#### ***Existing SJKF Travel Corridors***

Within the San Joaquin Valley, the Ciervo-Panoche Natural Area (Fresno and San Benito counties) is designated as one of the three core recovery area for the SJKF (USFWS 2010). The other two core areas are the Carrizo Plain and Western Kern County core areas to the south of the Ciervo-Panoche. The Ciervo-Panoche core area, and particularly the Little Panoche Valley, provides important genetic connectivity and travel dispersal corridors to the broader population included the Santa Nella satellite population to the north and the Pleasant Valley and Kettleman Hills satellite populations to the south.

In a review of the existing site data concerning SJKF observations, it appears that this species uses existing features as travel and dispersal corridors (e.g., valley, stream corridors, and drainages) as well as den sites on the project footprint and Conservation Lands. These unimpeded north-south and west-east

corridors will be protected with no disturbance, during project construction and operations and maintenance. Existing SJKF travel corridors within the project boundary include:

- Las Aquilas Creek corridor (including northern tributaries) and associated Valley Floor Conservation Lands (VFCL) - bisecting the proposed project footprint in a northwest to southeast direction. This corridor provides connectivity and dispersal to the habitats to the north of the project including the Little Panoche Valley and the VRCL. The creek also provides a travel corridor to the lower Panoche Creek drainage, southern portion of the VFCL (1,683 acres) and eventually through to the large block and high quality, SCRCL and adjacent Tumey Hills BLM landholdings. The Ciervo-Panoche Natural Area has been identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the SJKF 5-Year Recovery Plan (USFWS 2010) as an important area for the conservation and recovery of the SJKF.



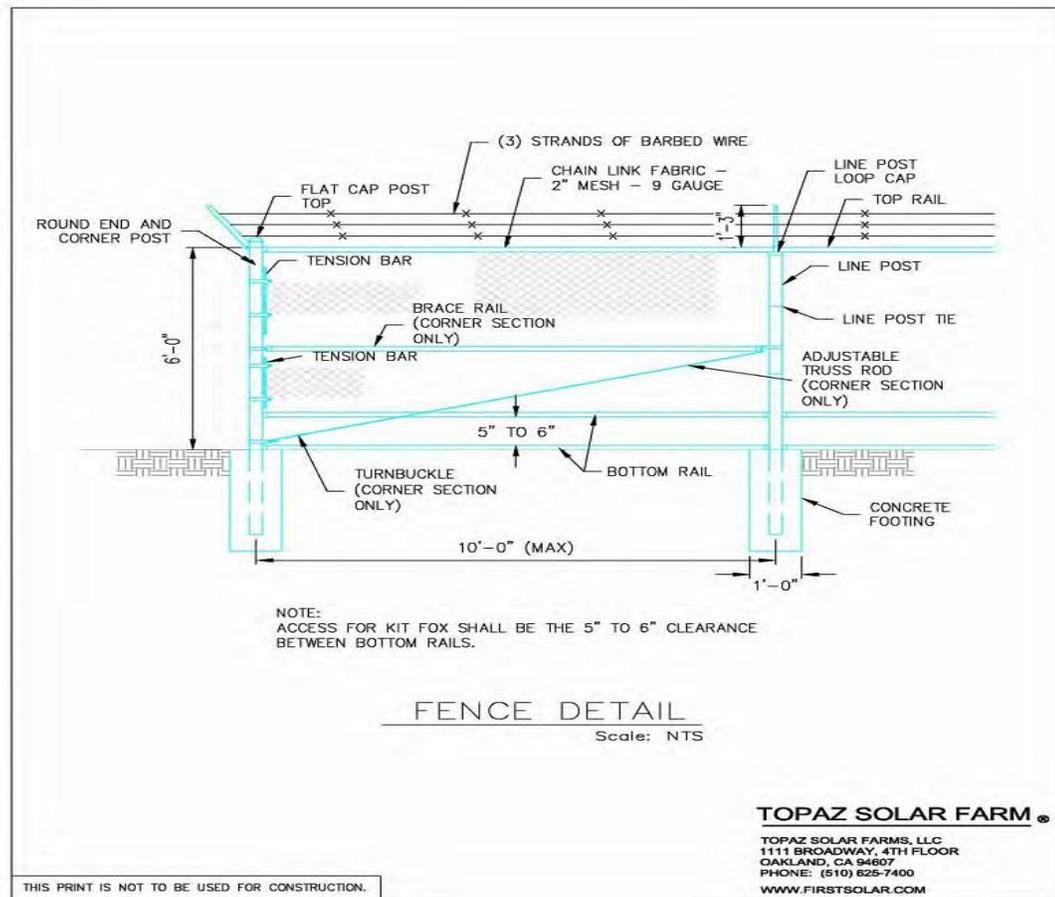
**Figure 2. Panoche Creek and VFCL travel corridor**

- Panoche Creek Corridor and associated VFCL - bisecting the southern portion of the VFCL in a west to southeast direction (Figure 2). This corridor provides connectivity to the large block and high quality habitats (e.g., grassland flats) to the west of the project including the Gabilan Range and eventually through to the SCRCL and the BLM lands beyond. The southern portion of the VFCL also provides unimpeded west to east travel ways from the Panoche Creek wash (and adjacent flats) to the Valadeao Ranch Conservation Lands and adjacent Tumey Hills/Panoche Hills BLM landholdings including the Las Aquilas Creek drainage.
- Moss-Panoche 230kV Transmission Line Corridor - bisecting the southwestern portion of the project footprint and associated VFCL in a northwest to southeast direction. This 22.48 meter (75 feet) corridor provides connectivity to the habitats (e.g., grassland flats, Panoche Creek wash) to the west of the project including the Gabilan Range and eventually through to the SCRCL and adjacent BLM landholdings.

### ***Additional SJKF Travel Corridor Enhancements***

There are several other travel corridor enhancements available through specific project designs. These design features are as follows:

- Based on the Cypher and Phillips SJKF connectivity discussion, it was determined that a 500 meter (1,640.4 feet) wide and approximately 2,484 meter (8,000 linear feet) long corridor associated with the existing Las Aquilas Creek /VFCL corridor would be beneficial in providing additional undisturbed connectivity and would promote movement through the site and north to the Panoche Hills and BLM landholdings. The undisturbed VFCL along Las Aquilas Creek would be widened to accommodate this SJKF enhancement. This corridor also includes two of the four proposed GKR avoidance areas.
- SJKF permeable perimeter fencing - facility perimeter fencing designed for SJKF movement through the site. A 12.7 to 15.2 cm (5 to 6 inch) gap along the bottom of the fence would allow SJKF to travel through the site and link up with the existing travel corridors including the creek washes and VFCL, as well link up prey base areas such as the giant kangaroo rat (GKR) precinct/colony avoidance areas (Cypher et al., 2009). This fencing design was approved by the CDFW and USFWS for the Topaz Solar project and the adjacent California Sun Valley Ranch project (Figure 3). In an early Solagen report (FEIR), it was stated that the bottom of the perimeter fence would be elevated 61.0 cm (24 inch) above the ground. A 61.0 cm gap is too large and will allow unimpeded entry of predatory coyotes and red fox. Fences surrounding the proposed substation and O&M building would not need to be raised.



**Figure 3. Example SJKF permeable perimeter fence design (Topaz Solar Farm).**

- Further enhancement along these roads (including at the fence perimeter and road interfaces) can be accrued through the periodic placement of artificial SJKF escape and subterranean dens (Althouse and Meade 2011; Harrison et al. 2011) (Figure 4). These artificial dens could also be installed within the Valley Floor, Valadeao Ranch, and Silver Creek Ranch Conservation Lands as added enhancement. SJKF readily use artificial dens, and the installation of such dens can increase survival, movement, and colonization potential in satellite and linkage areas (Harrison et al. 2011).

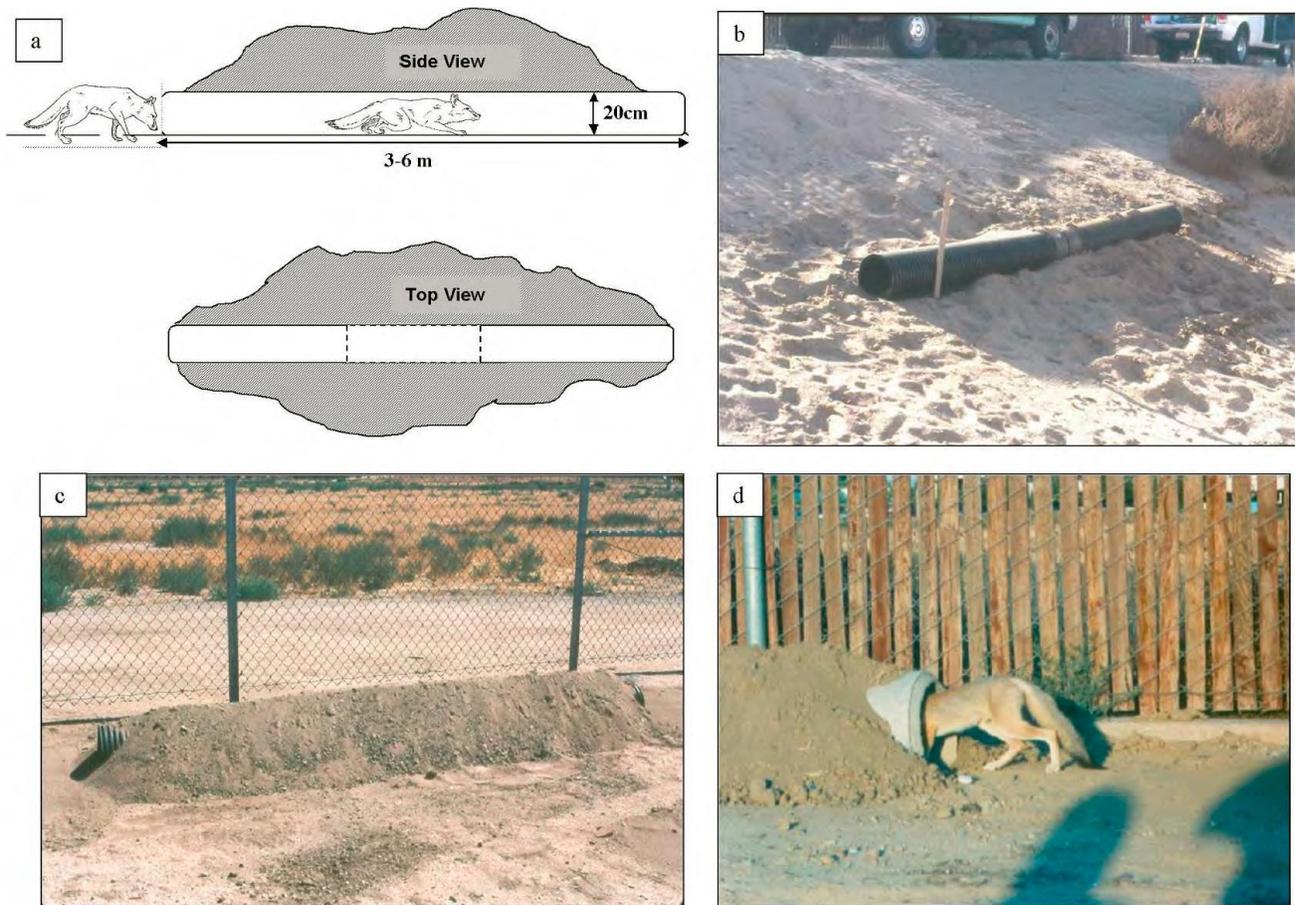


Figure 4. Artificial SJKF escape dens (Althouse and Meade 2011).

**San Joaquin Kit Fox Specific Conservation Measures**

The following conservation measures were provided in the FEIR (County of San Benito 2010) for the project, are based on the *USFWS Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 2011), and include recommendations from recent agency conversations.

- Prior to surface disturbance or other covered activity, a Designated Biologist(s) shall conduct a SJKF education program for all project personnel.
- All activities that will result in permanent or temporary ground disturbances shall be preceded by a preconstruction survey conducted by a Designated Biologist(s). The biologist(s) shall identify and clearly mark the location of areas where SJKF individuals, dens (four inches or larger), or burrows was/were identified. Appropriate buffers will be established with highly visible markers. All known or occupied SJKF dens shall be identified by flagging and avoided by a buffer with a radius of 30.5 meters (100 feet) (Table 1).

**Table 1. SJKF Buffer Zones**

| <b>SJKF Resource Area</b> | <b>Radius of Buffer Zone (Feet)</b>                |
|---------------------------|--|
| Occupied Den              | 30.5 meters (100)                                  |
| Known Den                 | 30.5 meters (100)                                  |
| Known Natal Den           | 45.7 meters (150)                                  |
| Occupied Natal Den        | 61.0 meters (200) Note:<br>USFWS must be contacted |
| Potential Den             | 15.2 meters (50)                                   |

- All known SJKF natal dens shall be identified by flagging and buffered by a radius of 45.7 meters (150 Feet) (Table 1).
- All occupied SJKF natal dens shall be identified by flagging and buffered by a radius of 61.0 meters (200 Feet) (Table 1).
- Work around known and occupied dens, if possible. Dens do not need to be blocked or excavated in most cases. Monitoring of dens near work areas and clearly marked dens with a reduced avoidance radius is likely sufficient protection as opposed to den blocking.
- If avoidance of potential or known dens is not possible, the Applicant shall take the following sequential steps when working in such areas:
  1. Allow for three consecutive days of monitoring to determine the occupancy status of each den. Activity at the den shall be monitored by using tracking medium at the entrance to the den or stationary infrared beam cameras, and by spotlighting. If no activity is observed actions described below under Step 3 may be implemented. If SJKF activity is observed the den shall be monitored for an additional five days from the date of observance. Use of the den during this time can be discouraged by partially plugging its entrance(s) with soil in such a manner that any resident animal can escape easily. If SJKF are still present after five days, den excavation, discussed below under Step 3 may proceed when, in the judgment of the qualified/approved biologist, it is determined temporarily vacant.
  2. Once the kit fox has vacated the den, methods (e.g., one way doors) shall be taken to prevent reentry to the burrow by kit fox (and other mammal species) until construction is complete in these areas. Once construction activities are complete access to the burrows shall be restored.
  3. Once it has been confirmed that the dens have been vacated, if construction related impacts would result in the crushing or destruction of a den, then the den shall be excavated. Excavation shall be done only by hand and under the direct supervision of the biologist, removing no more than four inches at a time. If at any time during excavation a SJKF is discovered inside the den, all activity will cease immediately and monitoring described above under Step 1 shall be resumed. As indicated above, natal dens shall not be disturbed at any time.

- Potential SJKF dens that cannot be avoided may be excavated and back-filled pursuant to USFWS guidelines (2011) without prior notification, provided that excavation is approved and supervised by a biological monitor or other qualified biologist.
- All open holes, steep-walled holes, or trenches more than two feet deep shall 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 (wooden planks should be no less than 10 inches in width and should reach to bottom of trench, and placed at an appropriate angle to allow SJKF to exit).
- Construction materials will not be stacked in a manner that allows SJKF to establish den sites within the material.
- In an effort to reduce the likelihood of SJKF mortality due to construction related vehicles, a day-time speed limit of 15 mph and a night-time speed limit of 10 mph will be adhered to on the Project site and will not exceed 25 mph on public roads in the vicinity of the Project site. If a den is located near a project road, speed will be reduced to 10 mph and the den will not be blocked or excavated.
- Unless biological monitors allow alterations to routes, all Project vehicles shall be confined to defined access routes that will be staked and/or flagged. All Project-related flagging shall be collected and removed after completion of the Project.
- Use of rodenticides and herbicides in areas affected by the Project will be restricted to use within the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.
- Pets and firearms will be prohibited at the site.
- Collaring of individual SJKF, for location monitoring, can be used as an impact avoidance measures.
- As required by the FEIR, lands permanently affected by the proposed Project will be mitigated at a 4:1 acreage ratio by conservation lands. This 4:1 ratio will be broken down into high and moderate suitability habitat. A 2:1 acreage ratio will consist of high suitability habitat, and another 2:1 acreage ratio will consist of moderate suitability habitat.

Based on the above mitigation ratios, this would require the proposed project to conserve more than 4,512 acres of high suitability (<5% slope) SJKF, and 5,626 acres of moderate suitability (<15% slope) SJKF habitat. VFCL will conserve more than 2,523 acres of high suitability SJKF habitat. Combined, off-site conservation lands on Valadeao Ranch and Silver Creek Ranch will incorporate approximately 4,057 acres of high suitability SJKF habitat, and 7,898 acres of moderate suitability SJKF habitat. When combined, on-site and off-site conservation lands would total approximately 6,580 acres of high suitability SJKF habitat and 7,898 acres of moderate suitability SJKF habitat.

#### **4.0 Literature Cited**

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