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FINAL REPORT

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PREPARED FOR BUREAU OF LAND MANAGEMENT,
U.S. DEPARTMENT OF THE INTERIOR

THROUGH INTERAGENCY AGREEMENT CA-910-IA0-7 WITH THE
DEPARTMENT OF ENERGY, NEVADA OPERATIONS OFFICE
UNDER CONTRACT NO. DE-AC08-76NV01183

SANTA BARBARA OPERATIONS
EG&G INC., 130 ROBIN HILL RD., GOLETA, CALIF. 93017

NOTICE

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FINAL REPORT

by

Thomas P. O'Farrell, Ph.D. and Patrick McCue

FEBRUARY 1981

This report is unclassified: Henry M. Borrello
Classification Officer

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U.S. DEPARTMENT OF THE INTERIOR
FEDERAL OFFICE BUILDING
2800 COTTAGE WAY
SACRAMENTO, CALIFORNIA 95825

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SUMMARY

The major objectives of this project were to determine the distribution of, and habitat utilization by, the San Joaquin kit fox on BLM lands in the western foothills of the San Joaquin Valley, California, and to evaluate the potential of these lands as critical habitat for the species.

A total of 71,115 acres of public land was surveyed using aerial and ground techniques. Use of both techniques proved to be far superior and more cost-effective than surveying exclusively by ground methods. Aerial surveys were conducted in the Panoche Hills, Tumey Hills, and Elkhorn Plain. Ground surveys were conducted to: 1) verify aerial observations of kit fox dens, 2) provide a comparison between results of aerial and ground surveys, 3) gather primary data on all BLM parcels that were too small (<640 acres) for aerial surveys, and 4) to supplement aerial survey data. Eight line transects per mile were used during ground surveys to gather information on 1) kit fox dens, scats, tracks, and remains of their prey; 2) vegetation associations; 3) topography; 4) evidence of human activities; 5) presence of other wildlife species; and 6) any additional scientific data related to endangered species. Night spotlight surveys were conducted in the Panoche Hills, Tumey Hills, and Elkhorn Plain to document presence of kit fox, their potential prey, and other vertebrates.

Surveyed BLM parcels were arranged into four land units: Panoche Hills, Tumey Hills, Coalinga, and Elkhorn Plain. Data from each unit were evaluated using a numerical rating system that considered presence of San Joaquin kit fox, evidence of breeding, abundance of prey (lagomorphs), space, suitability of topography, and impacts of grazing and oil development. Final scores of the rating system were used to judge the potential of land units as critical habitat for the kit fox.

The Elkhorn Plain Land Unit showed the highest potential. The North Dome of Kettleman Hills and East Coalinga Extension Oil Field, both of which were subunits of the Coalinga Land Unit, and the central plateau of the Tumey Hills Land Unit showed moderate potential. The Kreyenhagen Hills-Jacalito Canyon subunit of the Coalinga Land Unit had low potential. The Panoche Hills Land Unit and the remainder of the Tumey Hills Land Unit demonstrated little potential.

A total of 116 kit fox dens were observed. The estimated relative density (number/1000 acres) of kit fox dens for all land units combined was 1.8; the highest density of natal (1.7) and non-natal (5.9) dens was observed on Elkhorn Plain.

Relative densities of black-tailed jackrabbits (28.6/1000 acres) and Audubon's cottontails (4.8/1000 acres) were highest on the Coalinga Land Unit. Average densities for all land units combined were 15.2 and 2.5 for *Lepus* and *Sylvilagus*, respectively.

Panoche Hills and Tumey Hills were large enough to support breeding populations of kit fox, but were too rugged to provide sufficient suitable habitat. Elkhorn Plain and Coalinga were generally satisfactory as regards topography, but the largest contiguous parcel in Elkhorn Plain was 2605 acres, and all of the Coalinga Land Unit consisted of small (<300 acre), scattered parcels of public land.

Grazing pressure was heaviest in the Elkhorn Plain and Tumey Hills. Oil development was observed in Coalinga.

Kit fox natal dens had 51% more entrances than non-natal multiple-hole dens. Dens were found at elevations between 220 and 899 meters, even though areas up to 1315 m were surveyed. About 73% of the dens were found at or below mid-slope, and 89% were found on slopes of less than 40°. Natal dens were found on slopes averaging 6.2°. An above-average number of dens were oriented towards the northeastern quadrant and below-average numbers faced the northwestern quadrant. No evidence was gathered showing that kit fox den sites were selected because of the presence of particular plant species or associations.

In addition to providing potential critical habitat for the San Joaquin kit fox, the Elkhorn Plain also supports comparatively dense populations of 1) blunt-nosed leopard lizards, *Crotaphytus silus*, a federally-listed endangered species; 2) giant kangaroo rats, *Dipodomys ingens*, a state-listed endangered species and a potential candidate for federal protection; and 3) the San Joaquin antelope ground squirrel, *Ammospermophilus nelsoni*, considered to be rare by the State of California.

ACKNOWLEDGEMENTS

We wish to acknowledge the contributions of Linda Tolladay, Joel Freeberg, Curt Uptain, Juanita Lorenzana, Betsy Collins, Thomas Kato, and Mary Sauls, who helped gather the field data for this project.

Scott Florence of the BLM, Folsom District, was very helpful by providing liaison with the Bureau, constructive suggestions and information, maps, keys, and logistics contacts, as well as a genuine interest in the success of the study.

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1. INTRODUCTION

1.1 BACKGROUND

On 28 December 1973, the Endangered Species Act (ESA) (Public Law 93-205) became law and superseded similar acts passed in 1966 and 1969. In Section 2(c) and Section 7(a) it was declared that all Federal departments and agencies shall seek to conserve endangered species and threatened species listed pursuant to Section 4 of the ESA. Section 7(a) further states that each Federal agency shall insure that any action authorized funded or carried out by such agency does not jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary of Interior to be critical.

According to Section 2(5)(A) of the ESA,

> "the term 'critical habitat' for a threatened or endangered species means: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of this Act, on which are found those physical or biological features, (i) essential to the conservation of the species, and (ii) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species."

It should be emphasized that application of the term 'critical habitat' need not be restricted to the habitat necessary for a minimum viable population (Federal Register Vol. 40, No. 78, 22 April 1975).

The San Joaquin kit fox, *Vulpes macrotis mutica*, was once a widely distributed predator in the semi-arid Central Valley of California. Now considered to be endangered, it has been on the Secretary of Interior's List of Endangered and Threatened Species since 1966 (Federal Register, 41:43339-43358 and 41:47180-47198). The subspecies is also considered to be rare by the California Department of Fish and Game, and it is now in the IUCN Red Book (1968) of rare and endangered species of the world.

Because kit fox are relatively unwary animals (Hall, 1946; Egoscue, 1956, 1962, 1975; Laughrin, 1970; Morrell, 1972), they appear to be sensitive to human activities. Highway fatalities are a significant source of mortality (Egoscue, 1962; Morrell, 1972). Kit fox are also vulnerable to night hunting for predators (Laughrin, 1970; Morrell, 1972). Poisoned grains used to control rodent populations in California pose a serious threat because kit fox may become secondary, non-target, victims if they consume poisoned rodents or bait (Swick, 1973; Schitosky, 1975; Hegdal, et al, 1979). Indiscriminate disturbance of kit fox

habitats and prey by off-road vehicle enthusiasts may also have a serious, negative impact on the species (Laughrin, 1970).

However, the most serious threat to survival of the kit fox appears to be significant loss of suitable habitat due to increased agricultural development (Laughrin, 1970; Morrell, 1972, 1975). Increased petroleum development in the San Joaquin Valley has also resulted in native habitat alteration due to construction of drilling pads, roads, and pipeline corridors. Heavy grazing by cattle and sheep may also threaten survival of the kit fox by reducing forage and shrub cover for fox prey. Since the Bureau of Land Management (BLM) is responsible for controlling permits for energy development and grazing on most lands in the Central Valley, it must ensure that the kit fox and its critical habitat are not negatively impacted by these activities.

Information on present kit fox distribution and critical habitat on public lands is required before potential impacts of energy development and grazing can be adequately assessed. On 23 May 1977, President Carter directed the Secretary of Interior to accelerate identification of critical habitats of endangered species. Support for implementation of this directive as it applies to the San Joaquin kit fox was made available through funds allocated to the BLM.

1.2 OBJECTIVES

The major objective of this project was to determine the distribution and habitat utilization of the San Joaquin kit fox on BLM lands in the western foothills of the San Joaquin Valley of California, and to evaluate the potential of these lands as critical habitat for the San Joaquin kit fox. Specific goals included: 1) determination of the distribution and relative density of kit fox on approximately 40,000 acres (or more) of public land in western Fresno, Kings, and Kern counties, and eastern San Benito and San Luis Obispo counties; and 2) correlation of the presence of kit fox with environmental parameters such as elevation, topography, soils, major vegetation associations, and relative abundance of potential prey.

2. METHODS

2.1 AERIAL SURVEYS

Aerial surveys were conducted in the Panoche and Tumey Hills on all BLM land parcels larger than 320 acres, and on the largest parcel in the Elkhorn Plain. Cessna 172 and 182 aircraft were used because: 1) their high-wing configuration permits an unobstructed view of the ground; 2) they carry three passengers, which increased the effectiveness of search patterns; 3) their speed permitted rapid coverage of long transects; and 4) their maneuverability allowed safe searches along steep ridges and canyons. Aerial transect lines were generally flown either in a north-south direction or parallel to major landmarks such as powerlines, aqueducts, pipelines, ridges and washes. Surveys were flown at an altitude of 200-400 ft above ground level and an airspeed of 70-90 mph. Observations were made out of both sides of the aircraft during transects.

When a potential kit fox den site was noted, the aircraft circled to allow further observation with binoculars to insure that the den probably was a kit fox den and warranted a ground search. Many badger (*Taxidea taxis*) digs located throughout the study areas were thus eliminated from ground surveys. Photographs were taken of the larger den sites, and all potential kit fox dens were plotted on 7.5 minute topographical maps.

2.2 GROUND SURVEYS

Ground surveys were conducted to 1) verify aerial observations of kit fox dens, 2) gather primary data on all BLM parcels near Coalinga and in the Elkhorn Plain, 3) supplement aerial survey data in the Panoche Hills and Tumey Hills, and 4) provide a comparison of ground and aerial techniques.

Methods employed for the ground surveys were identical with those used during 1979 (O'Farrell, et al, 1980). Straight line transects were conducted in a density of eight per mile. The number and length of transects were adjusted proportionately to the parcel size. In some sections, rugged topography forced observers to survey only ridgelines and washes. Trained personnel slowly walked (<1 mph) the transects using hand held compasses to maintain a straight line. All data were recorded in field notebooks, and later transcribed into permanent ledger books. Data included: date, time, temperature, and weather during transects; presence of kit fox signs (i.e., den sites, scats, tracks, and prey remains); topography; evidence of human activity (impact); and tallies (species and number) of all wildlife observed. Records were also kept of the dominant plant species present on all sections of BLM land surveyed on the ground, as well as changes in annual and perennial plant associations along transect lines. Special efforts were made to observe and tally lagomorphs, specifically black-tailed jackrabbits, *Lepus californicus*, and desert cottontails, *Sylvilagus audubonii*, because they are important prey for kit fox. Observations of the endangered blunt-nosed leopard lizard, *Crotaphytus (Gambelia) silus*, were also recorded and plotted on 7.5 minute topographical maps.

Each den site encountered during the transect was examined for the following characteristics: 1) activity (active versus inactive); type (natal, multiple-hole, single-hole); 3) number and dimensions of entrances; 4) position on slope; 5) aspect; 6) slope angle of the den site; 7) elevation; and 8) presence or absence of fox tracks, scats, prey remains, matted vegetation, dirt berms, other mammals and owls, and human activities and/or disturbances. Detailed descriptions of vegetation in the immediate vicinity of each kit fox den were also noted including 1) species composition and relative density of dominant shrub cover, 2) species composition and relative density of understory grasses and forbs, 3) presence of unusual or uncommon species, 4) general condition of the vegetation, and 5) observations of vegetation disturbance due to either kit fox or human activity.

Dens were positively identified as kit fox dens only when the investigator was satisfied that the size and shape of the den and associated signs (tracks, scats, and prey remains) were consistent with those of a kit fox den. The remainder were recorded as "unidentified," coyote (*Canis latrans*), or badger dens.

Den sites were plotted in the field on 7.5 minute topographical maps, and were later placed on permanant topographical maps included with the master copy of the final report to the BLM. Den sites plotted on topographical maps were given code numbers so their locations could be easily cross-referenced with the field data in ledger books and den analysis information (Appendix B).

2.3 NIGHT SURVEYS

Night spotlight surveys were conducted on, or adjacent to, selected BLM land parcels in the Panoche Hills, Tumey Hills, and Elkhorn Plain to document the presence of kit fox, their potential prey, and other nocturnal vertebrates. Observations were made from a vehicle driven at 10-15 mph with high beams on. Two passengers used powerful spotlights to locate animals peripheral to the vehicle path. When eyeshines were detected the vehicle was stopped and the identity of the animal determined. The driver recorded all data, including time and mileage of all kit fox observations. Night surveys were preceded by daylight test drives through the areas to familiarize the crew with the terrain and route.

2.4 DATA SUMMARIES

Section summary sheets were prepared to provide the BLM with a brief analysis of each parcel surveyed on the ground (Appendix A). Information was included on the legal description of the section, data surveyed, field crew, a brief description of the general topography, habitat and disturbances, the number of lagomorphs observed (*Lepus* and *Sylvilagus*), and any evidence of kit fox observed. Comments were also made on the potential of the section as kit fox critical habitat and on points of significant biological interest.

Information on physical characteristics of each kit fox den was recorded on den analysis sheets, which are summarized in Appendix B.

2.5 LAND UNITS

Four major "land units" were created by combining adjacent ecologically similar BLM land parcels, and were based on proximity of parcels, topographical

and vegetational similarities, and existing land-use patterns. Combining data from the numerous sections into land units made it easier to formulate kit fox critical habitat recommendations.

2.6 RATING SYSTEM

A numerical rating system (O'Farrell, et al, 1980) was used to make recommendations on the potential of surveyed lands as San Joaquin kit fox critical habitat. The rating system is based on the Fish and Wildlife Service guidelines for the delineation of "... vital needs ... relevant in determining 'critical habitat' for a given species ...," including:

1. Space for normal growth, movements or territorial behavior
2. Nutritional requirements, such as food, water, minerals
3. Sites for breeding, reproduction, or rearing offspring
4. Cover or shelter
5. Other biological, physical, or behavioral requirements (Federal Register Vol. 40, No. 78, 22 April 1975)

Interpretations of those guidelines were adapted to reflect significant aspects of the ecology of the San Joaquin kit fox that could be observed and qualified, if not quantified, during field surveys. Five rating categories paralleling the FWS guidelines were proposed: Presence of Species, Breeding Sites, Prey Base, Space, and Other Habitat Parameters. Numerical values were established reflecting conditions between the most (3) and least (0) optimal states in each category. Land units were then assigned values, determined by field data and observations, for each category.

Presence of Species was considered essential in determining the potential of a land unit as kit fox critical habitat. The most unequivocal evidence of kit fox observable during daytime transect-type surveys was the presence of dens. For comparative purposes a relative density index (number of dens per 1000 acres) was calculated for each land unit.

The second category, Breeding Sites, provided an important assessment of the reproductive success of kit fox on each land unit. Relative density (number/1000 acres) of natal dens was the criterion used to assign numerical values within this category.

Presence of an adequate Prey Base was the third factor used to rank the potential of land units as critical habitat. Assuming that San Joaquin kit fox prey heavily on lagomorphs, especially during the breeding season, we determined the relative densities (number/1000 acres) of jackrabbits and cottontails in each land unit. Density indices were used to assign numerical values within this category.

Space to support and protect a breeding population is essential to an endangered species. Large contiguous parcels of relatively undisturbed land under Federal jurisdiction (i.e., Panoche Hills, Tumey Hills) were considered to be optimal. Relatively small, widely scattered parcels of Federal land (Coalinga) were judged to be marginally important as potential critical habitat.

A fifth category, Other Habitat Parameters, was created to rank potential importance of three factors thought to influence kit fox populations: impacts of grazing, effects of oil developments, and influence of topography. Quantifiable criteria for ranking the possible significance of these factors were not available; therefore, they were evaluated using subjective judgements of fox specialists who had conducted comparative field studies for two years.

Heavy grazing by cattle and sheep, especially in combination, may have a negative affect on the herbivorous prey of kit fox, although results of studies testing this hypothesis have not been published. Increasing intensities of petroleum developments also have increasingly negative impacts on populations of San Joaquin kit fox (O'Farrell, et al, 1980). Rugged topography is not suitable habitat for the species (Morrell, 1972; O'Farrell, et al, 1980).

Numerical values were assigned for each land unit under the three Other Habitat category subheadings. Values were summed and land units were ranked according to their total score under this category, so that land units with the highest and lowest scores received values of 3 and 0, respectively, while land units with intermediate scores received intermediate values.

After ratings were assigned in five categories for each land unit, a cumulative score for each unit was summed. These total scores were used as a comparative index to evaluate land units as potential San Joaquin kit fox critical habitat with respect to each other and, ultimately, with other BLM lands surveyed in 1979 (O'Farrell, et al, 1980).

3. RESULTS

Field studies were conducted between 9 July and 23 September 1980. Approximately 40,000 acres of public land were initially assigned by the BLM for inventory, but 71,115 acres were actually surveyed. All 2710 acres of public land near Taft, Kern County, California were deleted from the survey since 880 acres (Sections 18, 20, T32S, R23E, Mt. Diablo Meridian) had been surveyed in 1979, and the remaining 1830 acres (Sections 19, 28, 29, T32S, R23E) were located in an area having low potential as kit fox critical habitat (O'Farrell, et al, 1980).

BLM land parcels surveyed in 1980 were arranged into four ecologically and geographically distinct land units: Panoche Hills, Tumey Hills, Coalinga, and Elkhorn Plain (Figure 1). Characteristics of these land units are described in this section which includes information relating to: 1) size, integrity, and topography; 2) land use patterns; 3) major vegetation associations; 4) results of den surveys; and 5) potential prey base.

Private land in the Tumey Hills was surveyed at the request of the BLM. The parcels are all included in a proposed land exchange between the BLM and Silver Creek Cattle Company.

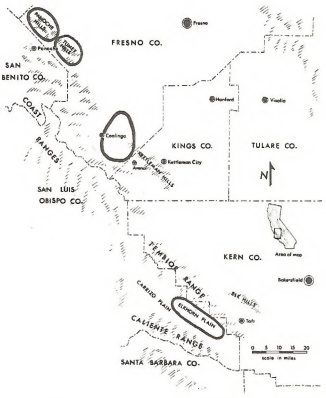

Figure 1. Location of four land units composed of parcels of BLM lands located in Fresno, San Luis Obispo, and San Benito Counties, California, that were surveyed in 1980 to determine their potential as San Joaquin kit fox critical habitat.

3.1 PANOCHE HILLS LAND UNIT

3.1.1 Description

The Panoche Hills Land Unit consisted of a large contiguous parcel of 31,270 acres, with seven smaller parcels, totalling 1200 acres, scattered along its western and southern perimeter (Table 1, Figure 2). It was bounded on the east by Interstate 5 and the San Joaquin Valley, on the north and west by Little Panoche Valley and Little Panoche Road, and on the south by Panoche Creek. Deep drainages and steep ridges fanned out from a plateau in the west-central portion of the land unit (Figure 3). Elevations ranged between 204 and 785 m.

Table 1. BLM land in the Panoche Hills Land Unit surveyed between 9 July and 7 August 1980 to determine their potential as San Joaquin kit fox critical habitat

Survey Method/ Quadrat(s)	Township/Range*	Section(s)	Area (acres)
Aerial			31,750
Laguna Seca Ranch	T13S, R11E	32-35	
Hammonds Ranch	T14S, R11E	1-15,17-35	
Chounet Ranch	T14S, R12E	31	
Mercey Hot Springs	T15S, R11E	1-15,17,18,20-22	
Panoche	T15S, R12E	6,7,8,17,18	
Tumey Hills			
Standard Ground			720
Mercey Hot Springs	T14S, R10E	1,2,10-13,24	
Ridge/Wash			1,760
Mercey Hot Springs	T14S, R11E	1,2,18,20,33	
	T15S, R11E	4,5	
Deleted			226
Mercey Hot Springs	T15S, R11E	18	

*Mt. Diablo Meridian

Livestock grazing was the major habitat disturbance and varied in intensity between moderate to heavy in the peripheral and low relief areas to light or no grazing in the steeper interior. There was no oil development and only limited recent damage due to off-road vehicles. Vehicular traffic was associated with maintenance of radio facilities and microwave towers in the north-central region, and hunting and recreational users.

3.1.2 Vegetation

Major plant associations included Upper Sonoran Subshrub and a mixture of Upper and Lower Sonoran grasslands as defined by Twisselman (1967). These associations appeared to be dependent on the general elevation, relief, aspect, and grazing pressure.

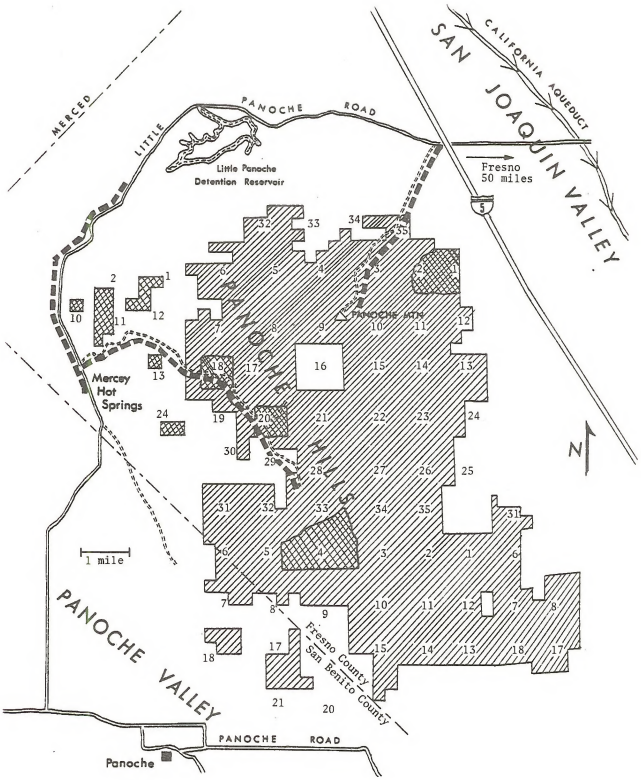

Figure 2. Parcels of BLM land in the Panoche Hills Land Unit that were surveyed by aerial (hatched lines) and ground (crosshatched lines) techniques. Night spotlight survey routes are indicated by heavy dashed lines. Section centers are numbered.

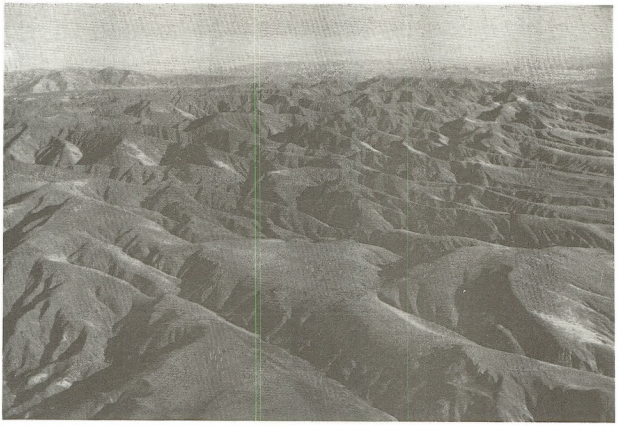

Figure 3. High relief typical of Panoche Hills Land Unit. Suitable kit fox habitat was limited to the few isolated patches of flat terrain such as in central foreground.

The Upper Sonoran Subshrub association was typical of rugged higher elevations with low grazing pressure. It was dominated by a mixture of drought-resistant, summer dormant shrubs such as *Ephedra californica*, *Gutierrezia bracteata*, *Haplopappus linearifolius*, *Hemizonia* sp., *Eastwoodia elegans*, *Isomeris arborea*, *Atriplex polycarpa*, and *Eriogonum fasciculatum*, with scattered areas of *Yucca whippleyi*, *Eriogonum inflatum*, and *Juniperus*. Annuals consisted primarily of *Bromus mollis*, *Festuca* sp., *Avena barbata*, *A. fatua*, and *Eriogonum viridescens* (Table 2).

Heavily grazed, low relief sites were dominated by a mixture of Upper and Lower Sonoran grassland species such as *Bromus rubens*, *B. mollis*, *B. diandrus*, *Erodium cicutarium*, *Avena barbata*, *A. fatua*, *Holocarpha obconica*, *Trichostema*, and *Eremocarpus*, with the dominant shrubs being *Atriplex polycarpa* and *Gutierrezia bracteata* (Table 2).

3.1.3 Aerial Surveys

Five hours of flying time were spent conducting 14 aerial transects over BLM and adjacent private lands in the Panoche Hills (Figure 2). Potential kit fox den sites were noted during aerial observations of the central plateau, eastern foothills, and in the Panoche Valley west of the land unit. Observations made

Table 2. Dominant plant species observed along ground transects in the Panoche Hills surveyed for the BLM, Folsom District, in 1980 to determine their potential as San Joaquin kit fox critical habitat

	Township/Range												
	T14S, R10E						T14S, R11E					T15S, R11E	
Sections	1	2	10	11	12	13	24	1	2	18	20	33	4	5
Grasses														
Avena barbata		x	x	x			x				x		x	x
Bromus mollis								x	x			x	x	x
Bromus rubens								x	x			x		
Bromus sp.	x	x	x	x	x	x	x			x	x		x	x
Festuca megalura												x		
Festuca sp.		x		x		x					x		x	x
Schiemus arabicus							x							
Forbs														
Amsinckia sp.												x		
Eremocarpus setigerus			x											
Eriogonum inflatum													x	x
Eriogonum viridescens							x					x		
Erodium cicutarium	x	x		x		x		x	x	x	x	x		
Hemizonia pallida										x	x	x	x	x
Holocarpha obconica		x	x	x	x			x						
Trichostema ovatum		x		x	x			x	x					
Shrubs/Sub-Trees														
Atriplex polycarpa		x		x								x	x	x
Eastwoodia elegans	x				x									
Eriogonum fasciculatum	x				x	x	x							
Ephedra californicus	x				x	x	x			x	x			
Gutierrezia bracteata	x	x			x					x	x	x	x	x
Haplopappus linearifolius						x				x				
Hymenoclea salsola							x							
Isomeris arborea										x	x			
Juniperus californica							x							

during subsequent ground surveys indicated that all "dens" in the central plateau and eastern foothills were active California ground squirrel (*Spermophilus beecheyi*) burrow systems that had been excavated by badgers. Five active natal San Joaquin kit fox den sites were verified during ground surveys of the less rugged, private land in the Panoche Valley.

3.1.4 Ground Surveys

Standard ground surveys were conducted on five small parcels of BLM land, totalling 720 acres, in the northwest corner of the land unit (Figure 2). An

additional 1760 acres were surveyed by ridge/wash techniques to supplement aerial survey data. A total of 226 acres were deleted from ground surveys after consultation with the Contract Administrator (Table 1).

No positively identified San Joaquin kit fox dens were located on public lands during ground surveys. One possible kit fox scat was collected in Section 13, T14S, R10E, Fresno County.

Only 16 black-tailed jackrabbits and five cottontails were observed during ground surveys.

Three night spotlight surveys totalling 18.3 miles were conducted in the Panoche Hills on 8-9 July 1980 (Figure 2). A total of 84 kangaroo rats, 25 black-tailed jackrabbits, 16 cottontails, and 10 other vertebrate species were observed (Appendix C).

A road-killed kit fox was observed on 11 July along the Little Panoche Road 0.25 miles west of Little Panoche Detention Reservoir, Section 19, T31S, R11E, Fresno County (Appendix D).

3.2 TUMEY HILLS LAND UNIT

3.2.1 Description

The Tumey Hills Land Unit, totalling 20,500 acres, consisted of one contiguous land parcel of 18,200 acres interspersed with private land holdings (Table 3, Figure 4). Three additional parcels totalling 2300 acres were peripheral to the northwest and northeast boundaries. This land unit was heavily dissected by steep ridges and narrow drainages, generally oriented in the northerly direction. The only area of low relief was a 1½ square mile plateau of rolling hills in the north-central portion of the unit. Elevation ranged between 189 and 802 m.

Moderate to heavy cattle grazing was the primary source of habitat disturbance. Oil development was limited to a few old wells in the southwest, and two east-west pipelines. Most forms of public use were limited by access restrictions imposed by Silver Creek Cattle Company, the major private landowner and BLM grazing leaseholder.

3.2.2 Vegetation

Vegetation in the Tumey Hills was the least diverse of any land unit surveyed in 1980 (Table 4). The dominant plant association observed was Upper Sonoran Grassland (Twisselman, 1967) that included moderate to heavily grazed *Bromus rubens*, *B. mollis*, *Erodium cicutarium*, and *Festuca megalura*, with a scattered shrub cover of *Atriplex polycarpa*, *A. spinifera*, and *Gutierrezia brateata*. Weedy species such as *Eremocarpus setigerus*, *Euphorbia* spp., and *Astragalus* ssp. were found scattered throughout the hills. *Eriogonum fasciculatum*, *E. inflatum*, *Haplopappus linearifolius*, and *Amsinckia intermedia* were observed at higher elevations and on steeper slopes.

Table 3. BLM and private land in the Tumey Hills Land Unit surveyed between 29 July and 6 August 1980 to determine their potential as San Joaquin kit fox critical habitat

Survey Method/ Quadrat(s)	Township/Range*	Section(s)	Area (acres)
BLM Land			
Aerial			20,500
Idria	T15S, R11E	23-25	
Monocline Ridge	T15S, R12E	15,19,21,22,27-32, 34,35	
Tumey Hills	T16S, R12E	1-15,17-24,26-29, 33-35	
	T16S, R13E	7,17,18	
	T17S, R12E	2-4	
Standard Ground			1,000
Tumey Hills	T15S, R12E	27,28,33,34	
Ridge/Wash			1,920
Tumey Hills	T16S, R12E	5,14,21	
Private Land			
Aerial			3,500
Ciervo Mountain	T15S, R12E	27,28	
Idria	T16S, R12E	3,9,11-16,22-25,27, 35,36	
Monocline Ridge			
Tumey Hills			
Standard Ground			160
Tumey Hills	T15S, R12E	27,28	
Ridge/Wash			440
Tumey Hills	T16S, R12E	14	
Deleted			640
Panoche	T15S, R11E	16	

*Mt. Diablo Meridian

3.2.3 Aerial Surveys

A total of 5.2 hours of flying time were spent conducting 31 aerial transects over public (20,500 acres and private (3500 acres) lands within and adjacent to the Tumey Hills (Table 3, Figure 4). Several potential kit fox den sites were observed from the air and later verified during ground surveys.

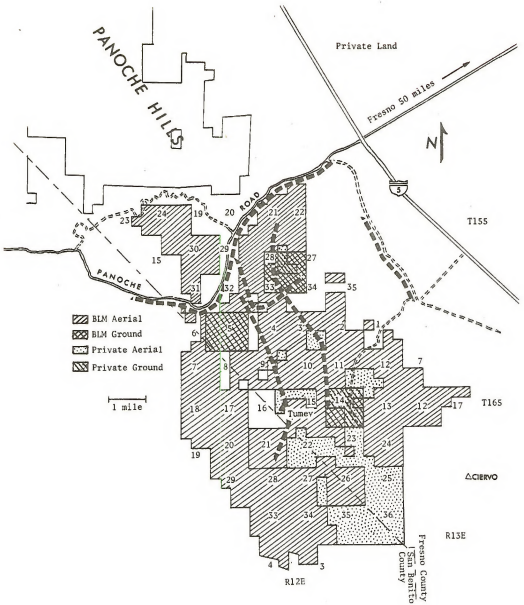

Figure 4. BLM and private land parcels surveyed in the Tumey Hills Land Unit by aerial (hatched lines) and ground (crosshatched lines) techniques. Night spotlight survey routes are shown by heavy dashed lines.

3.2.4 Ground Surveys

Standard ground and ridge/wash surveys were conducted on 2920 acres of public land and 600 acres of private land. Twenty kit fox dens were discovered in the rolling central plateau of the Tumey Hills including: two active (1980) natal dens, six active and three inactive multiple-hole dens, seven active single-hole dens, and two inactive single-hole dens. No natal dens were found in the more rugged portions of the hills. Positive evidence of kit fox usage was not noted in the foothills and flat valley land east of the hills although the area appeared to be suitable for the species.

Table 4. Dominant plant species observed along ground transects in the Tumey Hills surveyed for the BLM, Folsom District, in 1980 to determine their potential as San Joaquin kit fox critical habitat

	Township/Range						
	T15S, R12E				T16S, R17E		
Sections	27	28	33	34	5	14	21
Grasses							
Bromus mollis			x	x	x	x	x
Bromus rubens			x	x	x	x	x
Bromus sp.	x	x	x	x	x		
Festuca megalura			x	x			x
Festuca sp.	x	x	x	x	x		
Schismus arabicus			x	x	x		x
Forbs							
Amsinckia sp.						x	
Astragalus sp.	x	x	x				
Eremocarpus setigerus	x	x	x				
Eriogonum inflatum							x
Erodium cicutarium	x	x	x	x	x	x	
Salsola kali						x	
Shrubs/Sub-Trees							
Atriplex polycarpa	x	x		x		x	x
Atriplex spinifera				x		x	
Eriogonum fasciculatum							x
Gutierrezia bracteata		x					x

Only 10 black-tailed jackrabbits and one cottontail were observed during ground surveys.

Five spotlight surveys, totalling 29 miles, were conducted within and adjacent to the Tumey Hills (Figure 4). Two kit fox, 33 jackrabbits, 31 cottontails, three striped skunks and nine other species of vertebrates were observed (Appendix C).

3.3 COALINGA LAND UNIT

3.3.1 Description

This land unit consisted of 7080 acres of BLM land in 21 isolated parcels scattered through sections of privately-owned land (Table 5, Figure 5). It was further divided into three subunits: North Dome, Kettleman Hills; East Coalinga Extension Oil Field; and Kreyenhagen Hills-Jacalitos Canyon (Figure 5). Except for a few areas of high relief in the Kettleman and Kreyenhagen Hills, most of the land consisted of gently rolling hills. Elevation varied between 183 and 447 m.

Table 5. BLM land in the Coalinga Land Unit surveyed between 18 August and 17 September 1980 to determine their potential as San Joaquin kit fox critical habitat

Survey Method/ Quadrat(s)	Township/Range*	Section(s)*	Area (acres)
Standard Ground			4,920
Avenal	T19S, R15E	2,12,24	
Coalinga	T19S, R16E	18	
Domengine Ranch	T20S, R15E	2.12	
Kreyenhagen Hills	T21S, R16E	24	
	T21S, R17E	18,28.34	
	T22S, R15E	12	
	R22S, R16E	6,18	
Ridge/Wash			2,000
Avenal	T21S, R15E	22,26,28	
Kreyenhagen Hills	T21S, R17E	4,32	
Deleted			160
Avenal	T21S, R16E	32	
Kreyenhagen Hills	T21S, R17E	8	

*Mt. Diablo Meridian

Sources of human disturbances included oil field development, grazing, and road systems. Oil field disturbances varied, but the most intense were observed on the North Dome of Kettleman Hills. Vegetation in the Kettleman and Kreyenhagen Hills received the heaviest grazing pressure from cattle and sheep. Oil field development and roads were the major sources of disturbance in the East Coalinga Extension Oil Field subunit.

3.3.2 Vegetation

An Upper Sonoran Grassland association (Twisselman, 1967) dominated this unit. Typical ground cover was moderately to heavily grazed species of *Bromus*, *Festuca*, *Erodium*, and *Schismus*, with a sparse shrub cover of *Atriplex polycarpa* and *Gutierrezia bracteata* (Table 6). Weedy species such as *Trichostema ovatum* and *Eremocarpus setigerus* were abundant in heavily grazed areas. The only increase in floral diversity was observed on steeper hills where *Eriogonum fasciculatum*, *Eastwoodia elegans*, *Yucca whippleyi*, and *Juniperus californica* occurred.

3.3.3 Aerial Surveys

No aerial surveys were conducted in the Coalinga Land Unit because of the small size and scattered nature of the BLM lands.

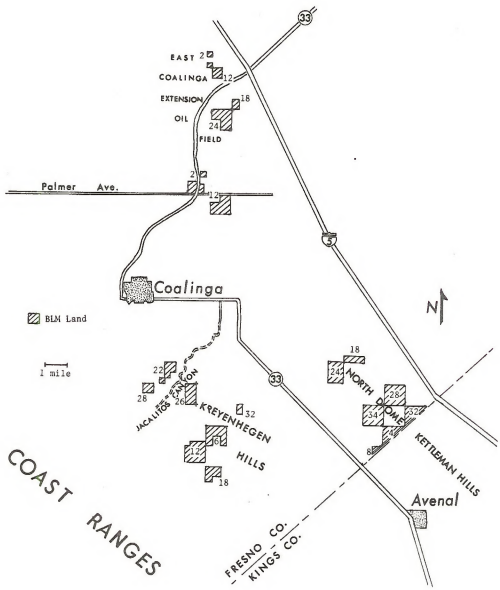

Figure 5. BLM land parcels in the Coalinga Land Unit surveyed by ground techniques in 1980. This unit was divided into North Dome, Kettleman Hills; East Coalinga Extension Oil Fields; and Kreyenhagen Hills-Jacalitos Canyon subunits. Section centers are numbered.

3.3.4 Ground Surveys

A total of 6920 acres of BLM land were surveyed and 160 acres were deleted (Table 5). Standard ground surveys were conducted on 70% of the parcels, while ridge/wash surveys were conducted in high-relief land in the Kettleman and Kreyenhagen Hills.

Evidence of kit fox usage was found in all but six of the parcels surveyed. A total of 37 dens was found: three active natal, two active and seven inactive

Table 6. Dominant plant species observed along ground transects in the Coalinga Land Unit surveyed for the BLM, Folsom District, in 1980 to determine their potential as San Joaquin kit fox critical habitat

	Township/Range																		
	T19S R15E			T19S R16E	T20S R15E		T21S R15E			T21S R16E	T21S R17E					T22S R15E		T22S R16E	
Sections	2	12	24	18	2	12	22	26	28	24	4	18	28	32	34	12		6	18
Grasses																			
Avena barbata					x	x	x	x			x					x			
Bromus mollis										x								x	
Bromus rubens		x			x					x			x	x					
Bromus sp.	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x
Festuca megalura		x								x									
Festuca sp.	x		x	x	x	x	x	x		x		x		x	x	x		x	x
Forbs																			
Ambrosia acanthicarpa					x	x								x					
Amsinckia sp.																		x	
Astragalus sp.					x								x	x					
Eremocarpus setigerus	x	x	x		x	x		x	x	x		x	x	x	x	x		x	x
Eriogonum viridescens											x								
Erodium cicutarium			x	x	x	x		x	x	x	x					x		x	x
Holocarpha obconica								x											
Salsola sp.				x	x	x		x		x									
Trichostema ovatum	x	x	x		x	x		x	x	x				x		x		x	x
Shrubs/Sub-Trees																			
Atriplex polycarpa	x						x	x	x	x	x	x	x		x	x			
Eastwoodia elegans							x		x							x		x	
Eriogonum fasciculatum							x	x	x							x			x
Gutierrezia bracteata	x	x		x	x	x		x	x	x	x	x	x	x	x	x		x	x
Hymenoclea salsola						x			x				x						
Juniperus californica																x		x	x
Yucca whippleyi																x			x

multiple-hole, 15 active single-hole, and ten inactive single-hole. Kit fox tracks, scats, and prey remains were observed in nine of 20 parcels.

Lagomorphs were most dense in this land unit; 207 black-tailed jackrabbits and 34 cottontails were observed.

3.4 ELKHORN PLAIN LAND UNIT

3.4.1 Description

Elkhorn Plain included 7725 acres of BLM land in seven parcels. The largest parcel contained 2605 acres, and the remaining six averaged 853 acres in size (Table 7, Figure 6). Most of the land was flat, but included some

Table 7. BLM land in the Elkhorn Plain Land Unit surveyed for their potential as San Joaquin kit fox critical habitat in 1980

Survey Method/ Quadrat(s)	Township/Range*	Section(s)	Area (acres)
Aerial			2,280
Elkhorn Hills	T32S, R22E	27,28,33-35	
Standard Ground			7,160
Elkhorn Hills			
Painted Rock	T31S, R21E	7,8,17,18,21,22,27,35	
Panorama Hills	T32S, R22E	7,17-19,27,28,33-35	
Ridge/Wash			565
McKittrick Summit	T31S, R21E	6	

*Mt. Diablo Meridian

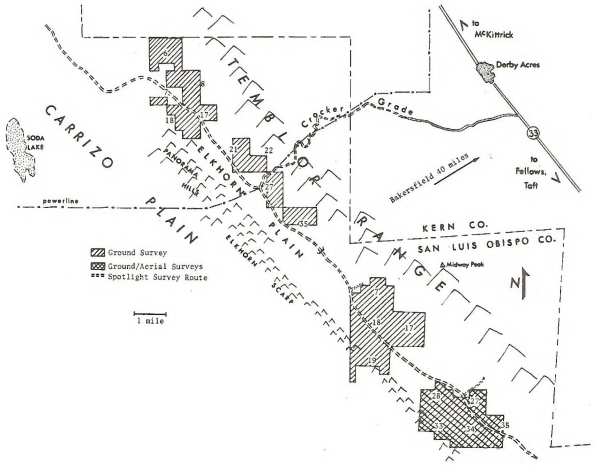

Figure 6. Parcels of BLM land in the Elkhorn Plain Land Unit surveyed in 1980.

rugged areas in the southern foothills of the Temblor Range, as well as rolling parts of the Elkhorn Hills (Figure 7). Elevations ranged between 641 and 1315 m.

Cattle grazing, the heaviest observed on any area surveyed in 1980, was the primary source of habitat disturbance.

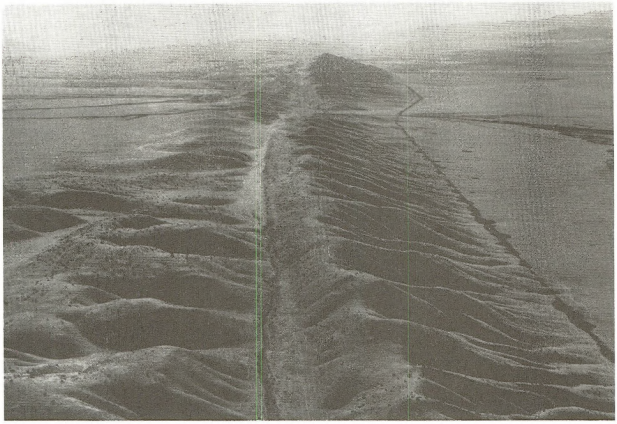

Figure 7. View towards the southeast along the Elkhorn Hills separating the Elkhorn Plain (left) and Carrizo Plain (right). The San Andreas Fault occupies the trough at the base of the scarp. These gently rolling plains represent one of the best kit fox habitats surveyed in 1979 or 1980.

3.4.2 Vegetation

Low relief areas of Elkhorn Plain were dominated by a grazing disclimax that included *Bromus rubens*, *Schismus arabicus*, *Erodium cicutarium*, *Gutierrezia bracteata*, and *Ephedra californica*. Weedy species including *Eremocarpus setigerus* and *Astragalus* spp. were found in scattered patches. High relief areas included some of the above species as well as *Festuca microstachys*, *Eastwoodia elegans*, *Atriplex polycarpa*, *Hymenoclea salsola*, *Eriogonum fasciculatum*, *E. viridescens*, and *Chrysothamnus nauseosus* (Table 8).

Table 8. Dominant plant species observed along ground transects in the Elkhorn Plain Land Unit surveyed for the BLM, Folsom District, in 1980 to determine their potential as San Joaquin kit fox critical habitat

	Township/Range															
	T31S, R21E								T32S, R22E							
Sections	6	7	8	17	18	21	22	27	35	7	17	18	19	27	28	33	34	35
Grasses																		
Bromus rubens											x		x					
Bromus sp.	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
Festuca microstachys												x	x					
Festuca sp.		x			x	x	x		x					x	x	x	x	
Schismus arabicus	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Stipa sp.	x		x															
Forbs																		
Amsinckia sp.								x			x							
Astragalus sp.		x											x	x	x	x	x	x
Eremocarpus setigerus		x												x	x	x	x	x
Eriogonum gossypinum										x	x							
Eriogonum viridescens															x	x		
Erodium cicutarium	x				x					x	x	x	x					
Shrubs/Sub-Trees																		
Atriplex polycarpa	x	x		x	x	x	x						x	x		x	x	
Chrysothamnus nauseosus														x		x	x	
Eastwoodia elegans	x	x			x			x	x		x		x			x		
Eriogonum fasciculatum	x	x	x	x	x		x	x	x	x	x			x		x	x	
Ephedra californicus			x			x	x	x	x	x	x	x		x		x	x	
Eurotia lanata	x		x		x				x									
Gutierrezia bracteata	x	x	x	x		x	x	x	x	x	x	x	x	x				x
Hymenoclea salsola											x	x						
Yucca whippleyi							x			x								

3.4.3 Aerial Surveys

One aerial survey was flown over Elkhorn Plain (Table 7), and several kit fox den sites were observed. These were later verified during ground surveys.

3.4.4 Ground Surveys

Standard ground surveys were conducted on 7160 acres of Elkhorn Plain, while 565 acres in the Temblor foothills were surveyed using ridge/wash techniques (Table 7).

More evidence of San Joaquin kit fox was found on Elkhorn Plain that on any other land unit surveyed in 1980. Fifty nine dens were found including

13 active natal dens, 11 active multiple-hole dens, seven inactive multiple-hole dens, 22 active single-hole dens, and six inactive single-hole dens. In addition, 80 scats, five sets of tracks, and two kit fox were observed.

Lagomorphs were moderately abundant; 79 black-tailed jackrabbits and 10 cottontails were observed.

Two spotlight surveys totalling 11 miles were conducted (Figure 6). Nineteen kit fox, four coyotes, 40 jackrabbits, 54 kangaroo rats, and eight other species of vertebrates were observed (Appendices C and D).

3.5 CRITICAL HABITAT RATING SYSTEM

3.5.1 Presence of Species

A total of 116 kit fox dens, for a relative density of 1.8/1000 acres, was observed (Table 9). Over half of the observations of dens (59) were made in the Elkhorn Plain Land Unit which had the greatest concentration of both natal and nonnatal dens (1.7/1000 acres and 5.9/1000 acres, respectively). The Coalinga Land Unit had the second highest density of dens, 5.2/1000 acres, as well as an abundance of fox scats and tracks. Both land units received scores of 3 in the Presence of Species category.

Twenty kit fox dens were observed in the Tumey Hills Land Unit, for a relative density of 1.0/1000 acres, and two kit fox were observed during night spotlight surveys. The land unit earned a rating of 1 for this category.

No kit fox dens or other evidence of the species were observed in the Panoche Hills; therefore, the land unit received a score of 0 in Presence of Species.

Table 9. Synthesis of type, number (N), and relative densities (RD) of San Joaquin kit fox dens observed in each land unit during 1980 inventories

Land Unit	Den Type												Totals	
	Natal				Multiple-Hole				Single-Hole					
	Active		Inactive		Active		Inactive		Active		Inactive			
	N	RD	N	RD	N	RD	N	RD	N	RD	N	RD	N	RD
Panoche Hills	--	--	--	--	--	--	--	--	--	--	--	--	0	0
Tumey Hills	2	0.1			6	0.3	3	0.1	7	0.3	2	0.1	20	1.0
Coalinga	3	0.4			2	0.3	7	1.0	15	2.1	10	1.4	37	5.2
Elkhorn Plain	13	1.7			11	1.4	7	0.9	22	2.8	6	0.8	59	7.6
Totals	18	0.3			19	0.3	17	0.3	44	0.7	18	0.3	116	1.8

3.5.2 Breeding Sites

Relative density of active natal dens was used to score land units in this rating category. Since 74% of the active natal dens were observed in the Elkhorn Plain (Table 9), the land unit received a score of 3. Relatively low densities of active natal dens were observed in the Coalinga and Tumey Hills land units, 0.4 and 0.1, respectively; therefore, they were assigned scores of 1 each. Panoche Hills received a score of 0 since no active natal dens were discovered.

3.5.3 Prey Base

Highest relative lagomorph densities, 33.4/1000 acres, were observed in the Coalinga Land Unit, where densities of both black-tailed jackrabbits, 28.6/1000 acres, and cottontails, 4.8/1000 acres, exceeded averages for all land units combined (Table 10). Coalinga was given a score of 3 in this category. Lowest relative densities of lagomorphs, 3.7/1000 acres, were observed in the Tumey Hills, and it rated a 0. Both Panoche Hills and Elkhorn Land Units had lagomorph densities well below the average for all land units combined, and they were given scores of 1.

Table 10. Relative densities (number observed/1000 acres) of black-tailed jackrabbits (*Lepus californicus*) and desert cottontails (*Sylvilagus audubonii*) observed during 1980 inventory of potential kit fox critical habitat

Land Unit	*Lepus*	*Sylvilagus*	Totals
Panoche Hills	6.5	2.4	8.9
Tumey Hills	3.4	0.3	3.7
Coalinga	28.6	4.8	33.4
Elkhorn Plain	10.5	1.3	11.8
Average Densities	15.2	2.5	17.7

3.5.4 Space

Panoche Hills and Tumey Hills Land Units received the maximum score of 3 in this category because of their large sizes and contiguous distribution of parcels (Table 11). Coalinga received a 0 in the Space category because it was the smallest and most widely scattered land unit, consisting of 21 parcels of land, the largest of which was only 1160 acres. Elkhorn Plain was given a rating of 1 because of the size of its largest contiguous parcels, 2605 acres, and the large average size of the scattered parcels, 853 acres.

Table 11. Total acreage, size of largest contiguous parcel, and number and average size of discontinuous parcels in each land unit surveyed as potential kit fox critical habitat in 1980

	Area (acres)	Largest Contiguous Area (acres)	Discontinuous Parcels	
			Number	Average Area (acres)
Panoche Hills	32,470	31,270	7	203.7
Tumey Hills	20,500	18,200	3	750.0
Coalinga	7,080	1,160	21	281.9
Elkhorn Plain	7,725	2,605	6	853.3

3.5.5 Other Habitat Parameters — Grazing

Vegetation in the Elkhorn Plain and Tumey Hills received the heaviest grazing pressure, therefore, the land units received scores of 0 (Table 12). The light to moderate grazing observed in Coalinga and Panoche Hills rated scores of 1.

Table 12. Ratings of BLM land units as potential kit fox critical habitat based on Other Habitat Parameters category

Land Unit	Grazing[1]	Oil[2]	Topography[3]	Cumulative Score	Overall[4] Score
Panoche Hills	1	3	0	4	1
Tumey Hills	0	3	0	3	1
Coalinga	1	1	2	4	1
Elkhorn Plain	0	3	2	5	2

[1]Grazing: Heavy = 0 Moderate = 1 Light = 2 None = 3
[2]Development: Extensive = 0 Moderate = 1 Light = 2 None = 3
[3]Unsuitable Topography = 0 Suitable Topography = 2
[4]Cumulative Score: 0-2 = 0 3-4 = 1 5-6 = 2 7-8 = 3

3.5.6 Other Habitat Parameters — Oil Development

Levels of oil field impacts were assessed using definitions of intensities published by O'Farrell, et al, 1980. Coalinga received a score of 1 for overall moderate oil field development, although intensity ranged between none in portions of the Kreyenhagen Hills to heavy development in the Kettleman Hills (Table 12). No oil field development was observed on the remaining land units, and they were given scores of 3 in this category (Table 12).

3.5.7 Other Habitat Parameters — Topography

Most of the Panoche Hills and Tumey Hills were deemed too rugged to support populations of kit fox and were given scores of 0 (Table 12). The Elkhorn Plain and Coalinga Land Units were topographically suitable for kit fox and received scores of 2 (Table 12).

3.5.8 Other Habitat Parameters — Cumulative Scores

Scores assigned under Grazing, Oil Development, and Topography were summed to obtain a cumulative score for each land unit (Table 12). Overall scores under the Other Habitat Parameter category were assigned to each land unit according to the relative ranking scale proposed in 1979 (O'Farrell, et al, 1980). Elkhorn Plain received the highest cumulative score (5) and was assigned an overall score of 2. Cumulative scores for Panoche Hills and Coalinga were 4 while that for Tumey Hills was 3. The three land units were given overall scores of 1.

3.5.9 Final Score

After the scores received by each land unit under the five rating system categories were summed, Elkhorn Plain had the highest total, 10 out of a possible 15 (Table 13). Coalinga had the second highest score (8) while Tumey Hills and Panoche Hills had scores of 6 and 5, respectively. The land units were ranked 1 through 4 according to these totals.

Table 13. Ratings of BLM land units surveyed in 1980 as potential kit fox critical habitat

Land Unit	Presence of Species	Breeding Sites	Prey Base	Space	Other Habitat Parameters	Total	Rank
Panoche Hills	0	0	1	3	1	5	4
Tumey Hills	1	1	0	3	1	6	3
Coalinga	3	1	3	0	1	8	2
Elkhorn Plain	3	3	1	1	2	10	1

3.6 CHARACTERISTICS OF KIT FOX DENS

Field data also provided information on the physical characteristics of kit fox dens on BLM land. Data combined from all land units indicated that natal dens averaged 5.3 entrances ranging from 3 to 10, while multiple-hole dens averaged significantly lower: 3.5, with a range of 2 to 7 (Table 14).

Average elevations of dens varied significantly between land units (Table 14). The lowest average den elevations were 278 m on Coalinga, intermediate average elevations were 357 m on Tumey Hills, while the highest average

Table 14. Average number of entrances and elevational ranges of kit fox dens observed during surveys in 1980

Land Unit	Number of Den Entrances, $\bar{x}$ ±SE(N)		Den Elevation (m)		Land Unit Elevation (m)
	Natal Den	Multiple-Hole	$\bar{x}$ ±SE(N)	Range	Range
Tumey Hills	4 (2)	2.7 ±0.3(8)	357 ±17(18)	305-622	189-802
Coalinga	5.3 ±0.9(3)	3.0 ±0.3(8)	278 ±8 (36)	220-366	183-447
Elkhorn Plain	5.5 ±0.6(13)	4.1 ±0.4(18)	739 ±6 (57)	663-899	641-1315
Total	5.3 ±0.5(18)	3.5 ±0.2(34)	528 ±21(111)	220-899	
Range	3-10	2-7			

elevations were recorded for dens on Elkhorn Plain, 739 m. Ranking of average elevations for kit fox dens paralleled that of elevational ranges surveyed in the three land units (Table 14). No dens were found above 900 m.

Kit fox dens were found on sites having an average slope of 18.9°; 89% were found on slopes of less than 40° (Table 15). Natal dens were found on slopes averaging 6.2° which was significantly less than average slope values of 18.6° and 22.9° for multiple-hole and single-hole dens, respectively.

Table 15. Proportion of San Joaquin kit fox dens tabulated as a function of slope angle (°)

Slope Angle (°)	Dens Found (%)
0-4	14
5-9	20
10-14	13
15-19	11
20-24	12
25-29	10
30-34	9
35-39	6
40-44	4
45-49	1
≥50	6
Mean Slope Angle = 18.9° ±1.6°	

The proportion of dens found at various positions on slopes, regardless of elevation or slope angle, was: crest, 10%; upper slope, 17%; mid-slope, 23%; lower slope, 21%; washes, 9%; and flats, 20%. Thus, 73% of all kit fox dens were found at or below mid-slope. While 89% of natal dens were also found at or below mid-slope, half were found in flat terrain.

Analysis of information on aspect, compass directions faced by dens, revealed that dens were not facing quadrants in equal proportions. Orientation of dens was: 0-90°, 37%; 91-180°, 23%; 181-270°, 26%; 271-359°, 14%. The differences were biologically significant ($0.10 > X^2 > 0.50$) because of the above average number of dens facing the northeastern quadrant and the below average number of dens facing the northwestern quadrant.

3.7 OBSERVATIONS OF VERTEBRATES

Eight species of mammals, seven species of reptiles, and 38 species of birds were observed on BLM lands during the 1980 surveys (Appendix D). Six additional species of mammals were observed during night spotlight surveys (Appendix C).

The most important observations were those of San Joaquin kit fox (Appendix D). Two kit fox were noted during ground surveys of the Elkhorn Plain. Twenty one fox were observed during spotlight surveys, 19 in the Elkhorn Plain, and two in the Tumey Hills. A dead kit fox was seen on Little Panoche Road northwest of the Panoche Hills, while a live fox was observed crossing the Elkhorn Grade Road west of Maricopa.

Black-tailed jackrabbits were the most numerous, widely distributed mammal observed. Although cottontails were numerous at Coalinga, they were not frequently observed in the other land units.

We were surprised to discover that San Joaquin antelope ground squirrels, (*Ammospermophilus nelsoni*), were so numerous on the Elkhorn Plain. This species was recently listed as "rare" by the State of California. It was even more commonly observed than the California ground squirrel, which is considered to be a nuisance species.

A total of 169 side-blotch lizards (*Uta stansburiana*), 34 endangered blunt-nosed leopard lizards (*Crotaphytus silus*)* and 19 whiptails (*Cnemidophorus tigris*) were observed. Most of the sightings (80%, *Uta*; 79% *Cnemidophorus*; 97%, *Crotaphytus*) were made on the Elkhorn Plain (Appendix D).

Horned Larks (986), California Quail (937), Mourning Doves (216) and Western Meadowlarks (151) were the most numerous species of birds observed in 1980. American Kestrels (31) and Marsh Hawks (13) were the most numerous of the seven species of diurnal raptorial birds observed (Appendix D).

*Although some biologists use the generic name *Gambelia*, we use *Crotaphytus* because it has taxonomic priority that has not been superseded by an unequivocal taxonomic revision.

4. DISCUSSION

The potential of these four BLM land units as critical habitat for the San Joaquin kit fox was assessed following field data analysis and use of the rating system. Elkhorn Plain had the highest potential, followed by Coalinga, Tumey Hills, and Panoche Hills.

Elkhorn Plain received the highest score because of the large number of dens and kit fox observed, high densities of natal den sites, and the gentle relief in most places. Probably the most outstanding indicator of the potential of Elkhorn Plain as kit fox habitat was the high relative density of natal dens found. It not only exceeded densities observed on other BLM lands (O'Farrell, et al, 1980), but was also higher than densities observed on Elk Hills Naval Petroleum Reserve (O'Farrell, 1980), which is considered to be excellent habitat.

Elkhorn Plain lacks size, average lagomorph densities, and protection from possible overgrazing. Lack of size may not be a problem now because the adjacent private lands are managed in similar fashion to BLM lands. If future uses of private lands disrupt present patterns the potential of Elkhorn Plain BLM lands as critical habitat may be compromised.

Although lagomorph densities were slightly below the observed average, a dense kit fox population was present. Either the fox were finding suitable quantities of alternative prey or the densities of lagomorphs were sufficient.

Vegetation in the land unit was heavily grazed, but the fox appeared to have adapted to the regimen. In past studies (O'Farrell, et al, 1980), analysis of field data suggested that increasing intensities of grazing had negative impacts on kit fox populations. Indirect impacts included competition between grazing animals and native herbivores for limited quantities of vegetation to the extent that rodent and lagomorph populations were reduced, which limited the kit fox prey base. However, we stress that the relationship between grazing pressure and herbivorous native mammal populations, and between these mammals and kit fox, is unknown.

Although Coalinga ranked second on the critical habitat rating system, it presented some potential management problems. The small size and scattered nature of the BLM parcels in this land unit was not conducive to management as critical habitat. The quality of kit fox habitat also varied widely between parcels. Dividing the land unit into these subunits may assist in their management: Kreyenhagen Hills-Jacalitos Canyon; North Dome, Kettleman Hills; and East Coalinga Extension Oil Field.

Topography southeast of the canyon in the Kreyenhagen Hills-Jacalitos Canyon area was suitable for kit fox. However, very few lagomorphs were observed and the evidence for presence of kit fox consisted mainly of observations of scats and tracks. Two dens were observed, neither of which was a natal den.

Positive evidence of kit fox was gathered in the North Dome, Kettleman Hills. However, most of the dens observed were single-hole dens and no evidence of breeding was gathered. A high density of lagomorphs was observed even though the subunit was heavily disturbed by petroleum development. The potential of this subunit as kit fox critical habitat might be improved by increased efforts towards habitat restoration.

The only active natal or pupping dens found in Coalinga were located in the East Coalinga Extension Oil Field. The gently rolling hills and flatlands of this subunit were suitable for kit fox, and there appeared to be an adequate density of lagomorphs. Habitat disturbances included oil field development and light to moderate grazing. Oil development appeared stable since no new drilling activities were noted.

This discussion demonstrates that within the Coalinga Land Unit, which ranked second, individual subunits had potentials varying from low in the Kreyenhagen Hills-Jacalito Canyon subunit, to intermediate in North Dome, Kettleman Hills, to high in the East Coalinga Extension Oil Field.

Although we considered the small sizes and scattered nature of the Coalinga Land Unit to be a negative factor, we are not suggesting that smaller, scattered parcels of federal land are expendable fox habitats. Presence of dens is of course the best evidence that an area is suitable habitat for San Joaquin kit fox. Special emphasis should be placed on conserving lands having den sites, especially those containing natal den sites. Only activities compatible with the continued existence of kit fox and their critical habitat should be permitted on these parcels.

Despite their large areas the Tumey Hills and Panoche Hills Land Units had low potential as San Joaquin kit fox critical habitat. Both were too rugged to support populations of kit fox, and the presence of rock outcrops suggested that soils over large areas were too shallow to allow construction of suitable kit fox burrows. Prey populations were relatively low, and both units were impacted by varying intensities of grazing.

Evidence of kit fox, including natal den sites, was found on the central plateau of Tumey Hills, and these sections should receive special consideration for management as critical habitat.

No evidence of kit fox was found in Panoche Hills. Trappers and local residents have observed them in the hills during late-summer and fall, a time of year when puppies begin to disperse. Kit fox den sites were observed on private lands adjacent to Panoche Hills, and fox from these dens may hunt the periphery of the land unit.

Supplementary information on characteristics of kit fox dens corroborated findings proposed in 1979 (O'Farrell, et al, 1980). Most dens were found at or below mid-slope in areas where the average slope angle was 18.9°. In 1979 the average slope angle was 22°. Natal dens were found at average slope angles of 6.2° which indicated that fox may have selected flatter areas to dig natal or pupping dens.

The average number of entrances to natal dens was 51% larger than that for non-natal dens. In 1979 the average number of entrances was 40% greater (O'Farrell, et al, 1980).

Dens were found up to 899 m, which extends the elevational range of the species in the San Joaquin Valley from the value of 708 m reported last year (O'Farrell, et al, 1980). The elevational limitation was probably due to changes in relief, soils, vegetation associations, and species composition and the abundance of prey that become unfavorable with increasing elevations.

Last year one of the most intriguing observations was that a high proportion of kit fox dens were oriented toward the eastern half of the compass. In 1980 additional information not only supported that first observation, but also demonstrated that the eastern orientation was due to a high proportion of dens facing the northeastern quadrant, and a corresponding lack of dens facing the northwestern quadrant. We are still unable to suggest why this orientation may be adaptive.

No evidence was gathered showing that kit fox den sites were selected because of the presence, density, or growth form of specific or special vegetation associations. The same conclusion was reached following the 1979 surveys (O'Farrell, et al, 1980). Except for stating that kit fox dens were associated with major vegetation types found below 900 m in the southern San Joaquin Valley it did not appear that floral characteristics could be used to predict or describe critical habitat requirements of the San Joaquin kit fox.

In addition to its importance as potential critical habitat for the San Joaquin kit fox, the Elkhorn Plain may also be a critical habitat for the blunt-nosed leopard lizard, *Crotaphytus silus*, another endangered species. Although aware of relatively high densities of the species in the area, we were unprepared for the large numbers observed in September which is generally said to be a poor month to encounter adult *C. silus*. We observed 33 blunt-nosed leopard lizards in a few days of surveying the Elkhorn Plain. In four months of intensive surveying specifically for *C. silus* on BLM lands in Buena Vista Valley, only 22 observations were made (O'Farrell and Kato, 1980).

We also observed evidence of and incidentally live-trapped giant kangaroo rats, *Dipodomys ingens*, in the Elkhorn Plain. This species is presently being considered for federal protection, and it has already been listed as endangered by the State of California. If federal listing is completed, the Elkhorn will have to be considered as potential critical habitat for the species.

The Elkhorn Plain also provides excellent habitat for the San Joaquin antelope ground squirrel, which has been listed as rare by the State of California. *Ammospermophilus nelsoni* was second only to the black-tailed jackrabbit as the most commonly observed mammal.

Use of both aerial and ground surveys proved to be both effective and cost-efficient when compared with results of the 1979 BLM kit fox surveys (O'Farrell, et al, 1980). The 1980 funding was 17% less than in 1979 and yet we were able to survey 123% more land in 1980. Only ground surveys were conducted in 1979 regardless of the low densities or lack of kit fox dens. This year initial surveys were conducted by air, which allowed us to concentrate the labor-intensive ground surveys only in those BLM land parcels where it was justified.

5. RECOMMENDATIONS

1. The Bureau of Land Management should give high priority to recommending to the Secretary of Interior that all public lands in the Elkhorn Plain be designated as critical habitat for the San Joaquin kit fox. The Bureau should also urge the Secretary to purchase private lands in the area to increase the size of habitat to insure sufficient area for a breeding population.

2. Parcels of BLM land in the central plateau of the Tumey Hills, North Dome of the Kettleman Hills, and the East Coalinga Extension Oil Field have potential as kit fox critical habitat and should also be considered for that designation.

3. Some consideration should be given to managing BLM lands in the Kreyenhagen Hills-Jacalitos Canyon area, although their potential is not as great as the above land units.

4. Little if any consideration should be given to designating the Panoche Hills and the remainder of the Tumey Hills as kit fox critical habitat. Neither area showed signs of current use by kit fox, probably because both land units are too rugged to serve as good habitat.

5. Until the Secretary of Interior makes a final decision on critical habitat for the San Joaquin kit fox, the Bureau should manage all of these lands to insure that other uses do not negatively impact this endangered species or its habitat. Special emphasis should be placed on protecting the Elkhorn Plain.

6. The potential of BLM lands in other parts of the San Joaquin Valley as kit fox critical habitat should be evaluated in the spring of 1981. Surveys should be conducted using comparable techniques, preferably by the same trained field crew. BLM lands in the Salinas Valley, Carrizo Plain, north of Los Banos, and on the eastern foothills should be evaluated as soon as possible.

7. Future surveys should be conducted using a blend of aerial and ground techniques rather than limiting the efforts to ground surveys. The air sampling survey scheme should be used in the future on BLM parcels exceeding 640 acres.

8. Although grazing may adversely impact kit fox and their critical habitat, allotments are renewed each year without considering their compatibility with such sensitive habitats. The Bureau should support studies to determine the effects of cattle and sheep grazing of varying intensities on both short- and long-term success of kit fox populations. The Elkhorn Plain would make an excellent study area.

9. The Bureau should examine the state of the art as regards habitat restoration and revegetation techniques in semi-arid habitats, and apply practical programs to enhance natural recovery of disturbed BLM land holdings.

10. Predator trapping and poisoning campaigns are not compatible with potential kit fox critical habitats. Before recommending any of these land units for critical habitat status the BLM should review these practices on priority lands and proscribe them in the future. Studies should be conducted to determine the impacts of trapping and poisoning campaigns on kit fox, lagomorphs, and rodent populations on BLM lands.

11. The BLM should conclude its proposed land exchange with the Silver Creek Cattle Company because the Bureau will acquire land known to support San Joaquin kit fox, and it will not give up land that is potentially good critical habitat.

LITERATURE CITED

Egoscue, H.J. 1956. Preliminary studies of the kit fox in Utah. *J. Mammal.*, 37:351-357.

Egoscue, H.J. 1962. Ecology and life history of the kit fox in Tooele Co., Utah. *Ecology*, 43:481-497.

Egoscue, H.J. 1975. Population dynamics of the kit fox in western Utah. *Bull. So. Calif Acad. Sci.*, 74:122-127.

Hall, E.R. 1946. *Mammals of Nevada*. Univ. Calif. Press, Berkeley.

Hegdal, P.L., T.A. Gatz, K.A. Fagerstone, J.F. Glahn, and G.H. Matschke. 1979. Hazards to wildlife associated with 1080 baiting for California ground squirrels. Final Report, Interagency Study EPA-IAG-D7-0449. USFWS, Denver, Colo.

IUCN. 1968. *Red Data Book, Vol. 1. Mammalia*. Morges, Suisse.

Laughrin, L. 1970. San Joaquin kit fox. Its distribution and abundance. Admin. Rept. No. 70-2, P-R Project W-54-R, Calif. Dept. Fish and Game, Sacramento.

Morrell, S. 1972. Life history of the San Joaquin kit fox. *Calif. Fish and Game*, 58:162-174.

Morrell, S. 1975. San Joaquin kit fox distribution and abundance in 1975. Admin, Rept. No. 75-3, P-R Project W-54-R-7-1, Calif. Dept. Fish and Game, Sacramento.

O'Farrell, T.P. 1980. Elk Hills endangered and threatened species program, Phase 1 Progress Summary. U.S.D.O.E. Topical Report, EGG 1183-2403, Nevada Operations Office, Las Vegas, NV.

O'Farrell, T.P. and T. Kato. 1980. Relationship between abundance of blunt-nosed leopard lizards, *Crotaphytus silus*, and intensity of petroleum field developments in Kern County, California, 1980. U.S.D.O.E. Topical Report, EGG 1183-2413, Nevada Operations Office, Las Vegas, NV.

O'Farrell, T.P., T. Kato, P. McCue, and M.L. Sauls. 1980. Inventory of San Joaquin kit fox on BLM lands in southern and southwestern San Joaquin Valley. Final Report. U.S.D.O.E. Topical Report EGG 1183-2400, Nevada Operations Office, Las Vegas, NV.

Schitoskey, F., Jr. 1975. Primary and secondary hazards of three rodenticides to kit fox. *J. Wildl. Manage.*, 39:416-418.

Swick, C.D. 1973. San Joaquin kit fox — an impact report of secondary hazards of aerial application of 1080 grain baits for ground squirrel control in San Luis Obispo County, Calif. Dept. Fish and Game, Special Wildl. Investigations, Job II-11, Final Report, Sacramento.

Twisselman, E.C. 1967. A Flora of Kern County, California. *Wasmann J. Biol.*, 25:1-395.

APPENDIX A: DATA SUMMARY SHEETS FOR INDIVIDUAL PARCELS OF BLM LANDS SURVEYED FOR THEIR POTENTIAL AS SAN JOAQUIN KIT FOX CRITICAL HABITAT

At the end of each survey, data gathered by the field crew was collated and then synthesized to provide a concise summary of all important information gathered for each individual land parcel. Because data from individual parcels might be overlooked or lost when combined with data from other parcels into land unit summaries, they are provided here. The information on individual parcels is arranged by land unit.

Data for each parcel have been arranged into the following categories: location, topography, habitat, prey base, evidence of kit fox, conclusions, and recommendations.

Location. The township, range, and section coordinates are provided along with the title of the topographic map used. The date surveyed and names of field crew allow cross referencing with field data books.

Topography. Descriptions of drainage patterns, relief, and other topographic features that might affect kit fox are provided.

Habitat. Information on vegetation associations, and species of flora observed, were included in this category. Significant human disturbances were also described here.

Prey Base. The numbers of black-tailed jackrabbits and Audubon's cottontails observed were tallied in this category to provide an index to prey base.

Evidence of Kit Fox. The total number of each type of den observed by the field crew is given. Den types included: active natal, AN; inactive natal, IN; active multiple-hole, AM; inactive multiple-hole, IM; active single hole, AS; and inactive single hole, IS. The category also provides a summary of the numbers of kit fox tracks, scats, and prey remains observed in the land parcel.

Conclusion. A preliminary evaluation of the significance of this land parcel as kit fox critical habitat is given, and important observations that did not apply to above categories are included.

Recommendation. There are steps that should be taken to 1) maintain good habitat, 2) stop further deterioration of habitat, or 3) reverse present policies to improve habitat.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 1 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 30 July 1980

FIELD CREW: McCue, Tolladay

TOPOGRAPHY: Steep, northwest facing slope dominates the majority of the section. Valley bottom and small pond in northwest corner.

HABITAT: The dominant shrubs are *Ephedra*, *Eriogonum fasciculatum*, *Eastwoodia*, and *Gutierrezia*. Annuals include *Bromus rubens*, *Avena*, and *Erodium*.

PREY BASE: *Lepus* — 11
Sylvilagus — 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Marginal kit fox habitat due to steepness of terrain.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 2 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 10 July 1980

FIELD CREW: McCue, Tolladay

TOPOGRAPHY: Generally steep north-facing slope emptying into a large drainage. Sandstone cliffs in southern portion.

HABITAT: Annuals consist primarily of *Bromus*, *Avena*, *Festuca*, *Erodium*, and *Holocarpha;* shrubs are mainly *Atriplex polycarpa* and *Gutierrezia*. *Trichostemma* is also abundant.

PREY BASE: Information combined with Section 11 (T14S; R10E)

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Marginal kit fox habitat due to steepness of terrain.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 10 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 10 July 1980

FIELD CREW: Tolladay

TOPOGRAPHY: Gently rolling north-facing hillsides bordering large valley.

HABITAT: *Bromus*, *Avena*, *Eremocarpus*, and *Holocarpha*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Fair kit fox habitat. No sign observed.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 11 (W) LAND UNIT: Panoche

DATE OF FIELD SURVEY: 10 July 1980

FIELD CREW: Freeberg, McCue, Tolladay

TOPOGRAPHY: Eastern half of parcel is rolling land on a plateau; western half composed of sandstone cliffs and steep west-facing slopes.

HABITAT: *Bromus, Avena, Erodium, Festuca, Trichostemma,* and scattered *Atriplex polycarpa.*

PREY BASE: *Sylvilagus* — 2

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Eastern half is potentially good kit fox habitat; western half marginal due to topography; sandstone cliff area interesting — possible nesting kestrels.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 11 (NE) LAND UNIT: Panoche

DATE OF FIELD SURVEY: 30 July 1980

FIELD CREW: McCue, Tolladay

TOPOGRAPHY: Generally flat land ending at base of ridge.

HABITAT: *Bromus rubens*, *Holocarpha*, and *Trichostemma* are the dominant plant species.

PREY BASE: Information combined with Sections 1 and 12 (T14S; R10E)

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Topographically very good kit fox habitat; no sign observed, however.

TOWNSHIP RANGE: T14E; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 12 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 30 July 1980

FIELD CREW: McCue, Tolladay

TOPOGRAPHY: Long, steep, west-facing slope.

HABITAT: *Bromus, Holocarpha, Trichostemma,* with *Ephedra, Eriogonum fasciculatum, Eastwoodia,* and *Gutierrezia* dominant shrubs on slope.

PREY BASE: Information combined with Sections 1 and 11 (T14S; R10E)

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Marginal kit fox habitat due to topography.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 13 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 10 July 1980

FIELD CREW: McCue

TOPOGRAPHY: "U" shaped ridge surrounding west-running wash.

HABITAT: *Ephedra, Haplopappus,* and *Eriogonum fasciculatum* dominant shrubs. *Bromus, Festuca,* and *Erodium* primary annuals.

PREY BASE: *Lepus* — 2

EVIDENCE OF KIT FOX: Scats — 1

CONCLUSION: Moderately good kit fox habitat; one set of scats was observed.

TOWNSHIP RANGE: T14S; R10E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 24 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 10 July 1980

FIELD CREW: Freeberg, Tolladay

TOPOGRAPHY: Generally west-facing slope dissected by many small washes.

HABITAT: *Bromus, Avena, Schismus, Eriogonum fasciculatum, Ephedra,* and *Hymenoclea;* some *Juniperus.*

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Fair kit fox habitat. No sign observed, however.

TOWNSHIP RANGE: T14S; R11E

QUADRANGLE: Chounet Ranch

SECTION NUMBER(S): 1 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 7 August 1980

FIELD CREW: Collins, Tolladay, Uptain

TOPOGRAPHY: Rolling hills, generally facing north.

HABITAT: *Bromus*, *Erodium*, *Trichostemma*, and *Holocarpha*.

PREY BASE: *Sylvilagus* – 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially very good kit fox habitat.

TOWNSHIP RANGE: T14S; R11E

QUADRANGLE: Chounet Ranch

SECTION NUMBER(S): 2 (E) LAND UNIT: Panoche

DATE OF FIELD SURVEY: 7 August 1980

FIELD CREW: McCue

TOPOGRAPHY: Rolling hills, generally north facing.

HABITAT: *Bromus mollis*, *Erodium*, and *Trichostemma*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially very good kit fox habitat.

TOWNSHIP RANGE: T14S; R11E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 18 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 11 July 1980

FIELD CREW: Freeberg, McCue, Tolladay

TOPOGRAPHY: Northwest – southeast running plateau bordered by deeply dissected washes.

HABITAT: Shrubs are predominantly *Ephedra, Gutierrezia, Haplopappus, Isomeris,* and *Hemizonia.* Annual cover consists of *Bromus* and *Erodium.*

PREY BASE: *Lepus* – 3

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Plateau and wide valley to the south are potentially good kit fox habitat.

TOWNSHIP RANGE: T14S; R11E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 20 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 11 July 1980

FIELD CREW: Freeberg, McCue, Tolladay

TOPOGRAPHY: The southwest portion of the section is primarily a large plateau; it is bordered on the north and west by steep sloped washes.

HABITAT: *Ephedra, Gutierrezia, Isomeris,* and *Hemizonia.* Annuals are *Bromus, Festuca,* and *Erodium.*

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Plateau is potentially good kit fox habitat. Blunt-nosed leopard lizard observed on plateau.

TOWNSHIP RANGE: T14S; R11E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 33 (SE) LAND UNIT: Panoche

DATE OF FIELD SURVEY: 7 August 1980

FIELD CREW: Collins

TOPOGRAPHY: Deep northeast running washes and ridges dominate parcel.

HABITAT: *Atriplex polycarpa*, *Gutierrezia*, and *Hemizonia*. Annuals are primarily *Bromus mollis*, *Festuca*, *Erodium*, and *Eriogonum virideseens*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Poor kit fox habitat, due to topography.

TOWNSHIP RANGE: T15S; R11E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 4 LAND UNIT: Panoche

DATE OF FIELD SURVEY: 7 August 1980

FIELD CREW: McCue, Tolladay, Uptain

TOPOGRAPHY: Rugged parcel, dominated by northeast-southwest running wash, with many smaller drainges dumping into it.

HABITAT: Shrubs: *Atriplex polycarpa, Gutierrezia, Eriogonum inflatum,* and *Hemizonia.* Annuals: *Bromus mollis, Festuca,* and *Eriogonum viridescens.*

PREY BASE: *Sylvilagus* — 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Poor kit fox habitat — too rugged.

TOWNSHIP RANGE: T15S; R11E

QUADRANGLE: Mercey Hot Springs

SECTION NUMBER(S): 5 (E) LAND UNIT: Panoche

DATE OF FIELD SURVEY: 7 August 1980

FIELD CREW: Uptain

TOPOGRAPHY: Major drainage runs north-south through section, slopes are quite steep.

HABITAT: *Atriplex polycarpa*, *Gutierrezia*, *Hemizonia*, and *Eriogonum inflatum* are primary shrubs; *Bromus mollis*, *Festuca*, and *Avena* are dominant annuals.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Poor kit fox habitat due to rugged terrain.

TOWNSHIP RANGE: T15S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 27 (W)* LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 4 August 1980

FIELD CREW: Uptain

TOPOGRAPHY: Rolling hills, northwest-southeast ridge line along eastern boundary.

HABITAT: Annuals: *Bromus* and *Erodium* with patches of *Astragalus* and *Eremocarpus*. Shrubs: *Atriplex polycarpa* in wash bottoms.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially very good kit fox habitat.

*This also includes private land involved in the potential land exchange.

TOWNSHIP RANGE: T15S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 28 (E)* LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 4 August 1980

FIELD CREW: Florence, McCue, Collins

TOPOGRAPHY: Rolling hills, two major drainages traverse northeast through section; western portion of parcel composed of very steep, west-facing slopes.

HABITAT: Heavily grazed *Festuca, Bromus,* and *Erodium* with patches of *Euphorbia, Astragalus,* and *Eremocarpus.* Shrubs: *Gutierrezia* and *Atriplex polycarpa.*

PREY BASE: None observed

EVIDENCE OF KIT FOX: Active natal — 2
Active multiple — 1
Inactive multiple — 2
Active single — 1
Inactive single — 1
Scats — 6

CONCLUSION: Excellent kit fox habitat.

RECOMMENDATIONS: Future activities in this section should be monitored closely.

*This section includes private land involved in potential land exchange.

TOWNSHIP RANGE: T15S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 33 (E)* LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 5 August 1980

FIELD CREW: Collins, McCue, Uptain

TOPOGRAPHY: Rolling hills, slopes generally tend toward the northeast.

HABITAT: Heavily grazed *Bromus*, *Festuca*, and *Erodium*. *Astragalus* and *Eremocarpus* occur in patches.

PREY BASE: *Lepus* — 6

EVIDENCE OF KIT FOX: Active multiple — 5
Active single — 6
Inactive single — 1
Scats — 3
Prey remains — 1

CONCLUSION: Excellent kit fox habitat.

*This also includes private land involved in the potential land exchange.

TOWNSHIP RANGE: T15S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 34 (W) LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 5 August 1980

FIELD CREW: Collins, McCue, Uptain

TOPOGRAPHY: Rolling, east-west ridges.

HABITAT: Annuals: *Bromus*, *Erodium*, and *Festuca*. Shrubs: *Atriplex polycarpa* and *A. spinifera*.

PREY BASE: Information combined with Section 33.

EVIDENCE OF KIT FOX: Information combined with Section 33.

CONCLUSION: Potentially very good kit fox habitat.

TOWNSHIP RANGE: T16S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 5* LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 6 August 1980

FIELD CREW: Collins, McCue, Uptain

TOPOGRAPHY: High ridge line NW/SE dominates section giving rise to steep sloped north-south ridges to the north.

HABITAT: Moderately to heavily grazed *Bromus*, *Erodium*, *Schismus*, and *Festuca* vegetation. Some west-facing slopes practically devoid.

PREY BASE: *Lepus* — 2
Sylvilagus — 1

EVIDENCE OF KIT FOX: Prey Remains — 1

CONCLUSION: Marginal kit fox habitat due to rugged topography.

*This section is part of the potential land exchange.

TOWNSHIP RANGE: T16S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 14* LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 6 August 1980

FIELD CREW: Collins, Uptain

TOPOGRAPHY: Long, moderately steep east-facing slope, emptying into Tumey Gulch, a major north-running drainage.

HABITAT: Annuals: Grazed *Bromus*, *Amsinckia*, and *Erodium*; *Atriplex polycarpa*, *A. spinifera* and *Salsola*.

PREY BASE: *Lepus* – 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Marginal kit fox habitat.

*This also includes private land involved in the potential land exchange.

TOWNSHIP RANGE: T16S; R12E

QUADRANGLE: Tumey Hills

SECTION NUMBER(S): 21* LAND UNIT: Tumey Hills

DATE OF FIELD SURVEY: 5 August 1980

FIELD CREW: Collins, McCue, Uptain

TOPOGRAPHY: Northeast portion is a gently sloping plateau; southwest is ruggedly dissected with numerous small gulleys and washes flowing southwest.

HABITAT: Shrubs: *Eriogonum fasciculatum, E. inflatum, Gutierrezia,* and *Atriplex polycarpa.* Annuals: *Bromus mollis* and *Festuca megalura.*

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: Inactive multiple — 1 Scats — 1

CONCLUSION: Plateau is potentially good kit fox habitat; southwest area is poor kit fox habitat.

*This section is part of the potential land exchange.

TOWNSHIP RANGE: T19S; R15E

QUADRANGLE: Domengine Ranch

SECTION NUMBER(S): 2 (SE) LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 8 August 1980

FIELD CREW: Tolladay

TOPOGRAPHY: Generally low relief; drainage runs northward through section.

HABITAT: Bounded on west by Rt. 33. Annuals: *Bromus* and *Festuca*. Shrubs: *Gutierrezia* and *Atriplex polycarpa*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially good kit fox habitat.

TOWNSHIP RANGE: T19S, R15E

QUADRANGLE: Domengine Ranch

SECTION NUMBER(S): 2 (NE) LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 8 August 1980

FIELD CREW: McCue

TOPOGRAPHY: North-south ridgeline with a major drainage traversing the section. Sandstone rock outcroppings present.

HABITAT: *Bromus, Festuca, Trichostemma, Eremocarpus,* and *Gutierrezia.* Some *Atriplex polycarpa* also present in washes. Rt. 33 runs through center of parcel.

PREY BASE: *Sylvilagus* — 4

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Marginal kit fox habitat where sandstone is close to surface. Potentially good habitat in the west where relief is flatter.

TOWNSHIP RANGE: T19S; R15E

QUADRANGE: Domengine Ranch

SECTION NUMBER(S): 12 (NW) LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 8 August 1980

FIELD CREW: Collins, Uptain

TOPOGRAPHY: Rolling Hills.

HABITAT: *Bromus, Festuca, Trichostemma,* and *Gutierrezia.*

PREY BASE: *Lepus* — 5
Sylvilagus — 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially good kit fox habitat.

TOWNSHIP RANGE: T19S; R15E

QUADRANGLE: Domengine Ranch

SECTION NUMBER(S): 24 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 8 August 1980

FIELD CREW: Collins, McCue, Tolladay, Uptain

TOPOGRAPHY: Gently rolling hills bisected by a northeast drainage running through center of section.

HABITAT: Primarily a *Festuca* grassland with some *Bromus* and *Erodium* present; *Trichostemma* and *Eremocarpus* occur in patches.

PREY BASE: *Lepus* — 2

EVIDENCE OF KIT FOX: Active multiple — 1
Active single — 2
Inactive single — 1
Scats — 1
Tracks — 1

CONCLUSION: Potentially very good kit fox habitat.

TOWNSHIP RANGE: T19S; R16E

QUADRANGLE: Domengine Ranch

SECTION NUMBER(S): 18 (SW) LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 8 August 1980

FIELD CREW: Collins, McCue, Tolladay

TOPOGRAPHY: Rolling hills, bisected by one drainage running northeast.

HABITAT: Annuals: *Bromus, Festuca, Schimus* with *Euphorbia, Erodium,* and *Salsola* occuring in patches. Shrubs: *Gutierrezia.*

PREY BASE: *Lepus* – 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially very good kit fox habitat. No positive sign was seen however.

TOWNSHIP RANGE: T20S; R15E

QUADRANGLE: Coalinga

SECTION NUMBER(S): 2 (SW) LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 18 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay

TOPOGRAPHY: Gentle, south-facing hillside.

HABITAT: *Festuca, Avena, Bromus,* and *Erodium* dominant annuals. *Trichostemma, Eremocarpus, Ambrosia, Salsola,* and *Gutierrezia* also present.

PREY BASE: *Lepus* — 5
Sylvilagus — 1

EVIDENCE OF KIT FOX: Active natal — 3
Inactive multiple — 2
Active single — 1

CONCLUSION: Very good kit fox habitat, supporting at least one family group in 1980.

RECOMMENDATIONS: Section should be monitored closely and future development limited.

TOWNSHIP RANGE: T20S; R15E

QUADRANGLE: Coalinga

SECTION NUMBER(S): 2 (NE) LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 18 August 1980

FIELD CREW: Uptain

TOPOGRAPHY: Rolling Hills

HABITAT: Moderate, old oil development. *Festuca*, *Bromus*, and *Erodium*; *Gutierrezia* and *Ambrosia*.

PREY BASE: None observed

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Potentially good kit fox habitat.

TOWNSHIP RANGE: T20S; R15E

QUADRANGLE: Coalinga

SECTION NUMBER(S): 12 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 18 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Gently rolling hills.

HABITAT: Grazed *Bromus, Erodium,* and *Avena,* with scattered patches of *Eremocarpus, Phacelia, Trichostemma, Gutierrezia,* and *Ambrosia.*

PREY BASE: *Lepus* — 5
Sylvilagus — 2

EVIDENCE OF KIT FOX: Active multiple — 1
Active single — 1

CONCLUSION: Potentially very good kit fox habitat.

RECOMMENDATIONS: Future development in area should be monitored and limited.

TOWNSHIP RANGE: T21S; R15E

QUADRANGLE: Kreyenhagen Hills

SECTION NUMBER(S): 28 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 20 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Rolling, dissected ridgeline, the orientation of which is generally southeast.

HABITAT: Annuals: Grazed *Bromus* and *Erodium*. Shrubs: *Gutierrezia*, *Eriogonum fasciculatum*, *Eastwoodia*, and *Atriplex polycarpa*.

PREY BASE: *Lepus* — 3

EVIDENCE OF KIT FOX: Active single — 1

CONCLUSION: Potentially good kit fox habitat, especially along major drainage in the southern portion of parcel.

TOWNSHIP RANGE: T21S; R15E

QUADRANGLE: Kreyenhagen Hills

SECTION NUMBER(S): 22 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 18 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Steep sloped canyons running eastward, emptying into the wide Jacalitos Creek basin.

HABITAT: Grazed *Bromus* and *Festuca* with *Atriplex polycarpa* in the low relief areas; *Eastwoodia* and *Eriogonum fasciculatum* appear along ridges.

PREY BASE: *Lepus* — 5

EVIDENCE OF KIT FOX: Active single — 1
Inactive single — 2
Scats — 1
Prey remains — GI tracts and *Sylvilagus* tail

CONCLUSION: Marginal kit fox habitat in hills; BLM land in flatter areas and canyon bottoms good kit fox habitat.

TOWNSHIP RANGE: T21S; R15E

QUADRANGLE: Kreyenhagen Hills

SECTION NUMBER(S): 26 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 20 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Extremely steep, west-facing slopes in western portion of parcel; becomes rolling, east-facing hills in eastern half.

HABITAT: Annuals: Grazed *Bromus, Erodium, Avena, Festuca,* and *Holocarpha.*
Shrubs: *Atriplex polycarpa* and *Gutierrezia.*

PREY BASE: *Lepus* — 2
Sylvilagus — 3

EVIDENCE OF KIT FOX: Active single — 2

CONCLUSION: Potentially good kit fox habitat in eastern half of parcel; the western half is too rugged.

TOWNSHIP RANGE: T21S; R16E

QUADRANGLE: Avenal

SECTION NUMBER(S): 24 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 19 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Rolling Hills, ridges and washes generally run northwest.

HABITAT: *Bromus, Erodium, Festuca, Phacelia, Gutierrezia, Salsola,* and *Eremocarpus.*

PREY BASE: *Lepus* — 14

EVIDENCE OF KIT FOX: Inactive multiple — 1 Scats — 1
Inactive single — 1

CONCLUSION: Potentially good kit fox habitat.

TOWNSHIP RANGE: T21S; R17E

QUADRANGLE: Avenal

SECTION NUMBER(S): 4 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 20 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Deeply dissected canyons running generally north-south.

HABITAT: Grazed *Bromus* and *Erodium; Avena* and *Eriogonum viridescens* on hillsides. Shrubs: *Gutierrezia* and *Atriplex polycarpa*. Disturbance: Roads and old oilfield activity in northeast. Off road vehicle trails in west.

PREY BASE: *Lepus* — 5

EVIDENCE OF KIT FOX: Active single — 3 Scats — Abundant
Tracks — 2

CONCLUSION: Potentially good kit fox habitat and a great deal of positive evidence was observed.

RECOMMENDATIONS: Future development in this area should be carefully monitored and limited.

TOWNSHIP RANGE: T21S; R17E

QUADRANGLE: Avenal

SECTION NUMBER(S): 18 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 19 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Rolling hills; drainages tend to run north-south.

HABITAT: Moderately to heavily grazed *Bromus* and *Festuca*. Shrubs: *Gutierrezia* and *Atriplex polycarpa*.

PREY BASE: *Lepus* — 29

EVIDENCE OF KIT FOX: Inactive multiple — 1
Inactive single — 2

CONCLUSION: Potentially very good kit fox habitat.

TOWNSHIP RANGE: T21S, R17E

QUADRANGLE: Avenal

SECTION NUMBER(S): 28 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 19 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Rolling hills, with drainages generally heading north-south.

HABITAT: Intense oil development throughout section; very disturbed. *Bromus*, *Atriplex polycarpa*, and *Gutierrezia*.

PREY BASE: *Lepus* — 79
Sylvilagus — 3

EVIDENCE OF KIT FOX: Inactive multiple — 1 Scats — 3
Active single — 1
Inactive single — 3

CONCLUSION: Potentially good kit fox habitat. High number of lagomorphs observed.

TOWNSHIP RANGE: T21S, R17E

QUADRANGLE: Avenal

SECTION NUMBER(S): 32 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 19 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain.

TOPOGRAPHY: Central plateau running northwest-southeast through section; steep slope to each, shallower dissected slope to west.

HABITAT: *Festuca, Bromus, Trichostemma, Gutierrezia, Ambrosia,* and *Astragalus.* Disturbance limited to roads and old well pads.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: Active single — 2

CONCLUSION: Potentially good kit fox habitat.

TOWNSHIP RANGE: T21S, R17E

QUADRANGLE: La Cima

SECTION NUMBER(S): 34 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 20 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: Rolling hills, with shallow canyons running generally north-south.

HABITAT: Section is very disturbed by heavy oil development, especially southern portion. *Bromus*, *Festuca*, *Gutierrezia*, and *Atriplex polycarpa*.

PREY BASE: *Lepus* — 56
Sylvilagus — 19

EVIDENCE OF KIT FOX: Inactive multiple — 1 Scats — 2
Inactive single — 1 Tracks — 2

CONCLUSION: Potentially good kit fox habitat even with oil development. Very high prey density.

TOWNSHIP RANGE: T22S; R15E

QUADRANGLE: Kreyenhagen Hills

SECTION NUMBER(S): 12 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 16 September 1980

FIELD CREW: Kato, McCue

TOPOGRAPHY: The northern portion is composed of rolling hills the slopes of which end in a major northwest/southeast drainage. The southern portion is dominated by a steep northwest/southeast ridge.

HABITAT: Grazed *Bromus* and *Erodium* with *Trichostemma* and *Eremocarpus* in the northern hills. *Gutierrezia, Juniperus, Eriogonum fasciculatum, Atriplex, Eastwoodia,* and *Yucca whipley* occur on ridge.

PREY BASE: None observed

EVIDENCE OF KIT FOX: Scats — 2
Tracks — 3

CONCLUSION: Potential kit fox habitat.

TOWNSHIP RANGE: T22S, R16E

QUADRANGLE: Kreyenhagen Hills

SECTION NUMBER(S): 6 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 16 September 1980

FIELD CREW: Kato, McCue

TOPOGRAPHY: Rolling hills, bisected by three major northwest/southeast drainages.

HABITAT: Primarily moderately to heavily grazed *Bromus*, *Festuca*, and *Erodium*, with *Trichostemma* and *Eremocarpus* prevalent throughout the section.

PREY BASE: None observed.

EVIDENCE OF KIT FOX: Inactive multiple — 1 Scats — 3
Tracks — 2

CONCLUSION: Good potential kit fox habitat.

TOWNSHIP RANGE: T22S, R16E

QUADRANGLE: Kreyenhagen Hills

SECTION NUMBER(S): 18 LAND UNIT: Coalinga

DATE OF FIELD SURVEY: 17 September 1980

FIELD CREW: Kato, McCue

TOPOGRAPHY: The section is dominated by east-west ridges on both the north and wouth boundaries of Cedar Canyon.

HABITAT: Cedar Canyon is composed of grazed *Bromus, Festuca,* and *Erodium* with *Trichostemma* and *Eremocarpus* scattered throughout the ridges, especially the southern ridge has a diverse mixture of *Juniperus, Eriogonium fasciculatum, Gutierrezia,* and *Yucca whippleyi.*

PREY BASE: *Sylvilagus* — 1

EVIDENCE OF KIT FOX: Active single — 1 Scats — 1

CONCLUSION: Good potential kit fox habitat.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: McKittrick Summit

SECTION NUMBER(S): 6 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 12 August 1980

FIELD CREW: McCue, Tolladay, Lorenzana, Uptain

TOPOGRAPHY: Extremely rugged terrain; dissected by deep north-south washes.

HABITAT: Annual vegetation consists primarily of *Bromus*, *Schismus*, and *Erodium* with some *Stipa* present. The shrub cover is a composite of *Gutierrezia*, *Atriplex polycarpa*, *Eriogonum fasciculatum*, *Eastwoodia*, and *Eurotia*.

PREY BASE: *Lepus* — 4
Sylvilagus — 1

EVIDENCE OF KIT FOX: Inactive multiple — 1 Scats — 2
Active single — 1 Tracks — 1

CONCLUSION: Marginal kit fox habitat at best, due to the rugged topography.

RECOMMENDATIONS: Activity in the area should be monitored, but primarily in the less rugged area to the south.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Painted Rock

SECTION NUMBER(S): 7 (NE) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 12 August 1980

FIELD CREW: McCue, Tolladay, Lorenzana

TOPOGRAPHY: The topography of this small parcel is dominated by two major northeast/southwest drainages which converge in the southwest corner.

HABITAT: *Bromus, Festuca,* and *Gutierrezia* complex in the lower relief southwest area; *Eastwoodia, Atriplex polycarpa,* and *Eriogonum fasciculatum* appearing in the steeper slopes and ridges.

PREY BASE: *Lepus* — 7

EVIDENCE OF KIT FOX: Inactive multiple — 1
Active single — 1

CONCLUSION: Fair kit fox habitat in the southwest. One blunt-nosed leopard lizard observed.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Painted Rock

SECTION NUMBER(S): 7 (SW) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 12 August 1980

FIELD CREW: McCue

TOPOGRAPHY: Rolling hills running east-west forming the Elkhorn Scarp.

HABITAT: *Bromus, Schismus, Euphorbia, Holocarpha,* and *Eremocarpus* with shrub cover of *Gutierrezia,* scattered *Astragalus.*

PREY BASE: *Lepus* — 2

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Good kit fox habitat.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 8 (W) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 12 August 1980

FIELD CREW: McCue, Lorenzana

TOPOGRAPHY: Gently rolling hills in the southern one fourth section; increasing in steepness to the north.

HABITAT: Annuals consist primarily of *Schiemus, Stipa,* and *Bromus.* Dominant shrubs are *Gutierrezia, Ephedra, Eurotia,* and *Eriogonum fasciculatum.*

PREY BASE: *Lepus* — 10

EVIDENCE OF KIT FOX: Active single — 1
Inactive single — 2

CONCLUSION: Southern section good kit fox habitat; northern portion marginal at best.

RECOMMENDATIONS: Activity in the southern portion should be monitored and development limited.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 17 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 12 August 1980

FIELD CREW: Tolladay, Uptain

TOPOGRAPHY: The majority of the section is flat land in the bottom of the Elkhorn Plain. The northeast (Temblor foothills) and southwest (Elkhorn Scarp) consists of steeper terrain.

HABITAT: Vegetation in the section consists primarily of grazed *Schismus* and *Bromus* with scattered *Gutierrezia* in the plain; *Ephedra, Atriplex polycarpa,* and *Eriogonum fasciculatum* increasing in the foothills.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: Active single — 1

CONCLUSION: Very good kit fox habitat; one blunt-nosed leopard lizard observed.

RECOMMENDATIONS: Activity should be monitored and future development avoided.

TOWNSHIP RANGE: T31S, R21E

QUADRANGLE: Painted Rock

SECTION NUMBER(S): 18 (NE) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 13 August 1980

FIELD CREW: Lorenzana, McCue, Tolladay, Uptain

TOPOGRAPHY: North-facing rolling foothills of the Elkhorn Scarp.

HABITAT: *Bromus*, *Schismus*, *Erodium*, and *Festuca* are the primary annuals; *Atriplex* and *Eastwoodia* are found throughout the parcel; *Eurotia* and *Eriogonum fasciculatum* are present on south-facing slopes.

PREY BASE: *Lepus* — 1

EVIDENCE OF KIT FOX: Inactive multiple — 1
Active single — 2
Inactive single — 2

CONCLUSION: Good kit fox habitat along the foothils of the Elkhorn Scarp.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 21 (E) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 13 August 1980

FIELD CREW: Lorenzana, Tolladay, Uptain

TOPOGRAPHY: Gently rolling hills in the southwest, becoming increasingly dissected and rugged in the northeast.

HABITAT: *Bromus, Schismus,* and *Festuca* are the primary annuals; *Atriplex polycarpa, Gutierrezia,* and *Ephedra* are the dominant shrubs through the majority of the section.

PREY BASE: *Lepus* — 5

EVIDENCE OF KIT FOX: Active single — 1
Inactive single — 1

CONCLUSION: Good kit fox habitat.

RECOMMENDATIONS: Activity in this section should be monitored and future development limited.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 22 (SW) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 13 August 1980

FIELD CREW: McCue

TOPOGRAPHY: Moderately steep northeast/southwest running drainages becoming rolling hills in the southwest.

HABITAT: Dominant shrubs consist of *Atriplex polycarpa, Gutierrezia,* and *Ephedra* in the lower areas, adding *Eriogonum fasciculatum* and *Yucca whipleyi* in the high ridges and peaks. Annuals are dominated by *Bromus, Schismus,* and *Festuca.*

PREY BASE: *Lepus* — 1
Sylvilagus — 2

EVIDENCE OF KIT FOX: Scats — 1

CONCLUSION: Fair kit fox habitat.

RECOMMENDATIONS: Activity in this area should be monitored and future development limited.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 27 (E) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 13 August 1980

FIELD CREW: McCue, Lorenzana, Tolladay

TOPOGRAPHY: The northern half encompasses a major east-west drainage, while the southern portion consists of a series of north-south ridges.

HABITAT: *Ephedra*, *Gutierrezia*, *Eastwoodia*, and *Eriogonum fasciculatum* are the dominant shrubs; *Bromus*, *Festuca*, and *Amsinckia* the dominant annuals.

PREY BASE: *Lepus* — 4
Sylvilagus — 1

EVIDENCE OF KIT FOX: None observed

CONCLUSION: Fair kit fox habitat throughout section. Major disturbance is roads and powerlines in northwest and southwest.

RECOMMENDATIONS: Activity in the area should be monitored and development limited.

TOWNSHIP RANGE: T31S; R21E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 35 (N) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 13 August 1980

FIELD CREW: McCue, Lorenzana, Tolladay, Uptain

TOPOGRAPHY: This section consists of steep rounded hills in the south and west, becoming rugged in the northeast. Drainages tend to run northeast/southwest.

HABITAT: Shrub cover is primarily *Ephedra, Gutierrezia, Eriogonum fasciculatum, Eastwoodia,* and *Eurotia* in order of decreasing abundance. Annuals are *Schismus, Bromus,* and *Festuca.*

PREY BASE: *Lepus* — 5
Sylvilagus — 1

EVIDENCE OF KIT FOX: Scats — 1

CONCLUSION: Moderately good kit fox habitat in the southern and western portions, becoming marginal in the northeast. One blunt-nosed leopard lizard observed.

RECOMMENDATIONS: Activity in the area should be monitored and development limited.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 7 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 25 August 1980

FIELD CREW: Kato, Freeberg, McCue, Sauls

TOPOGRAPHY: The majority of this section consists of steep washes emptying into a deep northeast/southwest drainage. The southwest portion of the section is rolling hills.

HABITAT: *Gutierrezia, Eriogonum fasciculatum, Yucca whippleyi, Ephedra,* and *Lycium* are the dominant shrub species on the steeper slopes; grazed *Schismus, Bromus,* and *Erodium* occur along with scattered *Gutierrezia* in the lower hills.

PREY BASE: *Lepus* — 6
Sylvilagus — 1

EVIDENCE OF KIT FOX: Active single — 2 Scats — 5
Fox observed — 1

CONCLUSION: The majority of northeast Section 7 is marginal kit fox habitat due to the rugged topography, although evidence indicates that kit fox probably do hunt in the major drainage. The southwest portion is good kit fox habitat. One blunt-nosed leopard lizard observed.

RECOMMENDATIONS: The southern and western portions of Section 7 along with the major drainages should be protected from disturbances.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 17 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 26 August 1980

FIELD CREW: Freeberg, Kato, McCue, Sauls

TOPOGRAPHY: Rolling hills throughout the southern half, becoming rugged and dissected in the northern half.

HABITAT: Vegetation in the flats consisted of grazed *Schismus*, *Erodium*, and *Bromus rubens* with scattered *Gutierrezia*, while *Ephedra*, *Eriogonum fasciculatum*, *Eastwoodia*, and *Hymenoclea* were the dominant shrubs in the rugged areas.

PREY BASE: *Lepus* — 10
Sylvilagus — 4

EVIDENCE OF KIT FOX:

Active natal — 2	Scats — 10
Active multiple — 1	Tracks — 1
Active single — 4	Prey remains — 1

CONCLUSION: Southern half of section is good kit fox habitat, becoming marginal to the north. One blunt-nosed leopard lizard observed.

RECOMMENDATIONS: Further development of this area should be monitored.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 18 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 25 August 1980

FIELD CREW: Freeberg, Kato, McCue, Sauls

TOPOGRAPHY: Flat throughout the majority of the section, becoming hilly in the northeast corner.

HABITAT: Vegetation in flats is primarily *Schismus* and *Erodium* grassland with scattered *Gutierrezia;* patches of *Ephedra* and *Hymenoclea* occur near northeast hills.

PREY BASE: *Lepus* — 7

EVIDENCE OF KIT FOX:

Active natal — 3	Scats — 11
Active multiple — 1	Tracks — 1
Active single — 1	Prey remains — 1

CONCLUSION: Excellent kit fox habitat; possibly the best the Bakersfield District has; the primary impact is moderate/heavy grazing. Two blunt-nosed leopard lizards observed.

RECOMMENDATIONS: Further development in this area should be monitored and major disturbances should be avoided.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 19 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 25 August 1980

FIELD CREW: Freeberg, Kato, McCue, Sauls

TOPOGRAPHY: Flat in the northern and eastern portions of section; the Elkhorn Scarp, a series of low hills, traverses the section northwest to southeast.

HABITAT: Vegetation in the flats consists of *Bromus rubens*, *Schismus arabicus*, *Erodium*, *Holocarpha*, *Astragalus*, and *Gutierrezia*. Vegetation in the scarp is dominated by *Bromus*, *Festuca microstachys*, *Eastwoodia*, *Atriplex polycarpa*, and *Gutierrezia*.

PREY BASE: *Lepus* — 2

EVIDENCE OF KIT FOX: Active natal — 1 Scats — 4
Active multiple — 1
Active single — 2

CONCLUSION: Excellent kit fox habitat; the primary impact is moderate/heavy grazing.

RECOMMENDATIONS: Further development of this area should be monitored and major disturbances should be avoided.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Panorama Hills

SECTION NUMBER(S): 20 (N) (private) LAND UNIT:

DATE OF FIELD SURVEY: 26 August 1980

FIELD CREW: Kato, McCue

TOPOGRAPHY: Flat land in the bottom of the Elkhorn Plain.

HABITAT: *Schismus*, *Erodium*, *Festuca*, and *Bromus* grassland.

PREY BASE: *Lepus* — 2

EVIDENCE OF KIT FOX: Active multiple — 2 Scats — 6

CONCLUSION: Excellent kit fox habitat. One blunt-nosed leopard lizard observed.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Elkhorn Hills

SECTION NUMBER(S): 27 (S) and 34 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 23 September 1980

FIELD CREW: Collins, Freeberg, Kato, McCue

TOPOGRAPHY: Flat bottom land within the Elkhorn Plain bordered on the north by the rugged Temblor Range and the hilly Elkhorn Scarp to the south.

HABITAT: Grazed *Festuca, Bromus,* and *Schismus;* scattered *Astragalus, Eremocarpus,* and *Euphorbia;* no shrubs in flats. *Chrysothamnus, Atriplex,* and *Gutierrezia* appear in scarp, *Eriogonum fasciculatum* and *Ephedra* in Temblors.

PREY BASE: *Lepus* — 3

EVIDENCE OF KIT FOX: Active natal — 2
Active multiple — 4
Inactive multiple — 2
Active single — 5
Inactive single — 1

Scats — 23

CONCLUSION: Excellent kit fox habitat. Eighteen blunt-nosed leopard lizards observed.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Elkhorn Hills

SECTION NUMBER(S): 33 (N) and 28 LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 23 September 1980

FIELD CREW: Collins, Freeberg, Kato, McCue

TOPOGRAPHY: Generally flat, becoming hilly to the south along the Elkhorn Scarp.

HABITAT: Moderately to heavily grazed *Bromus*, *Schismus*, and *Festuca;* with scattered *Eremocarpus* and *Astragalus* and *Ephedra; Gutierrezia, Eriogonum viridescens, Eriogonum fasciculatum, Eastwoodia, Atriplex polycarpa,* and *Chrysothamnus* appear along the hilly Elkhorn Scarp.

PREY BASE: *Lepus* — 11

EVIDENCE OF KIT FOX: Active natal — 4 Scats — 18
Active multiple — 4 Tracks — 1
Inactive multiple — 1

CONCLUSION: Excellent kit fox habitat. Five blunt-nosed leopard lizards observed.

TOWNSHIP RANGE: T32S; R22E

QUADRANGLE: Elkhorn Hills

SECTION NUMBER(S): 35 (W) LAND UNIT: Elkhorn Plain

DATE OF FIELD SURVEY: 23 September 1980

FIELD CREW: Collins, Freeberg, Kato, McCue

TOPOGRAPHY: Generally flat, with rolling hills in the southern portion.

HABITAT: Heavily grazed *Bromus* and *Schismus; Euphorbia, Eremocarpus,* and *Astragalus* abundant in hills.

PREY BASE: None observed

EVIDENCE OF KIT FOX:

Active natal — 1	Scats — 3
Inactive multiple — 2	Tracks — 1
Active single — 1	Prey remains — 1

CONCLUSION: Very good kit fox habitat.

APPENDIX B: KIT FOX DEN ANALYSIS SHEETS OF SIGNIFICANT INFORMATION FOUND WITHIN EACH LAND UNIT

The following data are included:

CODE. Each den received an individual code number to facilitate cross-referencing with field notebooks and map references. The code consists of the section number, followed by the transect line number, and den number. Transect lines were number 1 through 8 from west to east or north to south, depending on how the transects were arranged within a land parcel. The den number was the cumulative number of dens found to that point on a specific transect. For example, in the Coalinga Land Unit, den 28-3-4, indicates that the den was found in Section 28, on the third of 8 transects numbered from west to east, and the specific den was the fourth den found on that transect.

CATEGORY. Dens were classified using the following abbreviations: AN — active natal den, AM — active multiple-hole den, AS — active single-hole den, IN — inactive natal den, IM — inactive multiple-hole den, IS — inactive single-hole den, AU — active unique den, and IU — inactive unique den. Active dens had Positive evidence of use by fox in (1980); inactive dens did not. Natal dens had multiple holes, matted vegetation, and prey remains. Unique dens, such as in culverts, were described when found.

NUMBER OF HOLES. The number of holes for each den was counted.

SLOPE POSITION. Position of dens on slopes was noted as follows: C — crest of hill, U — upper slope, M — mid-slope, L — lower slope, W — wash bottom, and F — found in the flats away from a slope.

DEN FACING. The compass direction (in degrees) faced by the den was determined.

SLOPE ANGLE. Slope angles (in degrees) where dens were found were measured with a clinometer.

ELEVATION. Presented here in both English and metric units.

VEGETATION DOMINANTS. The dominant ground cover and shrubs associated with individual den sites were noted using the following species key: Atpo — *Atriplex polycarpa*, Atsp — *Atriplex spintfera*, Avba — *Avena barbata*, Brru — *Bromus rubens*, Brsp — *Bromus* sp., Eael — *Eastwoodia elegans*, Epca — *Ephedra californicus*, Erci — *Erodium cicutarium*, Erfa — *Eriogonum fasciculatum*, Erse — *Eremocarpus setigerus*, Feme — *Festuca megalura*, Fesp — *Festuca* sp., Gubr — *Gutierrezia bracteata*, Hali — *Haplopappus linearifolius*, Hysa — *Hymenoclea salsola*, Lasp — *Lactuca* sp., Lysp — *Lycium* sp., Saka — *Salsola kali*, Scar — *Schismus arabicus*, Trov — *Trichostema ovatum*, Yuwh — *Yucca whippleyi*, and NA — not available.

ANIMAL SIGNS. Where observed at a den, the following types of information were noted with a plus (+): fox scats, fox tracks, fox prey remains, vegetation matted by fox (particularly pups), presence of owls (slices, pellets, prey), other mammals (observed, tracks, scats), and dirt berms due to animal digging. The following abbreviations were used in the Other Animals category: BO — burrowing owl, CY — coyote, BA — badger, UR — unidentified rodent, and CR — blunt-nosed leopard lizard.

HUMAN ACTIVITIES. The types and degrees of human activities proximate to the den site were summarized. The following abbreviations indicate human activities: UD — undisturbed, G — grazing, HG — heavy grazing, R — road, DR — dirt road, HWY — highway, OW — oil well, TS — tank settings, DM — dirt mound, and NA — data not available.

Den analysis sheets in this Appendix are presented for individual land units. Within land units the den analyses are arranged by section, transect number, and den order within individual transects.

An asterisk following den code indicates dens observed on private land. These data were not used in the Results or Discussion sections but are provided as supplementary information.

Land Unit: Tumey Hills

Den Code Number	28-1-1	28-1-2	28-2-1	28-3-2	28-3-3	28-3-4	28-4-1	34-1-1	33-2-1	33-2-2	35-3-1
Township/Range	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E
Category	AM	AS	AN	IS	IM	AN	IM	AM	AS	AM	AS
Number of Holes	2	1	4	1	2	4	NA	2	1	3	1
Slope Position	M	M	L	C	C	C	M	L	L	C	L
Den Facing (degrees)	40	155	12	20	53	58	90	140	62	50	180
Slope Angle (degrees)	15	18	5	15	5	25	NA	12	36	17	30
Elevation (ft) (m)	1240 378	1160 354	1240 378	1250 381	1280 390	1280 390	1160 354	1140 348	NA	NA	1040 317
Vegetation Dominants	Brsp Erse Atsp	Brsp Atpo	Brsp Fesp	Brsp Gubr	Brsp Gubr	Brsp Gubr	NA	Brsp Erse Atsp	NA	Brsp Hali	Brru Atpo
Animal Sign:											
Fox Scats	+		+	+		+	+	+			
Fox Tracks						+					
Prey Remains	+			+				+			
Matted Vegetation											
Other Animals								BA			
Dirt Berms	+	+	+	+	+	+	+	+	+	+	+
Human Activities	HG	G	G	UD	UD	UD	UD	DR	UD	HG	UD

Land Unit: Tumey Hills (continued)

Den Code Number	35-3-2	35-3-3	35-3-4	34-3-5	34-3-6	34-3-7	34-3-8	34-3-9	21-1-1		
Township/Range	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T15S R12E	T16S R12E		
Category	AS	IS	AS	AM	AM	AS	AM	AS	IM		
Number of Holes	1	1	1	3	2	1	4	1	4		
Slope Position	M	F	M	W	W	W	W	W	NA		
Den Facing (degrees)	0	NA	90	5	180	180	180	85	215		
Slope Angle (degrees)	40	0	25	5	30	40	35	25	10		
Elevation (ft) (m)	1040 317	1060 323	1060 323	1000 305	1000 305	1000 305	1040 317	1040 317	2040 622		
Vegetation Dominants	Brsp	Brru	Brru	Brsp Atpo	Brru Atpo	Brru Atpo	Brsp Atpo	Brsp	Brru Scar Atpo		
Animal Sign:											
Fox Scats											
Fox Tracks											
Prey Remains											
Matted Vegetation											
Other Animals			UR	BO							
Dirt Berms	+	+	+	+	+	+	+	+			
Human Activities	UD	UD	UD	UD	UD	UD	UD	UD	UD		

Land Unit: Tumey Hills (continued): Private Land

Den Code Number	35P-1*	35P-2*	35P-3*	35P-4*	35P-5*						
Township/Range	T15S R11E	T15S R11E	T15S R11E	T15S R11E	T15S R11E						
Category	AN	AN	AN	AN	AN						
Number of Holes	4	3	4	2	2						
Slope Position	U	M	M	M	L						
Den Facing (degrees)	148	186	174	162	158						
Slope Angle (degrees)	6	5	NA	6	8						
Elevation (ft) (m)	1230 375	1230 375	1230 375	1230 375	1220 372						
Vegetation Dominants	Brsp Trov	Brsp Trov	Brsp	Brsp Trov	Brsp Trov						
Animal Sign:											
Fox Scats	+	+	+	+	+						
Fox Tracks											
Prey Remains			+								
Matted Vegetation	+	+	+								
Other Animals	CR										
Dirt Berms	+	+	+	+	+						
Human Activities	HG	HG	HG	HG	HG						

Land Unit: Coalinga

Den Code Number	24-8-2	24-7-1	24-3-1	24-8-1	2-3-1	2-1-1	2-2-2	2-2-1	2-3-2	2-2-3	12-1-2
Township/Range	T19S R15E	T19S R15E	T19S R15E	T19S R15E	T20S R15E	T20S R15E	T20S R15E	T20S R15E	T20S R15E	T20S R15E	T20S R15E
Category	AS	AS	IS	AM	IM	AN	AN	AN	IM	AS	AS
Number of Holes	1	1	1	2	4	7	5	4	3	1	1
Slope Position	M	L	F	L	C	M	U	F	L	U	L
Den Facing (degrees)	80	322	NA	250	110	192	63	300	170	65	NA
Slope Angle (degrees)	23	8	2	15	15	5	13	7	5	12	NA
Elevation (ft) (m)	755 230	810 247	NA	750 229	980 299	970 296	1080 329	1060 325	1010 308	1080 329	840 256
Vegetation Dominants	Fesp Brsp Erci Atpo	Fesp Brsp Trov	Fesp Erse Trov	Fesp Erci	Brru Trov Erse Saka	Brsp Lasp Fesp Saka	Brsp Fesp Gubr	NA	Brru Erse Trov	Fesp Brsp Trov	Brsp Erci Erse
Animal Sign:											
Fox Scats						+	+	+			
Fox Tracks											
Prey Remains								+			
Matted Vegetation						+	+	+			
Other Animals		BO									
Dirt Berms		+	+	+	+	+	+	+	+		+
Human Activities	UD	UD	G	UD	HWY	HWY	UD	OW TS R	HWY	R	UD

Land Unit: Coalinga (continued)

Den Code Number	12-1-1	22-1-1	22-2-1	22-2-2	26-1-1	26-2-1	28-8-1	24-8-1	24-6-1	18-1-2	18-1-1
Township/Range	T20S R15E	T21S R15E	T21S R15E	T21S R15E	T21S R15E	T21S R15E	T21S R15E	T21S R16E	T21S R16E	T21S R17E	T21S R17E
Category	AM	IS	IS	AS	AS	AS	AS	IS	IM	IM	IS
Number of Holes	4	1	1	1	1	1	1	1	2	4	1
Slope Position	M	C	C	L	U	M	M	M	L	M	L
Den Facing (degrees)	227	78	160	293	50	67	355	348	252	74	23
Slope Angle (degrees)	15	5	NA	32	13	27	38	12	20	20	30
Elevation (ft) (m)	860 262	950 290	885 270	800 244	1100 336	1200 366	790 241	750 229	760 232	760 232	740 226
Vegetation Dominants	Brsp Fesp	Brru Avba Gubr	Brsp Eael Gubr	Brsp Avba Atpo	Brsp Avba Saka Gubr	Brsp Avba Erse	Brsp Atpo Gubr	Brsp Fesp Saka	Brsp Feme Erse	Brsp Feme Erse	Brsp Fesp Gubr
Animal Sign: Fox Scats											
Fox Tracks									+		
Prey Remains	+										
Matted Vegetation											
Other Animals											
Dirt Berms		+	+	+	+	+	+		+	+	
Human Activities	DM	UD	NA	G	UD	UD	R	UD	HWY	UD	UD

Den Code Number	18-2-1	28-3-4	28-3-1	28-3-2	28-3-3	4-1-2	4-1-1	4-1-3	32-3-1	32-4-1	34-3-1	34-3-2
Township/Range	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E	T21S R17E
Category	1S	1M	1S	1S	1S	AS	AS	AS	AS	AS	1S	1M
Number of Holes	1	4	1	1	1	1	1	1	1	1	1	2
Slope Position	M	U	L	NA	W	W	U	W	L	L	U	U
Den Facing (degrees)	55	148	144	206	72	66	168	252	118	200	340	48
Slope Angle (degrees)	25	60	30	50	45	NA	25	NA	75	20	35	40
Elevation (ft) (m)	720 220	725 221	790 241	825 252	725 221	1050 320	1075 328	1025 313	1025 313	1135 346	880 268	900 275
Vegetation Dominants	Brsp Fesp Atpo	Brru	Brru	Brru Erse Hysa Atpo	Brru Atpo	Brsp Avba Atpo	Brsp Atpo	Avba Brsp	Brru Erse	Brsp Erse	Brru Erse	Brru Erse Gubr
Animal Sign:												
Fox Scats								+		+	+	
Fox Tracks										+	+	+
Prey Remains	+											
Matted Vegetation									+			
Other Animals												
Dirt Berms	NA	+	+		+					+	+	+
Human Activities	OW	NA	OW R	UD	OW R	UD	UD	UD	UD	UD	OW R	UD

Den Code Number	6-1-1	28-1-1	18-1-1								
Township/Range	T22S R16E	T21S R17E	T22S R16E								
Category	IM	AS	AS								
Number of Holes	3	1	1								
Slope Position	M	M	U								
Den Facing (degrees)	2	355	52								
Slope Angle (degrees)	20	38	20								
Elevation (ft) (m)	1150 351	800 244	1130 344								
Vegetation Dominants	Brru Fesp Trov	Brru Atpo Gubr	Brru Fesp Trov								
Animal Sign:											
Fox Scats											
Fox Tracks			+								
Prey Remains											
Matted Vegetation											
Other Animals											
Dirt Berns											
Human Activities	UD	DR	G								

Land Unit: Elkhorn Plain

Den Code Number	6-2-1	6-2-2	7-1-1	7-3-1	8-2-1	8-3-1	8-4-1	17-3-1	18-6-1	18-1-2	18-1-1
Township/Range	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T31S R21E
Category	IM	AS	AS	IM	IS	IS	AS	AS	AS	IM	IS
Number of Holes	4	1	1	6	1	1	1	1	1	5	1
Slope Position	M	L	M	W	U	M	M	F	L	U	M
Den Facing (degrees)	142	160	200	46	242	207	183	250	40	18	310
Slope Angle (degrees)	12	17	20	60	5	10	26	0	20	40	50
Elevation (ft) (m)	2840 866	2949 899	2500 673	2703 824	2703 824	2700 823	2749 838	2450 747	2350 716	2560 781	2550 778
Vegetation Dominants	Brsp Erci Hysa Atsp	Brsp Erci Atsp	Brsp Fesp Gubr	Brru Atpo Ersp Eael	Brru Gubr Eael	Brsp Gubr Yuwh	Brsp Scar Epca	Brru	Brru Atpo Epca	Brru Gubr Eael	Brsp Eael Gubr
Animal Sign:											
Fox Scats				+							
Fox Tracks		+									
Prey Remains											
Matted Vegetation				+	+						
Other Animals							BO				
Dirt Berms		+		+	+	+	+	+	+	+	+
Human Activities	UD	UD	UD	UD	UD	UD	UD	R	UD	UD	UD

Land Unit: Elkhorn Plain (continued)

Den Code Number	21-3-1	18-2-1	18-2-2	21-1-1	7-2-1	7-5-1	17-1-1	17-1-2	17-2-1	17-3-1	17-5-1
Township/Range	T31S R21E	T31S R21E	T31S R21E	T31S R21E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E
Category	IS	AS	IS	AS	AS	AS	AN	AM	AS	AN	AS
Number of Holes	1	1	1	1	1	1	4	6	1	5	1
Slope Position	W	U	C	M	L	F	F	F	L	L	U
Den Facing (degrees)	280	39	NA	218	148	250	NA	NA	281	182	150
Slope Angle (degrees)	35	31	NA	10	5	5	NA	NA	20	5	20
Elevation (ft) (m)	2476 755	2499 762	2503 763	2450 747	2350 717	2425 740	2290 698	2350 717	2400 732	2325 709	2450 747
Vegetation Dominants	Brsp Gubr Eael	Brsp Fesp Atpo	Brsp Erci Scar Atpo	Brru Hysa Epca	Scar Epca Lysp	Brsp Fesp	Scar Erci Gubr	Scar Epca Gubr	Brsp Scar Epca Eael	Scar Gubr	Scar Atpo Gubr Epca
Animal Sign:											
Fox Scats							+	+	+	+	+
Fox Tracks								+		+	
Prey Remains							+		+		
Matted Vegetation					+		+	+	+	+	+
Other Animals	UR					BO	UR	CY	UR		
Dirt Berms	+	+	+		+	+	+	+	+	+	+
Human Activities	UD	UD	UD	UD	HG	HG	HG	HG	UD	HG	HG

Land Unit: Elkhorn Plain (continued)

Den Code Number	17-6-1	17-6-2	18-3-1	18-6-1	18-6-2	18-7-1	18-7-2	19-8-1	19-1-1	19-4-1	19-5-1
Township/Range	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E
Category	AS	AS	AN	AN	AN	AS	AM	AM	AS	AN	AS
Number of Holes	1	1	10	4	3	1	2	5	1	3	1
Slope Position	L	M	M	F	F	M	M	F	U	M	L
Den Facing (degrees)	74	286	120	198	120	122	322	NA	360	158	126
Slope Angle (degrees)	25	25	5	5	12	30	30	NA	30	10	21
Elevation (ft) (m)	2450 747	2450 747	2275 694	2275 694	2275 694	2400 732	2400 732	2250 686	2200 671	2225 679	2175 663
Vegetation Dominants	Scar Brru Epca Gubr	Brsp Scar Epca Eael	Brsp Gubr	Brsp Fesp	Brsp Gubr	Brru Scar Epca	Brru Scar Erfa Eael	Scar Brru Gubr	Fesp Brru Eael	Brsp Gubr	Brsp Scar Epca
Animal Sign:											
Fox Scats		+	+	+	+				+	+	
Fox Tracks		+					+		+	+	
Prey Remains			+	+	+					+	
Matted Vegetation	+	+	+		+	+	+	+			
Other Animals				BO		BO			UR	UR	UR
Dirt Berms	+	+	+	+	+	+	+	+		+	+
Human Activities	R HG	R HG	HG	HG	HG	HG	HG	R HG	HG	HG	HG

Land Unit: Elkhorn Plain (continued)

Den Code Number	27-3-1	27-3-2	27-2-1	27-2-2	20-7-1*	20-8-1*	28-1-2	28-1-1	28-2-1	28-3-1	28-4-1
Township/Range	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E
Category	AS	IS	AS	AN	AM	AM	AN	AN	IM	AM	AM
Number of Holes	1	1	1	5	3	3	4	5	4	7	4
Slope Position	F	F	F	F	F	F	F	F	F	L	F
Den Facing (degrees)	NA	NA	237	183	237	213	NA	336	11	210	NA
Slope Angle (degrees)	0	0	80	6	5	8	0	3	6	8	0
Elevation (ft) (m)	NA	NA	2425 739	2435 742	2300 701	2300 701	2309 704	2309 704	2310 705	2320 707	2325 709
Vegetation Dominants	Scar Brru	Scar Brru	Fesp Brsp	Fesp Brsp Scar	Brsp Scar	Brsp Scar Epca	Fesp Epca	Fesp Epca	Fesp Erse	Scar Fesp Epca	Scar Epca
Animal Sign:											
Fox Scats			+	+	+	+	+	+	+	+	+
Fox Tracks					+			+			
Prey Remains				+					+		+
Matted Vegetation				+	+	+	+	+			+
Other Animals						UR	UR		CY		
Dirt Berms	+	+		+	+		+	+	+	+	+
Human Activities	UD	UD	HG	HG	HG	HG	HG	HG	HG	HG	HG

Den Code Number	28-5-1	28-5-2	28-7-1	33-4-2	34-2-1	34-2-2	35-2-1	34-3-1	34-3-2	34-4-1	34-4-2
Township/Range	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E
Category	AM	AN	AN	AM	AS	AM	AS	IM	IM	AM	AS
Number of Holes	4	9	6	3	1	7	1	2	3	2	1
Slope Position	F	F	F	C	C	L	U	U	NA	U	U
Den Facing (degrees)	NA	NA	NA	210	NA	208	40	22	NA	50	340
Slope Angle (degrees)	0	0	0	8	0	25	10	15	NA	21	16
Elevation (ft) (m)	2325 709	2325 709	2360 719	2360 719	2440 744	2400 732	2500 762	2400 732	2400 732	2400 732	2421 738
Vegetation Dominants	Scar Erci Epca	Scar Brsp Erci	Brsp Epca	Scar Brsp Erfa	Fesp Gubr	Brsp Fesp	Scar Erci	Scar Fesp	Scar Fesp	Scar Ersp	Scar Fesp Brsp
Animal Sign:											
Fox Scats	+	+	+			+	+	+	+		
Fox Tracks	+	+	+	+			+				
Prey Remains		+	+								
Matted Vegetation	+	+	+								
Other Animals		BO UR				CY			CY		
Dirt Berms		+			+	+	+	+	+	+	+
Human Activities	HG	HG	HG	UD	HG	HG	HG	UD	UD	UD	UD

Land Unit: Elkhorn Plain (continued)

Den Code Number	34-4-3	34-5-1	34-7-1	34-8-1	35-2-2	35-4-1	35P-1*				
Township/Range	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E	T32S R22E				
Category	AM	AS	AM	AN	AN	IM	IM				
Number of Holes	3	1	3	5	9	4	3				
Slope Position	U	F	U	F	L	C	M				
Den Facing (degrees)	242	NA	260	NA	110	248	307				
Slope Angle (degrees)	16	0	10	0	5	6	19				
Elevation (ft) (m)	2401 732	2475 754	2450 747	2450 747	2475 754	2475 754	2500 762				
Vegetation Dominants	Scar Fesp Brsp	Brsp	Scar Brru Erse	Scar Brsp Erci	Scar Brsp Erse	Brsp Scar	Brsp Fesp				
Animal Sign:											
Fox Scats		+	+	+	+	+	+				
Fox Tracks			+	+	+						
Prey Remains	+	+	+	+	+						
Matted Vegetation				+	+		+				
Other Animals		UR		UR	UR	UR	UR				
Dirt Berms	+	+	+	+	+	+	+				
Human Activities	UD	UD	HG	HG	HG	HG	HG				

APPENDIX C: VERTEBRATES OBSERVED DURING NIGHT SPOTLIGHT SURVEYS OF BLM LANDS, 1980

Information is presented both in a table summarizing vertebrates observed on ten spotlight surveys, and in individual night survey sheets prepared following each survey. The night survey sheets include information on date, route, personnel conducting survey, start and finish time, mileage, speed, weather conditions, and total observations.

Vertebrates observed during night spotlight surveys of potential kit fox habitat in the Panoche Hills, Tumey Hills, and Elkhorn Plain, California, 1980

Species	Survey Locations*										Total
	A	B	C	D	E	F	G	H	I	J	
San Joaquin Kit Fox	--	--	--	1	1	--	--	--	4	15	21
Black-Tailed Jackrabbit	2	8	15	18	3	3	5	4	20	20	98
Desert Cottontail	6	1	9	9	1	4	3	14	2	--	49
Coyote	--	--	--	--	--	--	--	--	3	1	4
Bobcat	--	--	?	--	--	--	?	--	--	--	2?
Striped Skunk	--	--	--	--	2	--	1	--	--	--	3
Long-Tailed Weasel	--	--	--	--	--	--	--	--	--	1	1
Kangaroo Rats	--	5	79	6	6	4	7	11	31	54	203
Deer Mouse	--	2	--	1	--	--	--	--	--	--	3
Pocket Mouse	--	--	--	--	--	--	1	--	--	--	1
Pallid Bat	Many	--	--	--	--	--	--	--	--	--	Many
Black-Tailed Deer	1	--	--	--	--	--	--	--	--	--	1
Barn Owl	6	--	1	2	1	1	--	--	1	--	12
Burrowing Owl	--	--	--	2	4	2	--	--	--	2	10
Loggerhead Shrike	--	--	1	--	--	--	--	--	--	--	1
Western Meadowlark	--	--	--	--	--	--	--	--	1	--	1
Mourning Dove	--	--	--	--	5	--	1	--	3	--	9
Swallow	1	--	--	--	--	--	--	--	--	--	1
California Quail	--	--	--	--	--	1	--	--	--	--	1
Unknown Mammal	--	--	--	1	--	1	--	--	3	5	10
Unknown Bird	1	--	2	--	--	1	--	--	3	--	7

A — Little Panoche Road, east from Mercey Hot Springs, 4.8 miles
B — Microwave Tower Access Road, off Little Panoche Road, 5.4 miles
C — Panoche Access Road, 8.6 miles
D — Panoche Road, 1 mile west of I-5 to Section 35 (T15S, R11E), 8.8 miles
E — Road from Corral (Section 29, T15S, R12E) to the central plateau in the Tumey Hills, 5.4 miles
F — Road from Corral to Section 21 (T16S, R12E), 7 miles
G — Road from Corral to Section 15 (T16S, R12E), 5.6 miles
H — Road under powerlines (east of Tumey Hills), 2.2 miles
I — Elkhorn Plain, 6 miles
J — Elkhorn Plain, 5 miles

NIGHT SURVEY DATA

DATE: 8 July 1980

ROUTE: Main road from Mercey Hot Springs to I-5 (Little Panoche Road)

PERSONNEL: Freeberg, Tolladay, McCue

STARTING TIME: 2050 FINISHING TIME: 2135 TOTAL: 45 minutes

STARTING MILEAGE: 5363.9 FINISHING MILEAGE: 5368.7 TOTAL: 4.8 miles

SPEED: 10-15 mph

WEATHER: Temperature: 18.6°C
Cloud Cover: None
Wind: Moderate, from NW
Moon: Four days before new moon; did not rise

Species	Total
Jackrabbit	2
Cottontail	6
Black-Tailed Deer	1
Pallid Bat	Many
Barn Owl	6
Medium Sized Owl	1
Swallow	1
Unknown	4

NIGHT SURVEY DATA

DATE: 8 July 1980

ROUTE: Road to Radio Microwave Tower off Panoche Road

PERSONNEL: Freeberg, Tolladay, McCue

STARTING TIME: 2142 FINISHING TIME: 2220 TOTAL: 38 minutes

STARTING MILEAGE: 5376.4 FINISHING MILEAGE: 5381.8 TOTAL: 5.4 miles

SPEED: 10-15 mph

WEATHER: Temperature: 18.6°C
Cloud Cover: None
Wind: Moderate, from NW
Moon: Four days before new moon; did not rise

Species	Total
Jackrabbit	8
Cottontail	1
Deer Mice	2
Kangaroo Rat	5

NIGHT SURVEY DATA

DATE: 9 July 1980

ROUTE: Panoche Access Road

PERSONNEL: Freeberg, Tolladay, McCue

STARTING TIME: 2115 FINISHING TIME: 2205 TOTAL: 50 minutes

STARTING MILEAGE: 5625.1 FINISHING MILEAGE: 5633.7 TOTAL: 8.6 miles

SPEED: 10-15 mph

WEATHER: Temperature: 21.2°C
Cloud Cover: None
Wind: Moderate, from NE
Moon: Three days before new moon; did not rise

Species	Total
Jackrabbit	15
Cottontail	9
Kangaroo Rats	79
Barn Owl	1
Shrike	1
Unidentified Raptor	2

NIGHT SURVEY DATA

DATE: 29 July 1980

ROUTE: Panoche Road - began: 1 mile west of I-5; ended: North-central Sec 35

PERSONNEL: Tolladay, McCue

STARTING TIME: 2115 FINISHING TIME: 2225 TOTAL: 70 minutes

STARTING MILEAGE: 18826.1 FINISHING MILEAGE: 18834.9 TOTAL: 8.8 miles

SPEED: 10 mph

WEATHER: Temperature: High 20's
Cloud Cover: None
Wind: Light
Moon: Two days after full moon; rose at 2210

Species	Total
Jackrabbit	18
Cottontail	9
Kangaroo Rat	6
Deer Mice	1
Kit Fox	1
Barn Owl	2
Burrowing Owl	2
Unknown Mammal	1

NIGHT SURVEY DATA

DATE: 31 July 1980

ROUTE: Corral Road to Central Plateau

PERSONNEL: McCue, Tolladay

STARTING TIME: 2135 FINISHING TIME: 2245 TOTAL: 70 minutes

STARTING MILEAGE: 19263.1 FINISHING MILEAGE: 19268.5 TOTAL: 5.4 miles

SPEED: 10-15 mph

WEATHER: Temperature: 33°C
Cloud Cover: None
Wind: Light, approximately 25 mph
Moon: Four days after full moon; did not rise

Species	Total
Jackrabbit	3
Cottontail	1
Kangaroo Rat	6
Kit Fox	1
Barn Owl	1
Burrowing Owl	4
Mourning Dove	5
Skunk (striped)	2

NIGHT SURVEY DATA

DATE: 4 August 1980

ROUTE: Silver Creek Road from Corral to T16S, R12E, Section 21

PERSONNEL: Collins, Florence, McCue

STARTING TIME: 2105 FINISHING TIME: 2200 TOTAL: 55 minutes

STARTING MILEAGE: 19855.3 FINISHING MILEAGE: 19862.3 TOTAL: 7 miles

SPEED: 10 mph

WEATHER: Temperature: 26.4°C
Cloud Cover: None
Wind: Light from NW
Moon: One day after last quarter; did not rise

Species	Total
Jackrabbit	3
Cottontail	4
Kangaroo Rat	4
Barn Owl	1
Burrowing Owl	2
Unknown Bird	1
Quail	1
Unknown Mammal	1

NIGHT SURVEY DATA

DATE: 6 August 1980

ROUTE: Began at Corral in T15S, R12E, Section 29; end on ridge in NE Section 15 (T16S, R12E)

PERSONNEL: Collins, Uptain, Tolladay, McCue

STARTING TIME: 2052 FINISHING TIME: 2142 TOTAL: 50 minutes

STARTING MILEAGE: 20180.4 FINISHING MILEAGE: 20186.0 TOTAL: 5.6 miles

SPEED: 10 mph

WEATHER: Temperature: 28.2°C
Cloud Cover: Scattered
Wind: None
Moon: Three days after last quarter; did not rise

Species	Total
Jackrabbit	5
Cottontail	3
Kangaroo Rat	7
Striped Skunk	1
Bobcat	1(?)
Pocket Mouse	1
Mourning Dove	1

NIGHT SURVEY DATA

DATE: 7 August 1980

ROUTE: Under Powerlines east of Tumey Hills

PERSONNEL: McCue, Collins, Tolladay, Uptain

STARTING TIME: 2135 FINISHING TIME: 2210 TOTAL: 35 minutes

STARTING MILEAGE: 402.2 FINISHING MILEAGE: 404.4 TOTAL: 2.2 miles

SPEED: 10 mph

WEATHER: Temperature: 28.4°C
Cloud Cover: 10%
Wind: None
Moon: Four days after last quarter; did not rise

Species	Total
Jackrabbit	4
Cottontail	14
Kangaroo Rat	11

NIGHT SURVEY DATA

DATE: 12 August 1980

ROUTE: Elkhorn Plain

PERSONNEL: McCue, Tolladay, Lorenzana

STARTING TIME: 2130 FINISHING TIME: 2230 TOTAL: 60 minutes

STARTING MILEAGE: 20850.2 FINISHING MILEAGE: 20856.2 TOTAL: 6 miles

SPEED: 10 mph

WEATHER: Temperature: 30.2°C
Cloud Cover: None
Wind: None
Moon: Two days after new moon; did not rise

Species	Total
Jackrabbit	20
Cottontail	2
Kangaroo Rat	31
Kit Fox	4
Coyotes	3
Meadowlark	1
Barn Owl	1
Mourning Dove	3
Unidentified Bird	3
Unidentified Mammal	3

NIGHT SURVEY DATA

DATE: 25 August 1980

ROUTE: SW/NW Section 7, east on Elkhorn Grade Road

PERSONNEL: McCue, Kato, Sauls, Freeberg

STARTING TIME: 2032 FINISHING TIME: 2155 TOTAL: 83 minutes

STARTING MILEAGE: 38.9 FINISHING MILEAGE: 43.9 TOTAL: 5 miles

SPEED: 10 mph

WEATHER: Temperature: 24°C
Cloud Cover: None
Wind: None
Moon: One day before full moon; moon shining

Species	Total
Jackrabbit	20
Kangaroo Rat	54
Kit Fox	15
Coyote	1
Burrowing Owl	2
Long-Tailed Weasel	1
Small Unknown Mammal	2
Large Unknown Mammal	3

APPENDIX D: NUMBER OF MAMMALS, REPTILES, AND BIRDS OBSERVED ON BLM LANDS SURVEYED AS POTENTIAL SAN JOAQUIN KIT FOX CRITICAL HABITAT IN 1980

Information is presented in two tables. The first includes tallies of all vertebrates observed during ground surveys of four BLM land units. The second table is a complete annotated listing of direct observations of kit fox made during the study.

Species	Land Unit				Total
	Panoche Hills	Tumey Hills	Coalinga	Elkhorn Plain	
MAMMALS					
Lepus californicus Black-Tailed Jackrabbit	16	10	198	81	305
Sylvilagus audubonii Audubon's Cottontail	6	1	33	10	50
Ammospermophilus nelsoni San Joaquin Antelope Ground Squirrel	--	1	--	53	54
Spermophilus beecheyi California Ground Squirrel	24	--	4	4	32
Dipodomys sp. Kangaroo Rat	--	--	--	1	1
Canis latrans Coyote	1	--	4	3	8
Vulpes macrotis mutica San Joaquin Kit Fox	--	--	--	2	2
Odocoileus hemionus Mule Deer	--	--	--	1	1
REPTILES					
Uta stansburiana Side-Blotched Lizard	9	1	18	141	169
Crotaphytus silus Blunt-Nosed Leopard Lizard	1	--	--	33	34
Cnemidophorus tigris Whiptail Lizard	4	--	--	15	19
Phrynosoma coronatum Coast Horned Lizard	--	--	--	4	4
Masticophis flagellum San Joaquin Whipsnake	--	1	--	--	1
Crotalus viridis Prairie Rattlesnake	--	--	3	2	5
Pituophis melanoleucus Gopher Snake	--	--	2	--	2
BIRDS					
Cathartes aura Turkey Vulture	3	--	24	--	27

Vertebrate Tallies (continued)

Species	Land Unit				Total
	Panoche Hills	Tumey Hills	Coalinga	Elkhorn Plain	
BIRDS (continued)					
Aquila chrysaetos Golden Eagle	1	--	1	2	4
Circus cyaneus Marsh Hawk	3	1	5	4	13
Accipiter cooperii Cooper's Hawk	--	--	--	1	1
Buteo jamaicensis Red-Tailed Hawk	1	1	6	1	9
Buteo swainsoni Swainson's Hawk	--	--	3	--	3
Falco mexicanus Prairie Falcon	1	--	1	1	3
Falco sparverius American Kestrel	9	1	14	7	31
Lophortyx californicus California Quail	38	9	162	728	937
Alectoris chukar Chukar	8	6	--	33	47
Zenaida macroura Mourning Dove	23	2	123	68	216
Geococcyx californicus Roadrunner	--	--	2	3	5
Tyto alba Barn Owl	--	--	1	7	8
Athene cunicularia Burrowing Owl	--	--	5	6	11
Chordeiles acutipennis Lesser Nighthawk	--	--	--	1	1
Tyrannus verticalis Western Kingbird	--	--	1	--	1
Myiarchus cinerascens Ash-Throated Flycatcher	1	--	--	1	2
Sayornis saya Say's Phoebe	--	1	5	3	9
Eremophila alpestris Horned Lark	27	12	94	853	986

Species	Land Unit				Total
	Panoche Hills	Tumey Hills	Coalinga	Elkhorn Plain	
BIRDS (continued)					
Tachycineta thalassina Violet-Green Swallow	5	--	--	--	5
Petrochelidon pyrrhonota Cliff Swallow	2	--	--	--	2
Aphelocoma coerulescens Scrub Jay	--	--	14	1	15
Pica nuttalli Yellow-Billed Magpie	--	--	1	--	1
Corvus corax Common Raven	12	--	77	9	98
Corvus brachyrhynchos Common Crow	--	--	2	--	2
Parus inornatus Plain Titmouse	--	--	3	--	3
Psaltriparus minimus Bushtit	--	--	7	--	7
Salpinctes obsoletus Rock Wren	--	1	2	4	7
Mimus polyglottos Mockingbird	--	2	16	--	18
Toxostoma lecontei Le Conte's Thrasher	--	--	1	7	8
Oreoscoptes montanus Sage Thrasher	1	--	--	--	1
Anthus sp. Pipit sp.	--	--	--	25	25
Lanius ludovicianus Loggerhead Shrike	4	4	27	13	48
Dendroica petechia Yellow Warbler	--	--	3	--	3
Sturnella neglecta Western Meadowlark	13	4	72	62	151
Carpodacus purpureus Purple Finch	--	--	--	2	2
Pipilo fuscus Brown Townee	--	--	4	--	4
Amphispiza belli Sage Sparrow	--	--	10	39	49

Direct Observations of San Joaquin Kit Fox Made During the 1980 Inventory of BLM Lands

Date	Location
11 July 1980	Road killed kit fox observed on Little Panoche Road, 0.25 mile west of the Little Panoche Detention Reservoir, Section 19, R13S, R11E, Fresno County, CA
29 July 1980	Night survey observation 0.1 miles east of the Fresno/San Benito County line, SE Section 36, T15S, R12E, Fresno County, CA
31 July 1980	Night survey observation in the central plateau of the Tumey Hills, North-Central Section 33, T15S, R12E, Fresno County, CA
12 August 1980	Kit fox observed crossing road (0800 hours), 14.7 miles west of Route 33 on the Elkhorn Grade Road, Kern County, CA
12 August 1980	Night survey observation in the Elkhorn Plain, 1.7 miles west of Crocker Canyon Road, NW Section 2, T31S, R21E, Kern County, CA
12 August 1980	Night survey observation in the Elkhorn Plain, 1.45 miles west of Crocker Canyon Road, Central Section 2, T31S, R21E, Kern County, CA
12 August 1980	Night survey observation in the Elkhorn Plain 0.85 mile west of Crocker Canyon Road, NW Section 28, T31S, R21E, Kern County, CA
12 August 1980	Night survey observation in the Elkhorn Plain 2.25 miles east of Crocker Canyon Road, SE Section 35, T31S, R21E, Kern County, CA
25 August 1980	Kit fox observed during ground transects Section 7, T32S, R22E, Kern County, CA
25 August 1980	Kit fox observed during ground transects Section 17, T32S, R22E, Kern County, CA
25 August 1980	Night survey observations in the Elkhorn Plain: near road to abandoned well in NW Section 7, T32S, R22E, plus the following distances in miles east of the same road: 1.1,, 1.7, 2.0 (two kit fox observed), 2.1, 2.3, 2.4, 2.8, 2.95 (three kit fox observed), 3.8, and 4.1. A total of 15 kit fox were observed during the night survey, 25 August 1980.

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