

MAMMALS

SPECIES ACCOUNT

Riparian brush rabbit

(*Sylvilagus bachmani riparius*)

CA - E (1994)

FED - PE (1997)

General Habitat: Riparian Forest

The riparian brush rabbit is one of eight subspecies of the brush rabbit, which is generally widespread in California. However, the riparian brush rabbit's distribution is quite narrow; it is found in the 261-acre Caswell Memorial State Park in southern San Joaquin County, and near a railroad right of way in the Paradise Cut area south of Stockton. The riparian brush rabbit can be distinguished from other brush rabbit subspecies by its isolated location and its skull characteristics. This subspecies is slightly larger, has larger eyes and ears, is more grayish and yellowish in coloration, and has a very conspicuous tail. Riparian brush rabbits are only found in San Joaquin Valley native riparian areas with large clumps of dense shrubs, low growing vines, and some tall shrubs and scrubby trees. Grasses are the most important food, and riparian brush rabbits rarely venture more than one to two yards from dense cover. The animals are most active in the early morning and evening hours. The breeding season is typically from January to May, with peak activity between mid-January and mid-April. Gestation is about 27 days, and females may breed again shortly after giving birth. About three to four litters per female may be produced during the breeding season, with three to four young per litter.

Although in 1999 the population size is unknown, the last documented estimate in 1993 was 200 to 300 individuals. During the mid-1970s, the population had dipped to an extreme low of 15 to 20 individuals due to severe flooding. The floods of 1996 may also have caused extensive mortality. Initial attempts to live-capture rabbits during a study that began in 1997 were of limited success, indicating an extremely low estimated population. In 1997, USFWS proposed endangered status for the species. Flooding, wildfires, predation, and disease remain the greatest threats to the population.

In 1997, USFWS released its *Draft Recovery Plan for Upland Species of the San Joaquin Valley, California*. The Plan was made final in 1998. The Recovery Plan addresses the management needs for the riparian brush rabbit, including restoring habitat and establishing additional populations within the historic range. A brush rabbit working group met once in 1997, twice in 1998, and once in 1999 to help guide conservation efforts for the subspecies. In 1998 live capture success was very low but improved slightly in 1999; a new population was discovered in the Paradise Cut area of San Joaquin County on Union Pacific Rail Road right of way lands. An agreement being developed between the DFG and the rail road company will allow the rabbits within the right of way to be live captured and removed to a captive breeding facility that is being built on Department of Water Resources land in San Joaquin County. Rabbits reared in this facility will be use to establish new populations on yet to be established preserves on public lands within the former range of the species.

The status in 1999 of the riparian brush rabbit: *Declining.*

San Joaquin antelope squirrel

(*Ammospermophilus nelsoni*)

CA - T (1980)

FED - None

General Habitat: Chenopod Scrub
Valley and Foothill Grassland

Threatened and Endangered Species



Riparian brush rabbit



San Joaquin antelope squirrel

The San Joaquin antelope squirrel is one of five species of antelope squirrels. The species is omnivorous with a diet consisting primarily of grass and forb seeds and insects. Antelope squirrels are fossorial animals using burrows that they or other animals have dug. The general active period during spring and summer months coincides with air temperatures of 68° to 86°F. Historically, San Joaquin antelope squirrels ranged from western Merced County to the southern end of western San Joaquin Valley. They occupied the valley floor in Kern County and along the eastern edge northward to Tipton, Tulare County. Habitats of antelope squirrels consist of grasslands with moderate shrub cover which includes such species as salt bush, ephedra, bladder pod, goldenbush, snakeweed, and others. Populations now exist primarily in marginal habitats of the low foothills and mountains of the western edge of the valley. Currently, populations of significant size exist only in western Kern County at Elk Hills and on portions of the Carrizo and Elkhorn plains.

Conversion of native habitat to intensive forms of agricultural development is the greatest threat to the population. Recovery options for this species have been addressed in USFWS's 1998 *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Researchers have gathered data on the interrelationships between antelope squirrels and the State and federally listed giant kangaroo rat. Translocation of giant kangaroo rats from one locality to another has been successful on the Carrizo Plain Natural Area (CPNA) during 1989-92 and may have application to recovery efforts for antelope squirrels since the habitat requirements of the two species are similar. Study efforts during 1998 and 1999 resulted in few captures and the habitat condition on the CPNA has deteriorated dramatically due to growth of rank vegetation following the above average rainfall in recent years. Discussions are ongoing between land managers and researchers to institute a type of grazing management that is more sensitive to the requirements of species such as the squirrel. A study on the Lokern Area Preserve in Kern County, initiated in 1997, will address the issue of grazing as a management tool for several species including the antelope squirrel. The DFG is involved in several conservation efforts for the San Joaquin antelope squirrel, including the Metropolitan Bakersfield HCP, the California Department of Corrections Electric Fence HCP, the Coles Levee area 2081 Agreement, and the Arco Western Energy HCP.

The status in 1999 of the San Joaquin antelope squirrel: *Stable to Declining*.

Mohave ground squirrel

(*Spermophilus mohavensis*)

CA - T (1971)

FED - None

General Habitat: Mojavean Desert Scrub
Joshua Tree Woodland

This squirrel is cinnamon-gray in color with white underparts. Juveniles are cinnamon-colored and molt to the grayer pelage as they mature. The species lives in underground burrows, in which it spends at least seven months of the year (usually from July or August through February) in estivation. It is resident in the various desert scrub communities of the western Mojave Desert in southwestern Inyo, eastern Kern, northwestern San Bernardino, and extreme northeastern Los Angeles counties.

The squirrel is threatened by loss and degradation of its habitat due to clearing for agriculture and military activities and for urban, suburban, and rural development, livestock grazing, and OHVs.

In 1993, a coalition of environmental groups filed suit to set aside an earlier 1993 action by FGC to delist the species. The delisting action resulted from the FGC's accepting a 1991 petition to delist from the County of Kern. The DFG opposed delisting because the petition offered no new scientific information to support the FGC's action. A trial court ruled in 1994 that the FGC could not delist the squirrel because it had not done an analysis of the environmental impact of delisting. However, before the court acted, the FGC ordered removal of the name of the squirrel from the actual printed list



Mohave ground squirrel

of endangered and threatened species in Title 14, California Code of Regulations. After the trial-court ruling, the squirrel continued to receive the protections of CESA. In 1996, the California Court of Appeals upheld the trial court. In July 1997, the California Supreme Court upheld the lower courts. As a result of the Supreme Court action, the State Attorney General's office advised the FGC to restore the name of the squirrel to the printed list of species in Title 14. The FGC began the regulatory process in December 1997 and placed the squirrel's name on the threatened species list in Title 14 in 1998. However, in 1998, the DFG informally learned that the County of Kern had hired consultants to begin a second process to request delisting the squirrel.

The DFG, BLM, and USFWS continued to develop the West Mojave Desert Coordinated Management Plan, in which the squirrel and the desert tortoise are the primary species. In 1994, the three agencies had identified prospective management zones for the squirrel. In 1997, based on new information about the squirrel's use of habitat, the agencies abandoned the prior-identified zones as not being biologically based. In mid-1999, the BLM's West Mojave planning team released a general evaluation report that will serve as a basis for citizens' groups to prepare the actual plan for the desert. A chapter in the report is devoted to conservation needs of the squirrel.

The status in 1999 of the Mohave ground squirrel: *Unknown.*

Morro Bay kangaroo rat

(Dipodomys heermanni morroensis)

CA - E (1971); Fully Protected

FED - E (1970)

General Habitat: Coastal Scrub

This kangaroo rat, like all species of kangaroo rats, has long hind legs, small front legs and feet, brown upper parts, and a white belly. It is considered to be the darkest in color of all kangaroo rats. The lack of a complete hip stripe distinguishes this animal from other kangaroo rats. As with all kangaroo rats, this subspecies burrows into the ground for dens. It inhabits coastal scrub vegetation on old sand dune substrate and is geographically isolated from other subspecies of the Heermann's kangaroo rat. Until recently, it was found only in several small areas of less than one-half square mile in total size near Los Osos in San Luis Obispo County. Currently, if it still exists, it is thought to inhabit just one small privately-owned parcel which remains in native vegetation. This species may be extinct.

This kangaroo rat is threatened by loss and degradation of its habitat, although other factors may be operating. Adverse impacts to its habitat resulted from clearing for residential and urban uses, invasion of non-native plant species, and OHVs. In addition, owners of the last known site occupied by the kangaroo rat deny access to the DFG and the USFWS to inspect their habitat for signs of the animal or to set live traps in an attempt to capture individuals for captive breeding.

The University of California, Berkeley, has developed a successful captive-breeding program for kangaroo rats, using the Lompoc kangaroo rat as a surrogate for the Morro Bay kangaroo rat. The DFG has funded this program, which began in 1993, with federal Section 6 grant monies. The program continued through early 1999.

The status in 1999 of the Morro Bay kangaroo rat: *Unknown.*

Giant kangaroo rat

(Dipodomys ingens)

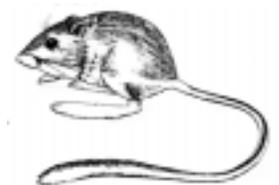
CA - E (1980)

FED - E (1987)

General Habitat: Valley and Foothill Grassland
Chenopod Scrub



Morro Bay kangaroo rat



Giant kangaroo rat

Giant kangaroo rats are small mammals with elongated hind limbs for hopping and external cheek pouches for carrying food to their burrows. The giant kangaroo rat is the largest of all kangaroo rats and weighs from 4.6 to 6.4 ounces. The total length is 12 to 13 inches, including a tail that is six to eight inches. Giant kangaroo rats subsist almost entirely on the seeds of annual plants such as brome grasses and filaree. The animals harvest, stack, and dry caches of grasses and forbs near the entrance of their burrows. Giant kangaroo rats inhabit a territory, known as a precinct, that averages 20 feet in diameter where a shallow burrow system, about 12 inches deep, is constructed. Each kangaroo rat maintains and defends an individual territory in a colony that may consist of from two to thousands of precincts.

Historical population distribution is estimated at about 1.3 million acres of habitat of varying quality which existed prior to the widespread cultivation of much of the San Joaquin Valley. The historical range extended from Merced County south to Kern County and west to eastern San Luis Obispo and northern Santa Barbara counties. Populations were most numerous in areas with sparse vegetative cover and low annual precipitation. Today very little undisturbed suitable habitat remains. The loss of original habitat to agricultural conversion may be as much as 98 percent. Five relatively small areas totaling 12-square miles remain that support population densities typical of those existing prior to 1950. Giant kangaroo rats require native annual grassland and shrub-land habitats with sparse vegetative cover and soils that are well drained, fine sandy loams with slope generally less than 10 percent. Areas of low annual precipitation and infrequent flooding are preferred by this species for establishment of permanent colonies.

In 1997, several population assessment studies confirmed that the giant kangaroo rat population has dramatically declined along with that of many other kangaroo rats in the southern San Joaquin Valley. At other locales such as the Elkhorn Plain in eastern San Luis Obispo County the declines were not as severe. This severe decline apparently began in 1995, as noted in the DFG's *The Status of Rare, Threatened, and Endangered Animals and Plants of California: Combined Annual Report for 1993, 1994, and 1995, An Addendum to the 1992 Report*. In 1998 and 1999 giant kangaroo rat numbers have begun to increase at the Elkhorn Plain study area. Genetics studies, initiated in 1993, continue on this and other kangaroo rat species and are yielding valuable information that can be applied to recovery strategies for all endangered kangaroo rats. In 1997, an additional research effort began at the Lokern Area in western Kern County to further investigate the role of livestock grazing on species and habitats on the floor of the San Joaquin Valley. The conversion of native habitat to agricultural uses remains the greatest threat to the species.

The recovery options for the giant kangaroo rat are addressed, along with those for 33 other species of plants and animals, in USFWS's 1998 *Recovery Plan for Upland Species of the San Joaquin Valley, California*. The DFG is involved in several conservation efforts for the giant kangaroo rat. Some of the efforts include the Metropolitan Bakersfield HCP, the California Department of Corrections Electric Fence HCP, the Coles Levee area 2081 Agreement, and the Arco Western Energy HCP.

The status in 1999 of the giant kangaroo rat: *Stable to Declining.*

Stephens' kangaroo rat

(*Dipodomys stephensi*)

CA - T (1971)

FED - E (1988)

General Habitat: Valley and Foothill Grassland

Although it is genetically different, this kangaroo rat physically resembles all other kangaroo rat species in having long hind legs, small front legs and feet, brown upper parts, a white belly, and a long, tufted tail. The Stephen's kangaroo rat is known to inhabit annual grassland with sparse perennial vegetation in the San Jacinto Valley and adjacent areas of western Riverside and northwestern San Diego County. A previously unknown population of the kangaroo rat was discovered in the Ramona Valley,



Stephens' kangaroo rat

San Diego County, in October 1997. It is not known if this species still inhabits extreme southwestern San Bernardino County.

The species is threatened by destruction, fragmentation, and degradation of its habitat through human and human-induced activities. Adverse impacts to kangaroo rat habitat result from clearing of land for urban and suburban development and for agriculture, water projects, military activities, wildland or prescribed fires, OHVs, livestock use, and invasion of non-native plant species.

The USFWS released its draft recovery plan for the kangaroo rat in mid-1997. The document proposes that USFWS consider the kangaroo rat for reclassification to threatened status when four reserves totaling at least 15,000 acres of habitat occupied by the kangaroo rat in western Riverside County and one habitat reserve in San Diego County are "permanently protected, funded, and managed". The USFWS would consider delisting the kangaroo rat when at least five habitat reserves in western Riverside County, totaling at least 16,500 acres of occupied habitat and two additional reserves in San Diego County are "permanently protected, funded, and managed."

Stephens' kangaroo rat populations at two reserves in Riverside County are being monitored through burrow counts and live-trapping. At the Southwestern Riverside County Multi-Species Reserve populations have been monitored since December 1996. Population levels at the end of 1999 were comparable to those in 1996. However, population numbers fell in 1998 after the El Niño year of 1997. At the Lake Mathews Ecological Reserve the first year of monitoring was done in 1999. At two additional reserves in Riverside County, the DFG's San Jacinto Wildlife Area and the University of California's Mott Reserve, population monitoring programs are planned to begin in 2000.

The Stephens' kangaroo rat is the sole species addressed in the Stephens' Kangaroo Rat Long-term HCP, a document prepared by the Riverside County Habitat Conservation Agency. Other conservation efforts involving this species include the Lake Mathews MSHCP, Pacific Gateway Homes HCP, and Ridge at Cresta Verde HCP. The species will also be addressed in the Western Riverside Plan, which is under development.

The status in 1999 of the Stephens' kangaroo rat: *Unknown*.

Tipton kangaroo rat

(Dipodomys nitratoides nitratoides)

CA - E (1989)

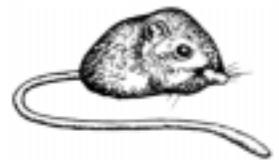
FED - E (1988)

General Habitat: Chenopod Scrub

Adult Tipton kangaroo rats weigh about one to 1.3 ounces. This subspecies originally occupied a range that included the Tulare Lake Basin in portions of Fresno, Kings, Tulare and Kern counties. This geographic range encompassed about 1.7 million acres. An estimate of historic population based on today's density data and the estimated extent of former range is about 17.2 million individuals. Currently, approximately 190,200 individuals, or about 1 percent, remain. Tipton kangaroo rats are limited to arid land communities of the valley floor in the Tulare Basin, in level to nearly level terrain at an elevation of 200 to 300 feet. Woody shrubs such as spiny saltbush, iodine bush, and mesquite are sparsely scattered over the terrain with scant to moderate ground cover of grasses and forbs. Soils are typically fine-textured and alkaline.

The conversion of native habitat to agricultural, residential, and commercial developments, and flooding remain the principal threats to this species.

The recovery options for this species are addressed in USFWS's *Recovery Plan for Upland Species of the San Joaquin Valley, California*, completed in 1998. Proposed actions include establishment of habitat preserves and captive breeding and translocation of populations. Severe declines, beginning in 1994, have continued for all kangaroo rat populations, including Tipton's, in the southern San Joaquin Valley. In 1998 and 1999 populations seem to be cycling back, but slowly, to previous population levels of the early 1990s. Dense vegetation due to above average rainfall has had a negative impact on this and other kangaroo rat species. During wet years, kangaroo rat species may suffer



**Tipton kangaroo
rat**

from diseases precipitated by low food stores and seeds that are moldy. The DFG is involved in several conservation efforts for Tipton's kangaroo rat including the Kern County Valley Floor and Waste Facilities HCPs, Kern Water Bank HCP, Metropolitan Bakersfield HCP, and the PG&E San Joaquin Valley HCP.

The status in 1999 of the Tipton kangaroo rat: *Declining.*



Fresno kangaroo rat

Fresno kangaroo rat
(*Dipodomys nitratooides exilis*)

CA - E (1980)
FED - E (1985)

General Habitat: Chenopod Scrub
Valley and Foothill Grassland.

The Fresno kangaroo rat is one of three subspecies of the San Joaquin kangaroo rat. The Fresno kangaroo rat is the smallest of the San Joaquin kangaroo rats with a total length of nine inches, including a five-inch tail. Adults weigh about one ounce. Pelage is dark yellowish-buff dorsally and white ventrally. A white stripe extends along the flanks and on the sides of the tufted tail. The historic range of the Fresno kangaroo rat extended from north central Merced County, south through southwestern Madera and central Fresno counties. Typical plants within the species habitat include seepweed, iodine bush, saltbush, pepper-grass, filaree, wild oats, and foxtail fescue. The current population distribution and population size are unknown. However, due to habitat loss, it is assumed that the distribution is restricted and the population size is small. Threats to the species include habitat loss, flooding, and rodenticide poisoning.

Demographic studies, initiated in 1993, are continuing to attempt to locate extant populations of Fresno kangaroo rats. Beginning in 1995 and continuing to the present time, fire management has been applied to the habitat supporting a small population of kangaroo rats on a small patch of habitat at the Lemoore Naval Air Station, Fresno County. Additional study and management are planned; discussions are ongoing between land managers and researchers concerning the future management of larger tracts of land that may constitute suitable habitats at Lemoore NAS and other locations within the range of the species in the San Joaquin Valley.

The recovery options for the Fresno kangaroo rat have been addressed in USFWS's *Recovery Plan for Upland Species of the San Joaquin Valley, California*, completed in 1998. The recovery plan calls for establishment of additional habitat preserves and the possible captive breeding and translocation of populations of this species onto those secure refuges.

The status in 1999 of the Fresno kangaroo rat: *Unknown.*



Salt-marsh harvest mouse

Salt-marsh harvest mouse
(*Reithrodontomys raviventris*)

CA - E (1971); Fully Protected
FED - E (1970)

General Habitat: Marsh and Swamp

This species has an upper pelage of rich brown, underparts of cinnamon to buffy white, and a unicolored tail. It inhabits tidal and nontidal salt marshes of Suisun, San Pablo, and central and south San Francisco bays.

This species is threatened by loss and degradation of its habitat through human and human-induced activities. Adverse impacts to harvest mouse habitat have resulted from filling of marshes to allow development; conversion of salt marshes to brackish marshes due to fresh-water discharges from sewage-treatment plants, invasion of non-native cordgrass and other non-native species, and pollution from urban run-off, industrial discharges, and sewage effluent. The harvest mouse itself likely is subject to

predation by the non-native red fox and non-native feral cat. Currently, the USFWS is preparing a recovery plan for the harvest mouse and the California clapper rail, another salt marsh species found around San Francisco Bay.

The status in 1999 of the salt marsh harvest mouse: *Unknown.*

Amargosa vole
(*Microtus californicus scirpensis*)

CA - E (1980)
FED - E (1984)

General Habitat: Marsh and Swamp

This small mammal is pallid, neutral gray above, smoky gray below, and has a tail which is brown above and grayish below and feet of brownish gray. The comparatively short tail, small rounded ears, and short legs distinguish voles from other mouse-like rodents. The Amargosa vole inhabits small fresh-water marshes of bulrush, cattail, saltgrass, and willow along a limited stretch of the Amargosa River in Inyo County. The species may occur in adjacent San Bernardino County. The flooding of potential or inhabited vole habitat during late summer thunder storms and extended periods of winter rainfall probably allow permanent vole occupation only in marshes on the margins of the River's floodplain.

The vole is threatened by loss and degradation of its habitat through human and human-induced activities. Adverse impacts to vole habitat result from human disturbance, use of OHVs, water diversions, invasion of non-native plant species (e.g., common reed), and severe flooding. The vole may be subject to predation by the domestic cat and native predators.

In July 1996, the DFG was awarded a federal Section 6 grant to determine the vole's distribution and population size and of the extent and quality of habitat at sites occupied by the vole. The results of this study will be reported in the next annual report.

The vole is a featured species in the planning effort by the Northern and Eastern Mojave Desert Planning Team, which is led by USFWS and NPS.

The status in 1999 of the Amargosa vole: *Unknown.*

Sierra Nevada red fox
(*Vulpes vulpes necator*)

CA - T (1980)
FED - None

General Habitat: Many High Elevation Habitats

The Sierra Nevada red fox is one of 10 recognized North American subspecies of *Vulpes*. The Sierra Nevada red fox is distinguished from members of the introduced lowland population of red foxes by its slightly smaller size and darker colored fur. They inhabit remote areas of the State where chance encounters with humans are uncommon. Relatively little is known of the life history of the Sierra Nevada red fox, but it is assumed that its habits are similar to those of other red foxes insofar as choice of dens, hunting tactics, and breeding behavior are concerned. The subspecies is known to inhabit vegetation types similar to those used by the marten and wolverine. Sightings of the subspecies have been reported from the 5,000 to 7,000 foot elevation range with extremes placed at 3,900 feet in Yosemite Valley and 11,900 feet at Lake South America in the southern Sierra Nevada. The range is described as the northern California Cascades eastward to the northern Sierra Nevada and then south along the Sierran crest to Tulare County. Preferred habitat for the Sierra Nevada red fox appears to be red fir and lodgepole pine forests in the subalpine zone and alpine fell-fields of the Sierra Nevada. The fox may hunt in forest openings, meadows, and barren rocky areas associated with its high elevation habitats. Threats to the Sierra Nevada red fox are unknown.



Amargosa vole



Sierra Nevada red fox

A study of the wolverine, initiated in 1990, using remote, automatic cameras yielded the first documented photographs of the Sierra Nevada red fox. Since then, additional photographs of foxes have been taken. The techniques used in the wolverine study (i.e., baited stations with remote cameras) showed promise for application to the study of several other carnivores including the Sierra Nevada red fox. A Sierra Nevada red fox study using remote cameras and possibly live-captures and radio transmitters was begun in 1997. A young male fox was captured and radio-collared in late 1997 and a female fox was likewise captured and collared in early 1998. These were the first individuals of this species ever captured and radio-collared in California. A graduate student is coordinating the monitoring effort and has plans to capture and collar additional animals as they become available.

The status in 1999 of the Sierra Nevada red fox: *Unknown.*



San Joaquin kit fox

San Joaquin kit fox

(*Vulpes macrotis mutica*)

CA - T (1971)

FED - E (1967)

General Habitat: Valley and Foothill Grasslands
Chenopod Scrub

The kit fox (*Vulpes macrotis*) is the smallest canid species in North America. San Joaquin kit foxes have an average body length of 20 inches, an average tail length of 12 inches and stand about nine to 12 inches at the shoulder. These slender-built mammals are characterized by relatively long legs and large, conspicuous ears. Adult males weigh about five pounds, and adult females weigh about 4.6 pounds. The historic range of the San Joaquin kit fox included most of the San Joaquin Valley from the vicinity of Tracy, San Joaquin County southward to southern Kern County. Currently, kit foxes occur in the remaining native valley and foothill grasslands and chenopod scrub communities of the valley floor and surrounding foothills from southern Kern County north to Los Baños, Merced County. Depending on extent of agricultural development, distribution is spotty within this broad range.

In addition, smaller, less dense populations may be found further north and in the narrow corridor between Interstate 5 and the Interior Coast Range from Los Baños to Contra Costa County. Portions of Monterey, Santa Clara, San Benito and Santa Barbara counties are also included in the range of the San Joaquin kit fox. Studies and information from various sources indicate that a density of one kit fox per square mile in suitable habitat is a reasonable figure to use to estimate populations based on known acreage of habitat, although densities can range from less than one to over six foxes per square mile.

Loss of native habitat to various kinds of agriculture (e.g., cotton fields and vineyards), and residential and commercial developments remain the principal threats to this species. DFG-funded research and studies by cooperators, begun in the mid-1990s and continuing to the present, are yielding more information about the habitat needs and biology of the kit fox. A failed population study in the northern range is being reattempted on public lands of the East Bay Regional Park where access is not an impediment to research. To date, however, no foxes have been live-captured in this effort, possibly indicating that the population is very low. The recovery options for the kit fox are contained in USFWS's *Recovery Plan for Upland Species of the San Joaquin Valley, California*, completed in 1998. The kit fox is described as a keystone species (i.e., a species essential to the health of the natural community), and efforts to save habitat for this species will result in benefits to other endangered plant and animal populations.

Long-term ecological studies at the Elk Hills Naval Petroleum Reserve in western Kern County have been terminated due to the sale of the Reserve to private interests. The landmark research that was conducted over a period of more than a decade is being published in a number of journal articles and will make valuable contributions to our understanding of the biology, ecology, and management of the species. This information will be invaluable in the years to come as we attempt to recover the species. A

study on the role of various agricultural crops as habitat for the kit fox was begun in 1998 and continues under federal Section 6 funding grants to the DFG. Genetic research of this species and its role in recovery planning is a component of the agricultural lands/kit fox study. Another study, begun in 1997 and continuing, examines the special case of the kit fox in the urban environment. Kit foxes are being captured, radio-collared and their movements monitored within the city of Bakersfield, Kern County. Finally, an additional study examines the kit fox population on the Carrizo Plain Natural Area. Studies at two military bases in Monterey County (Camp Roberts and Fort Hunter-Liggett) are currently yielding little data due to a decline of local kit fox populations during 1998 and 1999 and suspected problems with the introduced red fox. Control of nonnative introduced red fox populations and habitat management options available at Camp Roberts were discussed in an interagency meeting in 1999.

Protection for the kit fox is addressed in several conservation plans. These plans include the Kern County Valley Floor and Waste Facilities HCPs, Kern Water Bank HCP, Metropolitan Bakersfield HCP, and the PG&E San Joaquin Valley HCP.

The status in 1999 of the San Joaquin kit fox: *Declining.*

Island fox

(Urocyon littoralis)

CA - T (1971)

FED - None

General Habitat: Chaparral
 Coastal Scrub
 Cismontane Woodland
 Valley and Foothill Grasslands

This small fox has pepper-and-salt upper pelage with a rufous or buffy underfur and a dorsal median black stripe ending in the black tip of the tail. It occurs on the six largest California Channel Islands: San Miguel, Santa Rosa, Santa Cruz, Santa Catalina, San Nicolas, and San Clemente. The fox appears to use most habitat types found on these islands.

The fox is threatened by disease, predation by the golden eagle, loss and degradation of its habitat from rural development, military activities, fires, grazing, competition for food with domestic cats, habitat change by feral mammals, invasion of non-native plant species, and vehicles on those islands with extensive road systems.

In December 1999, the DFG learned that the fox has undergone a seemingly-simultaneous and dramatic decline on San Miguel, Santa Rosa, and Santa Cruz islands. Researchers suspect that the golden eagle, which recently has been attracted to these islands by the presence of domestic sheep and goats, is responsible. In 1999, researchers found a golden eagle nest on Santa Cruz, the first nest of that species on any Channel Island. A similar decline in the fox population has occurred on Santa Catalina. There, researchers suspect a disease agent has caused mortality. The population on San Nicolas is thought to be stable.

The fox likely is also a predator of the San Clemente loggerhead shrike, a federally-listed and critically-endangered bird. In 1997, the DFG and the USFWS began assisting the Navy, which controls San Clemente Island, in developing an overall predator control plan to protect the shrike. The DFG recommended control measures that would not result in the death of the State-listed foxes. In early 1999, the Navy implemented a predator control plan that included euthanizing 32 foxes during the shrike nesting season. The Navy shipped fourteen additional foxes to mainland zoological parks. Other foxes were held in cages during the shrike nesting period to temporarily remove them as a threat to young shrikes. The latter foxes were released at their original sites of capture. Researchers monitoring the movements of these foxes found that, for at least one month after release, none exhibited deleterious health effects from prolonged captivity.

The status in 1999 the island fox: *Declining.*

Threatened and Endangered Species



Island fox



Guadalupe fur seal

Guadalupe fur seal

(*Arctocephalus townsendi*)

CA - T (1971); Fully Protected

FED - T (1985)

General Habitat: Marine, Coastal Rocks

Guadalupe fur seals are medium-sized eared seals (Family Otariidae). They have dense gray-brown underfur covered with coarse guard hairs that tend to bleach out on the head and shoulders of adult males. Their appearance is very similar to the northern fur seal (*Callorhinus ursinus*) but are distinguished by a pointed muzzle. Males reach six feet in length and 350 pounds in weight, while females reach five feet in length and 100 pounds in weight. The maximum life span is estimated to be 17 to 20 years.

The Guadalupe fur seal is a pelagic species most the year, occurring in Pacific Ocean waters from Isla de Guadalupe, Mexico, to the northern Channel Islands of Southern California. When ashore, this seal occupies rocky caves and crevices and sandy beaches. Breeding occurs solely on Isla Guadalupe and occurs from May to July. Mating occurs approximately one week after pups are born; females bear a sole pup. Male seals are occasionally observed on rocky beaches of the southern Channel Islands. Little information exists on the diet or foraging behavior of this subspecies. However, it is believed that Guadalupe fur seals feed in deep waters on species of krill, squid and small, schooling fish.

The most recent population estimate was made in 1994, and the estimate was 7,408 fur seals. Additionally, it is estimated that the population is growing at a rate of approximately 14 percent. The most likely human-caused threat to Guadalupe fur seals would be injury or mortality due to entanglement in gill nets. No such mortality had been reported in California waters since specific records were kept in 1983. No information is available for gillnet fisheries or related mortalities in Mexican waters.

The Status in 1997-1999 of the Guadalupe fur seal: *Increasing to Stable*



Wolverine

Wolverine

(*Gulogulo*)

CA - T (1971); Fully Protected

FED - None

General Habitat: Various High Elevation Habitats

The wolverine resembles a small, short-legged bear with a coarse shaggy coat and a bushy tail. The coat is heavy and dark brown with two broad, light-colored bands extending from the shoulder to meet at the base of the tail. Wolverines typically weigh 35 to 60 pounds and measure 35 to 45 inches long, including a six to 10 inch tail. They stand about 14 to 18 inches at the shoulder. Their jaws are very powerful and are adapted to crush and shear frozen meat and bones. Sexes appear similar except that males are 25 to 35 percent larger than females. Wolverines subsist on a variety of foods including small- and medium-sized mammals, birds, insects, berries, and fungi. Carrion, especially in the form of large ungulates, is believed to be an important component of the diet, particularly during winter. Wolverines are often regarded as animals of high-elevation habitats; however, sightings collected by the DFG over the past several decades indicate that the species inhabits a variety of habitat types within an elevation range between 1,600 feet and 14,200 feet. The mean elevation of over 150 sightings in California is about 8,000 feet. Habitat generally consists of open terrain above timberline.

The present and historical ranges of the species are rather similar. The historic range encompassed an area from Mount Shasta south to Monache Meadows in Tulare County. Portions of the north coast and the northern Sierra Nevada regions of the State are also included in the historical range. No population density data are available

on the wolverine in the State due to difficulties involved in studying such an elusive and far-ranging species. An estimate of 50 to 100 wolverines was made over 20 years ago based on available habitat and home range information from studies in other parts of North America.

Specific threats to the wolverine are unknown. No management plans for this species have been prepared, partly because of the difficulty in collecting data and limited financial resources. No State or federal land-use planning documents address the habitat needs of wolverines at the present time.

Individual research programs, being carried out primarily by USFS and university biologists, continue to place remote camera stations out each winter in an attempt to photograph wolverines. The technique works well with a variety of species, including wolverines in other states, and has been adapted to a variety of research objectives since the DFG's initial attempts with wolverines. Although none have been recorded yet, the primary goal of the ongoing study remains to document the occurrence of wolverines in selected habitats within the suspected range by the use of remote sensor cameras associated with a carrion bait station. A study, begun in 1997 and continuing to the present, to detect and photograph Sierra Nevada red foxes may offer a further opportunity to incidentally photograph wolverines.

The status in 1999 of the wolverine: *Unknown.*

California (Sierra Nevada) bighorn sheep

(Ovis canadensis californiana)

CA - T (1971) E (1999)

FED - E (2000)

General Habitat: Eastern Slopes of Sierra Nevada - from Alpine Zones down to Great Basin Scrub

The California bighorn sheep is one of two mountain sheep subspecies found in California and one of eight found in North America. Both rams and ewes have horns. The ram's horns are massive and may grow to full curl when viewed from the side, and ewes' horns are 10 to 12 inches long and goat-like in appearance. Adult males may be 40 inches tall at the shoulder and weigh 200 pounds. Females weigh approximately 140 pounds.

Two native populations and three reintroduced populations of California bighorn exist in the eastern slopes of the Sierra Nevada Mountains. These are defined from north to south: Lee Vining Canyon, Mono County (reintroduced); Wheeler Ridge, Inyo County (reintroduced); Mount Baxter, Inyo County (native); Mount Williamson, Inyo County (native); and, Mount Langley, Inyo County (reintroduced). Basic habitat requirements of these bighorn sheep include open, rocky, and precipitous slopes for detecting and avoiding predators. These bighorn sheep occur as high as 14,000 feet in the summer and historically recede to lower elevations in the winter, depending on storm severity.

Emergency action was taken in 1999 by the California Fish and Game Commission and the U.S. Secretary of the Interior to list the Sierra Nevada bighorn sheep (SNBS) as endangered under both the State and the Federal endangered species acts. This action was in response to a significant decline in the population size from an estimated 310 in 1985 to an estimated 90-100 individuals in 1999. The reduction was apparently due to predation, severe winters, and accidental deaths in avalanches. With the small and declining population of SNBS, the threat of this unique subspecies becoming extinct is great.

The SNBS is one of the rarest and most endangered mammal subspecies in North America. Due to the high level of public attention and concern, the DFG was provided funding (in 1999 and 2000) through a legislative request to implement a recovery program for this population of sheep. This funding allowed us to initiate a long-term comprehensive population recovery program. Elements of this recovery program include intensive population monitoring, reducing mortality, reestablishing additional populations in historical range, and preparing for and potentially implementing captive



California bighorn sheep

breeding to increase population size and maintain genetic diversity. The continued monitoring of all bighorn sheep populations in the Sierra Nevada remains a high priority.

The status in 1999 of the California bighorn sheep: *Declining.*

Peninsular bighorn sheep
(*Ovis canadensis cremnobates*)

CA - T (1971)
FED - E (1998)

General Habitat: Sonoran Desert Scrub
 Sonoran Thorn Woodland



Peninsular bighorn sheep

Three subspecies of bighorn sheep have been defined by early scientists as occurring within California. California bighorns (*Ovis canadensis californiana*) are restricted to the Sierra Nevada; Peninsular bighorns (*O. c. cremnobates*) occur in the western Sonoran Desert of Riverside, Imperial, and San Diego counties; and Nelson bighorns (*O. c. nelsoni*) occur in the eastern Sonoran Desert, the Mojave Desert, the Transverse Ranges, and the Great Basin Desert of Mono and Inyo counties. Scientists have recently demonstrated that the Peninsular subspecies is not a distinct subspecies of desert sheep; therefore they are now combined into the Nelson subspecies of desert sheep. However, State-listed threatened status remains for the Peninsular group of bighorn sheep, and *O. c. cremnobates* was federally-listed as endangered in 1998 by the United States Fish and Wildlife Service. The Peninsular bighorn sheep are defined as occupying a range from the San Jacinto Mountains in the north, south through the Santa Rosa Mountains and Anza Borrego Desert State Park (ABDSP), to the Mexican border.

These mountains that extend north from Mexico are collectively referred to as the Peninsular Ranges. Bighorn sheep in these mountains prefer steep, open, rocky terrain that provides adequate visibility for detecting and avoiding predators. The availability and proximity to water sources, such as springs, creeks, and oases for drinking in the hot summer months, is also an important element of their habitat. Habitat use by bighorn sheep in the Peninsular Ranges is unique in that sheep rarely occur above an elevation of 4,000 feet, and they frequently use the lower alluvial slopes that radiate from the bases of the mountains. Therefore, their populations are distributed along a "ribbon" of habitat on the eastern side of the Peninsular Ranges.

Both rams and ewes have horns. As with the California bighorn sheep, ram horns are curled and ewe horns are slightly curved and goat-like in appearance. Adult rams weigh approximately 230 pounds, while ewes weigh about 140 pounds.

Continued declines of the small populations of bighorn sheep in the Santa Rosa and San Jacinto Mountains are cause for concern for the survival and long-term viability of Peninsular bighorn sheep in this region. Collaborative monitoring and analyses of these populations are being conducted by the Bighorn Institute and the DFG. This research identifies threats from habitat loss and human activity, and predation as the primary factors jeopardizing population viability and recovery of these bighorn sheep. Critical to the long-term survival of all bighorn sheep in this State is the maintenance of "connectivity" or exchange of individual animals between populations.

In 1994, Peninsular bighorns were estimated at approximately 363 adults distributed in at least eight distinct population segments. During 1996, Peninsular bighorns were again surveyed and estimated to number 277 individuals. In 1998, the DFG conducted a survey of the Peninsular Ranges and estimated approximately 334 adult bighorn sheep distributed in at least eight different locations. Population assessments from ground monitoring and aerial surveys will continue in all areas. Recent bighorn sheep declines may warrant a change in State listing status from threatened to endangered.

In 1997, a working group was formed to collaborate on a federal recovery plan for the Peninsular bighorn sheep. Participants in this working group include DFG, DPR, BLM, USFWS, the Bighorn Institute, and UCD. The primary objective of the Peninsular Ranges Bighorn Sheep Working Group is the conservation and maintenance of bighorn

sheep in viable numbers and healthy condition within the Peninsular Ranges of Southern California through the 21st century, using the application of scientifically based management.

Bighorn sheep in the Peninsular Ranges were federally listed as endangered in 1998. In December 1999, the "Draft Recovery Plan for Bighorn Sheep in the Peninsular Ranges" is being published for public review. Cooperators for this plan included USFWS, BLM, Agua Caliente Band of Cahuill Indians, DFG, and DPR.

The status in 1999 of the Peninsular bighorn sheep: *Declining.*

