December 6, 1993

Endangered Species Section
U. S. Fish and Wildlife Service
911 NE 11th Avenue
Portland, Oregon 97232

Ladies and Gentlemen:

Enclosed is a formal petition to list the Mohave ground squirrel (Spermophilus mohavensis) as a ***THREATENED*** species under the terms of the federal Endangered Species Act of 1973. I believe that a careful reading of the petition will lead to the conclusion that the degree of rarity of this species, and the numerous threats to its continued survival, justify its listing. This is particularly true now because the California Fish and Game Commission chose to remove the Mohave ground squirrel from California's list of threatened and endangered species earlier this year.

As one of the three zoologists who recommended the original listing of the Mohave ground squirrel by the California Fish and Game Commission in 1971, I believe that the species clearly is in worse shape now than it was then. However, while I have over 30 years of experience as a mammalogist and herpetologist studying the fauna of southern California, my attention has not been focused on the Mohave ground squirrel. Thus, in preparing the enclosed petition, I have drawn heavily on the work of others who are cited in the document.

I would appreciate your acknowledging receipt of this petition and keeping me apprised of its progress through your review process. Considering the Mohave ground squirrel's impending lack of legal protection, I urge you begin the process without delay. If you have any questions, please feel free to contact me.

Sincerely,

Glenn R. Stewart, Ph.D.
Professor of Zoology

A LISTING PETITION TO THE U. S. FISH AND WILDLIFE SERVICE

I. SPECIES BEING PETITIONED

Common Name: Mohave Ground Squirrel

Scientific Name: Spermophilus mohavensis Merriam 1889

II. RECOMMENDED ACTION

List as Threatened

III. AUTHOR OF PETITION

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IV. SUMMARY OF REASONS FOR RECOMMENDED ACTION

The Mohave ground squirrel (Spermophilus mohavensis) has the smallest geographic range of the seven species of Spermophilus found in California and one of the smallest ranges of any ground squirrel found in the United States. Its entire range lies within California and encompasses approximately 7,600 mi^2 in the northwestern corner of the Mohave Desert, generally west of the Mohave River. Approximately 375 mi^2 (5%) of the range is naturally unavailable habitat - dry lake beds and rocky hills of roughly equal area. Another 319 mi^2 (4.2%) is unavailable because it is occupied by urban areas and agriculture. An additional 866 mi^2 (11.4%) is severely degraded by rural development, authorized off-highway vehicle activity, and military training. Livestock grazing occurs throughout much of the Western Mohave Desert on public and military lands and degrades about 3,130 mi^2 (41.2%) of the squirrel's range, not counting that also degraded by authorized off-highway vehicles. Thus, over 60% of the squirrel's range currently is unavailable or degraded habitat.

While apparently good habitat conditions are present in much of the remaining 40% of the geographic range, the squirrel's distribution within this area is very patchy and existing populations tend to be of low density (approximately one breeding female per 6 acres in non-drought years). Local extirpations are known to occur due to a variety of anthropogenic and natural factors, and the species is largely absent from a significant portion of its former range in the south (Antelope Valley to Lucerne Valley). Repopulation of unoccupied suitable habitat is slow due to the species' inherently low vagility which probably is associated with its very limited activity season (3 to 5 months, usually March to July). Repopulation is further hindered by man-made barriers and habitat fragmentation. These factors also jeopardize the long-term viability of the species by disrupting gene flow and isolating populations.

The amount of unavailable, degraded and fragmented habitat will continue to increase in the foreseeable future. With total buildout of the major urban areas, it is projected that about 1,170 mi^2 (16.2%) of the original available habitat will be lost to urbanization. Counting this, other developments, and continued livestock grazing, more than 5,400 mi^2 (75%) of the species' habitat may be lost or severely degraded in the future. The California Fish and Game Commission currently is attempting to delist the Mohave ground squirrel and strip it of special protection under the law. Without legally

mandated mitigation of the anthropogenic factors causing its decline, it is likely to become an endangered species.

V. NATURE AND DEGREE OF THREAT

The survival of the Mohave ground squirrel clearly is threatened by habitat destruction, habitat degradation, habitat fragmentation, and drought. Table 1 summarizes the extent of anthropogenic habitat loss and degradation. Some populations also may suffer negative impacts from domestic animal predation, rodenticides, and motor vehicles traveling on roads and highways. When combined with the naturally patchy distribution and unusual biology of this species (see Sections VI-VIII), the cumulative impacts of these various factors seriously jeopardize the species' continued existence.

Habitat Destruction

The major cause of decline of the Mohave ground squirrel has been the destruction of its habitat for human uses - urban, agriculture, military, energy production, transportation, etc. Habitat destruction in occupied habitat results in the direct, immediate loss of individual squirrels. Destruction of unoccupied habitat constitutes the loss of squirrels that would have occupied that habitat in a future population expansion. In either case, physical space is lost to the species. Because the species is capable of occupying most habitats within its geographic range, except dry

Table 1. Current Land Uses and Habitat Conditions within the 7,600 mi^2 Mohave Ground Squirrel Geographic Range. (Most data from **Gustafson 1993**)

Land Use	Habitat Condition	mi^2	% Range	%Habitat*
Dry Lake Beds	Naturally Unavailable	180	2.4	----
Rocky Hills**	Naturally Unavailable	195	2.6	----
Urban Unavailable	258	3.4	3.6	

Agriculture	Unavailable	61	0.8	0.8
Rural Development	Severely Degraded	336	4.4	4.7
Other Disturbances	Severely Degraded	166	2.2	2.3
Ft. Irwin Training	Severely Degraded	203	2.7	2.8
Authorized OHV	Severely Degraded	161	2.1	2.2
Livestock Grazing***	Degraded	3,130	41.2	43.3
Total Used Up or Degraded by Humans		4,315	56.8	59.7
Total Degraded or Unavailable	4,690	61.8	59.7	

*Based on Habitat Area of 7,225 mi^2

**Estimated by visual map inspection

***Does not count overlap with authorized OHV areas

lake beds and rocky hills, destruction of virtually any plant community in the range constitutes loss of the squirrel's habitat.

Large scale habitat destruction occurs in urban areas with the development of subdivisions, shopping malls, golf courses, aircraft runways, landfills, sewage disposal facilities, prisons, dikes and levees, etc. The greatest losses to urbanization have been in and adjacent to the cities of Palmdale/Lancaster, Victorville/Adelanto/ Hesperia/Apple Valley, and Ridgecrest. Smaller areas of urbanization include the towns of Kramer Junction, Boron, North Edwards, California City, Mojave, Rosamond, Inyokern, and Little Rock. Additional urbanization has occurred at the headquarters and outlying areas of the three major military bases: Edwards Air Force Base, the National Training Center and Fort Irwin, and China Lake Naval Air Weapons Station.

The three major urban areas and smaller towns within the geographic range of the Mohave ground squirrel have continued to grow during the past two decades. Currently, urban development covers over 258 mi^2 (3.6%) of the squirrel's former habitat. When the delineated spheres of influence of the three major urban areas named above, plus California City and Mojave, are completely built out, over 1,170 mi^2 (16.2%) of former habitat will have been lost to urbanization (Gustafson 1993). In a letter addressed to the California Department of Fish and Game and dated September 26, 1992, Michael Starr, a researcher who is studying the effects of human activity on the squirrel, wrote: *"In the last decade, population growth in the cities of the western Mojave Desert has averaged nearly 100% (ranging from a low of 30% for Barstow and Mojave to the highest rates of Victorville at 186% and Palmdale at an incredible 460%). Associated with such growth is an increase in supporting structures [such] as new houses (up more than 50%), shopping malls (up 30%), roads, etc. Together, these land uses have resulted in a greater than 50% increase in the loss of open lands (amounting to hundreds of mi^2). Worse, such growth is projected to continue well into the next century, fueled in part by the net outward migration from Los Angeles..."* (Gustafson 1993).

About 61 mi^2 of habitat (0.8%) have been lost to agriculture, and solar energy power plants also may take large blocks. As an example of the latter, the LUZ solar plant, completed near Kramer Junction in 1988, destroyed about 2.5 mi^2 of desert tortoise and Mohave ground squirrel habitat (Stewart 1992). The amount of habitat lost to paved and unpaved roads has not been calculated, but probably is substantial. By themselves, large projects may not necessarily threaten the existence of the squirrel in a particular region. However, the total impact of all large projects, especially when combined with the impact of smaller projects, can cause regional extirpation. This may have happened in the western triangle of the Antelope Valley and in the region east of Victorville.

Habitat Degradation

A degraded habitat is not destroyed, but it is damaged by natural or anthropogenic factors. Depending on the degree and extent of damage, the quantity and quality of the resources may be diminished to the point that only a smaller population of Mohave ground squirrels can be supported than on a comparable area of non-degraded habitat. Also, the physical condition of the remaining squirrels may decline and reproductive recruitment to the population may not be sufficient to keep it from dying out.

Natural degradation may result from drought, heavy rain, flooding, sand storm, or fire. However, the effects almost always are temporary, and the habitat and squirrel population usually will recover through ecological processes. Habitats degraded by anthropogenic factors also can recover through ecological processes, but rarely are given a chance. Instead, the degrading impacts tend to be continuous, become more intense, and spread over ever-increasing areas.

Some anthropogenic impacts commonly are found adjacent to cities and towns, enlarging their zones of influence, e.g. garbage dumping, trampling, and off-highway vehicle use. Similar impacts, and some outright habitat destruction, occur with rural development in which single-family residences are distributed helter-skelter over a wide area. Rural development currently impacts and severely degrades about 336 mi^2 (4.7%) of Mohave ground squirrel habitat. Other disturbances, including unauthorized off-highway vehicle use and temporary land clearing on private and public lands, have severely degraded about 166 mi^2 (2.3%) of the habitat . Military training exercises at Fort Irwin, especially tank maneuvers, have severely degraded 203 mi^2 (2.8%) of the habitat. Another 161 mi^2 (2.2%) of the habitat have been severely degraded by intense off-highway vehicle use on public lands in the four areas where this activity is authorized by the U. S. Bureau of Land Management (BLM).

The effects of off-highway vehicles on terrestrial vertebrates have been studied at four sites in the Mohave Desert by Bury et al. (1977). These researchers found both direct and indirect effects on the fauna. Direct effects include running over individual animals and collapsing their burrows. Indirect effects include destruction of shrubs and disturbance of soils. The former results in a reduction of cover that is important for shade and escape from predators. The disturbance of soils may change their water retention and thermal capacities so as to reduce the abundance of spring annuals. This, in turn, results in decreased food production. In general, it may be expected that the impacts of tanks and other military vehicles are similar and, perhaps, more intense. All of these effects definitely are applicable to the Mohave ground squirrel.

By far the most extensive impact on Mohave ground squirrel habitat is grazing by domestic livestock - sheep and cattle. Grazing generally has been permitted on approximately 3,291 mi^2 of squirrel habitat, including much of that also impacted by authorized off-highway vehicle activity. All of the grazed habitat, except 364 mi^2 on the China Lake Naval Air Weapons Center, is on BLM lands. The China Lake area and

about 1,189 mi^2 of BLM squirrel habitat are subject to cattle grazing. Until recently, sheep grazing has been authorized on about 2,102 mi^2 of BLM squirrel habitat, but a Biological Opinion on the desert tortoise issued in 1991 by the U. S. Fish and Wildlife Service withdrew, at least temporarily, about 1,177 mi^2 from sheep use (Gustafson 1993).

Depending upon the availability of annual grasses and forbs, sheep grazing occurs for about a 70 day period between the months of February and June. The use of this ephemeral forage by sheep coincides precisely with the time when juvenile and adult Mohave ground squirrels are using the same forage to gain weight for their seven months of estivation and hibernation (Gustafson 1993). To the extent that there is competition for forage between sheep and squirrels, there will be direct impacts to the latter. It should be noted that BLM also has closed some areas to sheep grazing in recent years when ephemeral forage was judged to be inadequate to prevent sheep from competing with desert tortoises (USBLM 1993).

Sheep generally are moved through desert habitats in concentrated bands, though they may be somewhat dispersed when grazing. They prefer annuals but also browse on burro bushes (Ambrosia dumosa) and other perennials (Nicholson and Humphreys 1981). They may eat about 10% of the forage in their path (USDI-BLM 1993) and trample much of the remaining vegetation. Webb and Stielstra (1979) found that sheep trampling substantially reduced the density of annuals and decreased shrub cover. Trampling is particularly severe in bedding and watering areas (Nicholson and Humphreys 1981). Impacts on soil characteristics in such areas may be similar to that of off-highway vehicles.

Cattle usually are kept on the range for a longer period of time than sheep. They differ somewhat in foraging techniques and, tending to stay in small areas for extended periods, may consume greater quantities of the major forage species than sheep (USBLM 1993). Like sheep, they may compete with Mohave ground squirrels for forage, reduce shrub cover, damage soil structure, and diminish primary production of the desert ecosystem. With their larger size they are more likely than sheep to collapse squirrel burrows.

The General Accounting Office (GAO) has repeatedly criticized BLM for permitting overgrazing of the public lands (GAO 1988a, 1988b, 1991) and not managing for wildlife values (GAO 1989, 1990). In a comprehensive review of BLM's hot desert

grazing program, GAO (1991) determined that BLM lacks the staff and resources to monitor and properly manage grazing. GAO (1991) further concluded that historic grazing practices in the hot deserts have led to damaged plant communities, that some areas continue to be degraded by current grazing practices, and that livestock grazing can be detrimental to certain wildlife species. One option recommended to remedy the situation was discontinuation of livestock grazing in the hot deserts. Since Congress is neither likely to accept this option, nor to provide BLM with funding sufficient to meet appropriate management goals in the foreseeable future, livestock grazing may be expected to continue as a major and increasingly severe form of habitat degradation for the Mohave ground squirrel.

Habitat Fragmentation

Habitat fragmentation occurs when blocks of habitat become separated from one another by barriers or the destruction of intervening habitat. Gene flow between populations of animals in the isolated blocks is disrupted and, if these populations are small, there will be a gradual loss of genetic variability within them. Populations with greatly reduced genetic variation may not be able to adapt to changing environmental conditions and may be extirpated from their blocks of habitat.

With respect to the Mohave ground squirrel, habitat fragmentation poses two principal problems. First, there may be a disruption of gene flow between northern and southern populations, roughly in the vicinity of China Lake/Ridgecrest and again along State Highway 58 between Mojave and Barstow. This is due not only to highways, but also to a variety of urban and rural developments, off-highway vehicle areas, and solar power plants. The disruption of north-south gene flow may decrease the long-term viability of the species. Second, private lands, which comprise about 36% of the Mohave ground squirrel's range, often occur in small parcels less that 160 acres in size (Gustafson 1993). Development of these small parcels produces extensive habitat fragmentation and isolates many small populations of squirrels, making them vulnerable to extirpation by anthropogenic and natural disturbances. Due to the species' low vagility (see Section VIII) and inability to cross a variety of barriers, the extirpated populations may never be reestablished.

Drought

Biological productivity in the Western Mohave Desert is dependent upon precipitation, particularly that occurring in the winter months (December to February). A single low rainfall year may result in the decreased quantity and quality of spring forage. If the forage quantity/quality is sufficiently reduced, female Mohave ground squirrels fail to reproduce and concentrate on building up the fat reserves necessary to carry them through their normal seven month estivation/hibernation period (Leitner and Leitner 1990). A prolonged period of drought, such as was experienced from the years 1986 to 1990, can result in the extirpation of local populations because there is no reproductive recruitment and the survivability of adults is reduced by the poor conditions (Gustafson 1993).

Periodic droughts are a natural occurrence, but rainfall patterns in the Western Mohave Desert vary considerably from site to site and year to year at the same site (Beatley 1974). The Mohave ground squirrel has survived through time because habitat vacated by local extirpations has eventually been repopulated by individuals from other sites that received enough precipitation to sustain their populations. Because of the species' low vagility, repopulation of vacated habitat may take many years under natural conditions. Under the current conditions of reduced available habitat and substantial barriers to dispersal, repopulation of many vacated habitats is precluded.

Other Threats

Populations of the Mohave ground squirrel occurring adjacent to human developments may suffer losses to domestic animal predation, rodenticides, and motor vehicles. House cats, even well-fed ones, are notorious for their predation on small mammals and birds (Harrison 1992), and domestic dogs commonly dig up rodent burrows. Poisons frequently are used around agricultural fields, golf courses, and canal levees to control rodents. An extensive network of roads and highways lies within the range of the Mohave ground squirrel and squirrels are known to be run over by vehicles (Gustafson 1993). While none of these factors may be significant by themselves, they add to the cumulative impacts causing decline of the species.

VI. HISTORIC AND CURRENT DISTRIBUTION

Historic Range

The presumed historic range of the Mohave ground squirrel is shown in Figure 1 as delineated by the California Department of Fish and Game (CDFG 1980). Confined to the northwestern corner of the Mohave Desert, it is bounded on the south and west by the San Gabriel, Tehachapi, and Sierra Nevada Mountains. On the northeast, it is bounded by Owens Lake and a series of small mountain ranges, including the Coso, Argus, Slate, Quail, Granite, and Avawatz Mountains. On the southeast, the range of the Mohave ground squirrel abuts a portion of the range of the closely related, and probably ancestral, round-tailed ground squirrel (Spermophilus tereticaudus). The 144 mile zone of parapatry of these two species closely follows the network of ancient lakes and rivers that existed in the late Pleistocene Period until about 10,000 years ago (Hafner 1992). While the present Mohave River generally defines the extreme southeastern boundary of the Mohave ground squirrel's range, the species historically occurred east of the river in Lucerne Valley (see list of specimens examined by Hafner 1992).

Current Range

The current range of the Mohave ground squirrel is shown in Figure 2 as delineated in Gustafson (1993). The boundaries illustrated here include all known occurrences of the species and of native vegetation types used by the species in the vicinity of known occurrences. Mountain ranges on the periphery of the range are excluded. Also excluded from this revised map is the extreme southwestern toe of the presumed historic range (roughly 400 mi^2), which is that portion of the Antelope Valley west of Palmdale, Lancaster, Rosamond, and Mojave. Although this area apparently contained squirrel habitat prior to the extensive agricultural development and urbanization of recent decades, and a small amount of habitat still remains, the new boundary reflects the lack of definite records of the squirrel's occurrence here. The squirrel now may be absent from the Victorville to Lucerne Valley portion of its historic range because most the habitat here also has been lost to agriculture and urbanization. However, this region has been retained in the current range because of the squirrel's previous records of occurrence.

As delineated above, the current geographic range of the Mohave ground squirrel includes about 7,600 mi^2 in the northwestern corner of the Mohave Desert in California. This is the smallest range of the seven species of Spermophilus found in California and one of the three smallest ranges among the ground squirrels found in the United States. Only the San Joaquin antelope ground squirrel (Ammospermophilus nelsoni) in

California and the Idaho ground squirrel (Spermophilus brunneus) have comparably small ranges (Hall 1981). Also, it is important to note that, even within apparently good habitats, the distribution of the Mohave ground squirrel is very patchy. Thus, much of the potential habitat is unoccupied. In part, this probably is due to both naturally and anthropogenically induced local extirpations, and failure to repopulate these vacated sites, as discussed in Section V. However, other habitat features or aspects of the species' biology, not yet identified, also may contribute to the naturally patchy distribution.

VII. HISTORIC AND CURRENT ABUNDANCE

There is very little information on either the historic or current abundance of the Mohave ground squirrel. On the basis of casual observations, Burt (1936) estimated that there might be 15 to 20 adults per mi^2 in the vicinity of Palmdale, but felt that this figure was rather high. He also noted their patchy distribution and commented that they were distinctly less numerous than the white-tailed antelope ground squirrel (Ammospermophilus leucurus) occurring in the same area.

The only recent population data for the Mohave ground squirrel have been reported by Recht (1977) for an area near Saddleback Butte in Los Angeles County and Leitner and Leitner (1989, 1990) and Leitner et al. (1991) for the Coso geothermal area in Inyo County. Through careful studies, these researchers found that the density of adult female squirrels in non-drought years averaged about one per six acres (107 per mi^2) of suitable habitat. Zembal et al. (1979), Recht (1989) and the Leitners also found that the antelope ground squirrel generally occurred in much higher densities than the Mohave ground squirrel. Although Aardahl and Roush (1985) reported the Mohave ground squirrel to be as abundant as the antelope ground squirrel at their study sites, it is likely that this conclusion was based on the erroneous assumptions that trapping rates for the two species were equal (Gustafson 1993) and that three days was sufficient time to capture most Mohave squirrels in an area (Recht pers. comm.).

Because the Mohave ground squirrel has a very patchy distribution, it is not feasible to extrapolate a few local density figures to the entire range and calculate a total population. Moreover, even if such a calculation could be made reliably, it would not be of great importance in managing the species. This is because population numbers of rodents commonly fluctuate over time by as much as an order of magnitude on either side of the mean. Thus, the number of squirrels existing at any point in time is not indicative

of the degree of threat to the species. The quantity, quality, and distribution of habitat are much better indicators of the species' status (Gustafson 1993).

VIII. SPECIES DESCRIPTION AND BIOLOGY

Description

The Mohave ground squirrel is a medium sized squirrel with a total length of about nine inches and a tail length of about 2.5 inches (Ingles 1965). Its legs are relatively short. The color of the upper body pelage has been variously described as grayish-brown, pinkish-gray, cinnamon-gray, and pinkish-cinnamon (Gustafson 1993). The underparts of the body and undersurface of the tail are white. Recht (pers. comm.) observed that juveniles tend to be cinnamon-colored and adults more gray. He further noted that the dorsal hair tips are multi-banded and the skin darkly pigmented.

Taxonomy

The Mohave ground squirrel was described as a distinct, monotypic species by Merriam (1889). The type locality, Rabbit Springs, is about 15 miles east of Hesperia in Lucerne Valley. Because it is very similar to the round-tailed ground squirrel (Spermophilus tereticaudus) and has a contiguous geographic range (see Section VI), there has been some controversy as to whether the two taxa are full biological species (Gustafson 1993). However, the studies of Hafner and Yates (1983) and Hafner (1992) demonstrated a degree of chromosomal, genetic, and morphological differentiation consistent with species recognition. For example, the Mohave ground squirrel was found to have a diploid chromosome number of 38 while that of the round-tailed ground squirrel is 36; electrophoretic analysis of 24 gene loci coding for 16 proteins revealed a moderate level of genetic differentiation between the taxa (Rogers genetic similarity S = 0.78); and morphometric analysis of 20 cranial characters showed the Mohave ground squirrel to be significantly different ($P < 0.0001$) and larger in all but two characters. Moreover, evidence of hybridization was detected in only four specimens from three localities in San Bernardino County. One specimen from Helendale was genetically identified as a hybrid (Hafner and Yates 1983). Morphological evidence of hybridization was found in three specimens, one from about seven miles northeast of Helendale and two from near Coyote Dry Lake about 13 miles northeast of Barstow (Hafner 1992). The

localities in the vicinity Helendale are disturbed habitats where ecological prereproductive isolating mechanisms may have been broken down.

Hafner (1992) interpreted the existing data to indicate a zone of parapatry in which there is neutral secondary contact, i.e. no significant competition or intergradation between the species following vicariance and differentiation. Ecological factors, such as the Mohave ground squirrel's preference for gravelly soils and the round-tailed ground squirrel's preference for sandy soils, may serve as prereproductive isolating mechanisms (Hafner and Yates 1983, Hafner 1992). These species probably are isolated behaviorally, as well. The Mohave squirrel clearly is a solitary species while the round-tailed squirrel is colonial (Recht pers. comm.). As the biology of the two species becomes better known, other prereproductive isolating mechanisms also may be identified.

The vicariance event is believed to be the Wisconsinan full pluvial which created a network of rivers and lakes, isolating the ancestral Mohave ground squirrel population from the rest of the round-tailed ground squirrel population near the end of the Pleistocene Period (Hafner 1992). While the Wisconsinan full pluvial ended about 10,000 years ago, the two species may not have come into contact until the rivers and lakes were fully desiccated about 6,000 years ago. Considering that subsequent range expansion of either species across the former barrier has been limited to 18.6 miles, Hafner (1992) estimated that the average rate of dispersal of both species is only about 5.5 yards per year. Thus, the vagility of both species is very low.

Seasonal and Daily Activity

The activity season of the Mohave ground squirrel is very short (Bartholomew and Hudson 1960; Tomich 1982) and may explain the species' very low vagility (Hafner 1992). Adults generally are active for only about five months a year (usually March to July), at which time they reproduce, forage, and prepare for about seven months of inactivity (usually August to February). During the inactive season, the squirrels are secluded in their burrows and exist in a state of torpor for much of the time. The reduced metabolic rate of the torpid squirrels conserves energy and water, permitting them to be maintained on their stores of body fat. The summer period of inactivity is specifically called estivation and the winter period is called hibernation. This behavior appears designed to avoid that part of the year when food is scarce and temperatures may be extreme.

The length of the activity season for individual Mohave ground squirrels varies depending on the availability of food resources, age, and sex. In a poor food year, it takes longer for an individual to acquire the amount of fat necessary to carry it through the long period of inactivity. Adults tend to enter estivation earlier than juveniles because they do not have to put energy into growing before beginning to store fat, and they usually have home ranges with better food resources (Recht 1977). Juveniles may remain active as late as August or September (Recht pers. comm.). Males tend to enter estivation earlier than females because they typically emerge from hibernation earlier (Recht pers. comm.) and do not have to put energy into milk production and the feeding of young before they begin to store fat (Leitner and Leitner 1992). Leitner et al. (1991) observed that most squirrels in the Coso study area had emerged from hibernation by the first week of April and that some entered estivation as early as late May. In the northern part of the range, then, some Mohave ground squirrels may be active for as little as three months of the year.

During the active season, Mohave ground squirrels are above ground throughout the day (Recht 1977). However, as temperatures increase, the squirrels spend more and more time in the shade of shrubs and sometimes retreat briefly to burrows. This behavior reduces their heat load from the sun's radiation. To dissipate excess body heat, a squirrel often will dig a shallow depression in a shady spot and lay prone in it for a short time, allowing heat to be conducted efficiently from its body into the soil. Conversely, when ambient temperatures are cool, a squirrel may bask in the sun to warm its body. The rate of warming probably is increased by erection of the body hairs on the side facing the sun, which exposes the darkly pigmented skin.

Reproduction and Social Behavior

Information on reproduction in Mohave ground squirrels is limited to the observations of Burt (1936), Leitner et al. (1991), and Recht (pers. comm.). Mating occurs soon after emergence from hibernation and litters of four to six young are born after a gestation period of about 28 to 30 days. The young generally appear above ground in May at the age of about 10 days to two weeks.

Recht (pers. comm.) found that males tended to be territorial during the mating period. Females entered the territory of a given male one at a time and remained for a

day or two, apparently copulating in the male's burrow. Thereafter, the females established their own home ranges. After weaning, juveniles in Recht's (1977) study established home ranges that were larger and of poorer quality than those of adults. Adults kept juveniles out of their home ranges by agonistic behavior. Juvenile home ranges were clustered around those of adults, and when the adults entered estivation, the juveniles took over the adults' home ranges.

Aardahl and Roush (1985) also noted that juveniles had larger home ranges than adults. Leitner et al. (1991) determined that the mean home range of 12 radio equipped Mohave ground squirrels was 4.7 acres, as calculated using the minimum convex polygon method. However, the burrows in which individual squirrels spent the night often were 200 to over 400 yards from the areas where they foraged during the day.

Although usually not defending a territory in the strict sense, both juvenile and adult Mohave ground squirrels tend to be solitary with little overlap of their home ranges. This probably is the result of each squirrel maintaining a spatiotemporal territory about 2 m in diameter, the invasion of which by a conspecific triggers fighting (Recht pers. comm.). The extreme intraspecific aggression demonstrated in Adest's (1972) laboratory studies is consistent with such an interpretation.

Food Habits

Recht (1977) characterized the Mohave ground squirrel as a facultative specialist, concentrating for short periods of time on particular food sources, but changing from one source to another throughout the active season. He believed that squirrels sampled various foods periodically in order to recognize better forage, and that the two properties that caused them to select a particular plant species over others available at a given time were higher water content and greater abundance. Leitner and Leitner (1989) found great variation among individual squirrels, even on the same study site, suggesting that individuals may concentrate on their own preferred foods. These observations are not mutually exclusive, of course, and the general finding is that the Mohave ground squirrel is quite flexible in exploiting high quality food resources (Leitner and Leitner 1992). Particularly important among these are annual forbs, insufficient production of which in poor rainfall years may lead to reproductive failure (Leitner and Leitner 1990).

Summarizing the information on the kinds of food eaten by the Mohave ground squirrel, Gustafson (1993) listed the following: leaves of forbs, shrubs, and grasses; fruits and flowers of forbs; seeds of forbs, grasses, shrubs, and Joshua trees; fungi; and arthropods. Leitner and Leitner (1992) noted that the larvae of several species of Lepidoptera were present in exceptional numbers in the spring of 1991 and that the squirrels selected them even though the leaves and seeds of forbs also were abundant.

Interactions of Mohave and Antelope Ground Squirrels

The geographic range of the Mohave ground squirrel is overlapped completely by the range of the white-tailed antelope ground squirrel (Ammospermophilus leucurus). While these species are roughly similar in size (the Mohave is somewhat larger) and food habits, there apparently is little competition between them. Leitner and Leitner (1989) found that they differ in the relative proportions of foliage and seeds eaten. The predominant food of the Mohave ground squirrel was the foliage of forbs, with seeds of forbs and shrubs the next most important food category. The opposite was true for the antelope ground squirrel, with seeds being predominant and forb foliage of lesser importance.

Mohave and antelope ground squirrels also differ in other aspects of their biology. For example, while the Mohave ground squirrel is solitary, the antelope ground squirrel is colonial (Bartholomew and Hudson 1960). In encounters between individuals of the two species, the Mohave ground squirrel is dominant and displaces the antelope squirrel (Adest 1972, Zembal et al. 1979). Finally, by virtue of its ability to utilize seeds, a food resource that remains available long after it has been produced (Leitner and Leitner 1990), the antelope ground squirrel remains active all year long instead of estivating and hibernating like the Mohave ground squirrel (Bartholomew and Hudson 1960).

Predators

There is little documentation of the Mohave ground squirrel's natural predators. Leitner et al. (1991) found circumstantial evidence of predation by the prairie falcon and coyote. Recht (pers. comm.) found similar evidence of predation by the Mohave rattlesnake. Other likely predators include the red-tailed hawk, badger, kit fox, bobcat, and gopher snake.

IX. HABITAT REQUIREMENTS

Plant communities frequently are used as a simple way to characterize the general habitat requirements of animal species. Several authors have described plant communities in California, including those found in the Mohave Desert. Perhaps the best known of these authors are Munz and Keck (1959). Roughly in descending order of area covered within the range of the Mohave ground squirrel, the five Mohave Desert plant communities of Munz and Keck (1959) are: Creosote Bush Scrub, Joshua Tree Woodland, Shadscale Scrub, Alkali Sink, and Sagebrush Scrub. Most of the same names were used by Vasek and Barbour (1977) for the broad community types they recognized, but they substituted Saltbush Scrub for Alkali Sink and described Blackbush Scrub as a community distinct from the Sagebrush Scrub of Munz and Keck (1959). Holland (1986) took a finer grained approach and described nine different plant communities in the Mohave Desert.

As discussed below, the Mohave ground squirrel has been reported from all of the broad community types of Munz and Keck (1959) and Vasek and Barbour (1977), and all but three of Holland's (1986) more narrowly defined communities (Gustafson 1993). A brief description of the Munz and Keck (1959) communities is provided here to give an overview of Mohave ground squirrel habitats.

Creosote Bush Scrub: This community is an open scrub dominated by creosote bush (Larrea tridentata) and burrobush (Ambrosia dumosa). It is widespread on the well-drained soils of valleys, bajadas, and upland slopes, usually below 3,500 feet in elevation. Shreve (1942) estimated that Creosote Bush Scrub covers 70% of the Mohave Desert. More than any of the other communities, Creosote Bush Scrub is characterized by an abundance of annual species in the springs following good winter rains (Vasek and Barbour 1977).

Joshua Tree Woodland: This community is an open woodland, dominated by the Joshua tree (Yucca brevifolia), with an understory that consists of a variety of shrubs (often including other Yucca species and creosote bush) and perennial herbs. It is common on the well-drained soils of mesas and slopes from 2,500 to over 4,000 feet in elevation.

Shadscale Scrub: This community is an open scrub dominated by the intricately branched and often spiny shrubs Atriplex confertifolia, Grayia spinosa, and Artemisia spinescens. It usually occurs on heavy, somewhat alkaline and poorly drained soils, often with underlying hardpan, and covers mesas and flats between 3,000 and 6,000 feet in elevation.

Alkali Sink: This community is characterized by very sparse stands of short, microphyllous shrubs, typically dominated by a single species of Atriplex (e.g. A. polycarpa, A. lentiformis, or A. confertifolia) and a variety of halophytic succulents (e.g. Allenrolfea occidentalis, Suaeda torreyana, and Sarcobatus vermiculatus). It occurs on the fine textured, poorly drained and highly alkaline/saline soils surrounding dry lake beds, usually below 4,000 feet in elevation.

Sagebrush Scrub: This community generally is dominated by open stands of Great Basin sagebrush (Artemisia tridentata), blackbush (Coleogyne ramosissima), and rabbit brush (Chrysothamnus nauseosus). It occurs on deep pervious soils along the eastern base of the Sierra Nevada Mountains and at scattered locations south to the base of the San Bernardino and San Gabriel Mountains, mostly at elevations of 4,000 to 7,500 feet. Vasek and Barbour (1977) did not recognize this community because Vasek and Thorne (1977) placed many of its components in their juniper and pinyon pine woodlands.

Not enough is known about the specific habitat requirements of the Mohave ground squirrel to define its habitat precisely. Because Creosote Bush Scrub is the most wide-spread of the broad community types within the range of the Mohave ground squirrel, and also because it tends to have the greatest production of annual plants, it is the community in which the squirrel most often is found. The Mohave ground squirrel exhibits a preference for gravelly as opposed to sandy soils (Hafner 1992), but it is not abundant at sites with desert pavement (Aardahl and Roush 1985). With suitable soil conditions, the squirrel may reach elevations up to 5,600 feet where temperature and/or rainfall probably become limiting factors (Gustafson 1993). Wherever it has been observed within the various plant communities described above, the Mohave ground squirrel avoids steep slopes and rocky terrain (Leitner 1980, Leitner and Leitner 1989). Also, it has not been found in Holland's (1986) Mohave Wash Scrub, Desert Sink Scrub, and Desert Greasewood Scrub communities (Gustafson 1993). The latter two are subdivisions of Munz and Keck's (1959) Alkali Sink community that are characterized by soils with very high salinity and often an underlying high water table.

X. MANAGEMENT

LEGISLATIVE BASIS FOR MANAGEMENT

Gustafson (1993) has thoroughly reviewed the legislative basis for management of the Mohave ground squirrel, and the resulting recommended and current management activities. A brief summary is presented here.

State Endangered Species Act of 1970

Under the authority of the State Endangered Species Act of 1970, the Mohave ground squirrel was listed as a "rare" species by the California Fish and Game Commission on May 21, 1971. By the Act's definition, this meant that the species "*although not threatened with extinction, is in such small numbers throughout its range that it may be endangered if its environment worsens.*" The decision to list the species in 1971 was based in part on the recommendations of three professional mammalogists and an agricultural biologist who reviewed a working list of species being considered for listing. Protection under the Act provided that no person could import, take, possess, or sell the Mohave ground squirrel, or any part thereof, in California without a permit from the Department of Fish and Game.

The State Endangered Species Act of 1970 also required the Department of Fish and Game to prepare biennial reports on the status of listed species, including recommendations for protecting, preserving and enhancing these species. The reports were entitled "At The Crossroads" and appeared in 1972, 1974, 1976, 1978, and 1980. A supplement to the last report appeared in 1983. Except for the supplement, each report contained a summary of legislative and management actions for listed species, and an account with recommendations for each species, including the Mohave ground squirrel.

California Endangered Species Act of 1984

A new California Endangered Species Act was passed in 1984 and became effective on January 1, 1985. Its terminology, policies, and provisions were incorporated in appropriate sections of Title 14 of the California Code of Regulations and Chapter 1.5, Sections 2050-2098 of the California Fish and Game Code. In the new Act, the term "threatened" replaced the term "rare", and all species formerly identified as rare were classified as threatened. A threatened species was defined as one *"that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter."* These changes in terminology and definition brought the State Endangered Species Act into conformity with the federal Endangered Species Act of 1973.

In addition to the basic protection already provided for listed species, the California Endangered Species Act of 1984 established new, more far-reaching policies and procedures for managing them. For example, it declared that it is State policy to conserve, protect, restore and enhance listed species and their habitat. It provided that the Department of Fish and Game would consult with other State agencies, prepare Biological Opinions, and specify mitigations for projects that may adversely impact listed species or their habitats. Similar provisions were made for non-State entities. The 1984 Act also required the Department to prepare annual reports summarizing the status of all listed species, and to prepare detailed status reviews of each listed species every five years. The annual reports began in 1986 and the first status review of the Mohave ground squirrel was prepared in 1987 (Gustafson 1987). A second status review was prepared in 1993 (Gustafson 1993).

California Environmental Quality Act of 1973

The California Environmental Quality Act (CEQA) was passed in 1973 and became part of California statute law incorporated in Sections 21000-21177 of the Public Resources Code. It has been amended several times since its enactment. Under CEQA all of the counties and incorporated cities in California have authority for land use regulation. Any agency of a county or city government can act as a "lead agency" for determining the type of environmental analysis CEQA requires and for choosing among

alternative actions. CEQA is implemented through a set of Guidelines, prepared by the Governor's Office of Planning and Research, which are binding on all public agencies in California. The Guidelines require that, in order to prevent State or federally listed species from becoming extinct, lead agencies must take steps to conduct or permit only those activities that do not contribute to the extinction of these species. As a State-listed species, the Mohave ground squirrel comes under the CEQA Guidelines.

Federal Land Policy and Management Act of 1976

The Federal Land Policy and Management Act of 1976 directed the Secretary of the Interior, through the U. S. Bureau of Land Management (BLM), to prepare a comprehensive long-range plan to manage about 18,750 mi^2 of public lands in the deserts of California. Designated the California Desert Conservation Area, these lands include all of the Mohave and Colorado Deserts, and a small portion of the Great Basin Desert. Issued in 1980 and amended several times since then, the "Desert Plan" requires BLM to manage for State and federally listed threatened and endangered species. The policy is that BLM actions will not jeopardize the continued existence of these species, and the overall objective is to improve their status so that delisting can occur. In a section of the Plan reviewing the classification of lands for multiple uses, it is stated that all *"State and federally listed species and their critical habitats will be fully protected.*" (USBLM 1980). Management will be accomplished through close coordination with State and federal agencies. As a State-listed species, the Mohave ground squirrel qualifies for BLM management goals.

RECOMMENDED AND CURRENT MANAGEMENT

State Management Recommendations and Activities

Early in the development of management recommendations for the Mohave ground squirrel, the Department of Fish and Game recognized the need to more precisely describe the species' geographic range, taxonomy, and biology. Also recognized was the need to preserve essential habitat in the face of continuing loss and degradation. The 1987 status review (Gustafson 1987) and most recent annual report (Gustafson 1992) continued to emphasize most of these needs. The principal recommendations presented in these reports are the following:

l. Conduct intensive field studies to discover unknown aspects of the life history of the species, including local distribution and relative abundance in portions of its range.

2. Protect the species' habitat through project reviews by public agencies and by the establishment of a series of permanent preserves on public lands.

3. Restore degraded habitat through the control of livestock grazing and off-highway vehicle activity, and through revegetation where feasible.

4. Investigate the impacts of the use of rodenticides on the squirrel.

At the State level, the most tangible result of these recommendations has been a series of field studies, one conducted by the Department of Transportation (Recht 1989) and three conducted by the Department of Fish and Game. Beginning with Hoyt's (1972) work, these studies have increased existing knowledge of the Mohave ground squirrel's geographic range and biology, and lead to a new technique for determining project mitigations. For example, the study by Wessman (1977) discovered populations of the squirrel as far east as the western base of the Avawatz Mountains, expanding the known range by about 1,800 mi^2. The study by Rempel and Clark (1990) in Indian Wells Valley near Ridgecrest concluded, among other things, that trapping surveys were not reliable in determining the presence or absence of the species because visual sightings often were not confirmed by trapping. To get around this problem, they developed a system of rating the suitability of habitats depending on the amount of disturbance suffered.

Based on Rempel and Clark's (1990) work, the Department of Fish and Game developed and is now using what it calls the Cumulative Human Impacts Evaluation Format (CHIEF) methodology for determining mitigation requirements in proposed projects that would impact Mohave ground squirrel habitat. Since the squirrel occurs in virtually all plant communities, any vegetated site is assumed to be potential habitat, whether or not squirrels are present. In applying the CHIEF methodology, the Department assesses the degree of disturbance existing on the site and assigns a numerical score which determines the mitigation ratio. An undisturbed site requires the highest ratio of mitigation for loss while a highly disturbed site may require no mitigation at all.

Under Section 2081 of the Fish and Game Code, the Department of Fish and Game may issue permits to non-State entities to allow the take of listed species by habitat destruction when otherwise unprotected habitat can be protected on or off site. Such permits have been issued for the take of the Mohave ground squirrel in several projects when it was determined that the required mitigation protected habitat at sites where the squirrel was more likely to survive in the long term.

Management Activities by Other Agencies

The protections and management recommendations provided under State and federal laws have stimulated other agencies to conduct activities beneficial to the Mohave ground squirrel. Again, several field studies have contributed significantly to knowledge of the species. Particularly important among these are the studies by Aardahl and Roush (1985) for the BLM, Zembal et al. (1979) for the Navy's Coso geothermal development program at China Lake, and the continuing studies by the Leitners in the same area (Leitner 1980, Leitner and Leitner 1989, 1990, 1992, Leitner et al. 1991). Information from these studies has been discussed in earlier sections of this petition.

Under the Desert Plan, the USBLM (1980) proposed two Areas of Critical Environmental Concern (ACECs) to protect the Mohave ground squirrel. These were the Desert Tortoise Research Natural Area (DTRNA) ACEC, encompassing about 37.5 mi^2 of public and private lands in Kern County, and the West Rand ACEC encompassing about 25 mi^2 of such lands, also in Kern County. Specific management plans have been developed for the DTRNA ACEC and a new area called the Rand Mountains/Fremont Valley Management Area, which includes the West Rand ACEC. However, proposed management plans for several other areas of Mohave ground squirrel habitat were never developed.

Particularly encouraging are several cooperative management plans or mitigation programs involving the Mohave ground squirrel that are being developed jointly by different agencies. One is for the El Mirage Cooperative Management Area in San Bernardino County, which brings together the BLM, the County of San Bernardino, the County of Los Angeles, and the California Department of Parks and Recreation. This area encompasses some 38 mi^2 of public and private lands, about 25 mi^2 of which are potential squirrel habitat. While the area will be managed primarily for recreation and

other uses, it is significant that the management plan calls for appropriate actions to maintain populations of the Mohave ground squirrel that are identified in the area.

Another cooperative management effort is the Coso Mohave Ground Squirrel Mitigation Program in the Coso Known Geothermal Resource Area at the China Lake Naval Weapons Center in Inyo County. This program is a joint effort by the BLM, U. S. Navy, and California Department of Fish and Game designed to address impacts to the squirrel resulting from geothermal development. Elements of the program include rehabilitation of degraded habitat throughout the remainder of the roughly 68 mi^2 geothermal area by eliminating cattle grazing, long-term monitoring to evaluate the success of eliminating grazing, and research on the biology of the Mohave ground squirrel. Some results from the latter element already have been discussed.

The most ambitious and important cooperative management program for the Mohave ground squirrel currently is being developed by the BLM, California Department of Fish and Game, and U. S. Fish and Wildlife Service. Known as the West Mohave Coordinated Management Plan, this effort covers over 13,400 mi^2 of the Western Mohave Desert and includes portions of Inyo, San Bernardino, Riverside, Los Angeles, and Kern Counties. The planning process presently is focused on the squirrel and the desert tortoise, though other species may be added in the future. All agencies having land management and/or regulatory jurisdiction affecting the squirrel and tortoise have been invited to participate.

It is expected that products of the plan will include identified management zones with defined compatible uses and management prescriptions. The zones will contain habitat essential to the long-term survival of one or both target species, and will be categorized "A" or "B" to indicate the intensity of management needed to meet this objective. A-zones for the Mohave ground squirrel will be areas of high to medium quality habitat and at least 94 mi^2 (60,000 acres) in size. This size is based on population biology theory and calculations using existing data on the density of adult female squirrels. At least five A-zones tentatively have been selected to represent the northern, eastern, western, central, and southern parts of the range. This pattern will allow them to include as much genetic diversity as possible in the species population and to provide corridors for gene flow. In so far as possible, the A-zones will be located on public and military lands to minimize the need to acquire private land. The A-zones will be surrounded by B-zones in which there will be fewer restrictions on human activities

while still managing to protect the squirrel. The B-zones will be necessary as buffers to maintain the integrity of the A-zones.

Comments on Management Activities

From the preceding summary of management recommendations and activities, it is apparent that the actions necessary to insure long-term survival of the Mohave ground squirrel have only begun to be taken. Field studies have significantly increased knowledge of the species' range and biology, but habitat protection is in its infancy and habitat restoration is just beginning to be investigated. Nothing is known presently about the extent to which the use of rodenticides impacts the Mohave ground squirrel.

With the very limited amount of habitat protection that has been achieved (roughly 1% of the habitat meeting A-zone criteria), populations of the Mohave ground squirrel continue to decline. Major responsibility for protecting habitat and halting the decline must rest with the BLM, but this agency has yet to show that it can live up to the laudable goals stated in its Desert Plan.

In regard to the West Mohave Coordinated Management Plan, it is important to note that only 805 mi^2 within the range of the Mohave ground squirrel presently are proposed as A-zones for both the desert tortoise and the squirrel. This is only about 11% of the total habitat available for the squirrel and does not include important squirrel habitat north of Ridgecrest which is beyond the geographic range of the tortoise. In fact, about 15-20% of the squirrel's range is not overlapped by the tortoise's range, and the specific habitat requirements of the squirrel may be different from those of the tortoise. Thus, measures to protect the tortoise will not, by themselves, protect enough of the habitat and genetic diversity of the squirrel to insure its long-term survival.

At the local level, there is concern about the effectiveness of the CHIEF method of determining mitigation for habitat loss. While the California Department of Fish and Game has been requiring the use of CHIEF since mid-1991, there is practically no information on the number of projects reviewed, either before or after CHIEF's implementation, or on the benefits accrued to the Mohave ground squirrel. When confronted by substantial economic or political considerations on private lands, it is known that local lead agencies often fail to choose alternatives that protect State-listed species. In the case of the CHIEF process, it is conceivable that local agencies and

developers may use the process to their benefit, and to the detriment of the squirrel, by allowing or enhancing habitat disturbances before the evaluation occurs.

Delisting by California Fish and Game Commission

Not only are local agencies persuaded by economic and political considerations, but so is the California Fish and Game Commission.
The Commission is a political body whose members are appointed by the Governor and have little if any biological expertise. Among other things, the Commission is responsible for administering the provisions of the California Endangered Species Act with respect to listing and delisting threatened and endangered species.

On November 19, 1991, the Kern County Department of Planning and Development Services submitted to the Commission a petition to delist the Mohave ground squirrel as a threatened species. The reasons given to delist the squirrel were the following:

l. The listing has inhibited efforts by private property owners to subdivide their properties into home sites.

2. Other forms of development which are important to the economic prosperity of eastern Kern County have been delayed or stopped as a result of the listing.

3. The Mohave ground squirrel was erroneously listed as rare in 1971 in the absence of conclusive scientific evidence.

4. Available scientific studies do not substantiate that the Mohave ground squirrel and its habitat are threatened.

5. Recent studies show that there are large numbers squirrels.

6. Federal lands within Mohave ground squirrel habitat are being managed adequately to insure the continued existence of the species.

The Commission accepted Kern County's petition for consideration on April 2, 1992. In March 1993, the Department of Fish and Game released a status review

(Gustafson 1993) which refuted the claims in the County's petition. It also pointed out that economic considerations are not a valid reason for delisting, and concluded that the petition was deficient because it lacked much of the information required by the applicable regulations and did not present sufficient scientific data to support delisting.

After the Department's report was submitted, the Commission accepted two supplements to the County's petition which purported to support the County's claims. These were dated April 27, 1993 and May 12, 1993. Neither the Commission, its staff, the Department, nor the public had time to review and comment on these supplements prior to the Commission's hearing held on May 13, 1993. At this hearing, the Commission received oral and written testimony from the public, including several scientists familiar with the Mohave ground squirrel, and representatives of the Department who stated that the Mohave ground squirrel continues to be threatened. Further, they pointed out that the County's petition contained many scientific inaccuracies and did not comply with required procedures. In spite of initial admonishments to the contrary, the Commission also permitted a considerable amount of oral testimony on economic issues that are irrelevant to the Commission's decision making process under the terms of the California Endangered Species Act.

Notwithstanding the Department of Fish and Game's status report and the scientific testimony presented at the May 13, 1993 hearing, the Commission voted on May 14, 1993 to delist the Mohave ground squirrel. The Commission ratified this decision on June 17, 1993. Several environmental organizations currently are challenging the Commission's action in court. Also, the California Office of Administrative Law has delayed implementation of the delisting until the Commission adequately addresses public comments on the issue. The Commission's response to the Administrative Law Office's requirements must be filed by February, 1994, at which time the delisting action probably will be finalized.

If implemented, this unprecedented and unjustified delisting action will strip the species of all protection under the various laws described earlier. Without State or federal listing, there is no incentive for the various management agencies to continue the programs that have been initiated to insure the species' long-term survival. Lacking legally mandated mitigation of the anthropogenic factors causing its decline, the Mohave ground squirrel is likely to become an endangered species. Therefore, listing by the U. S. Fish and Wildlife Service as a threatened species is warranted.

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