

# MOHAVE GROUND SQUIRREL CONSERVATION PRIORITIES

Mohave Ground Squirrel Technical Advisory Group  
December 23, 2010

This document provides general recommendations for actions to conserve the Mohave ground squirrel (*Xerospermophilus mohavensis*), a California endemic species that is listed as threatened under the California Endangered Species Act. The Mohave ground squirrel has been petitioned for listing under the federal Endangered Species Act. A 90-day finding on the petition was published in the Federal Register on April 27, 2010 in which the U.S. Fish and Wildlife Service found the petition presented substantial scientific or commercial information indicating that listing the Mohave ground squirrel may be warranted and initiated a 12-month status review.

The Mohave ground squirrel has a restricted geographic range in the western Mojave Desert, where it has suffered from habitat loss as a result of conversion or degradation of native vegetation for residential, industrial, and energy-related developments, agriculture, recreation, and other human uses. On-going development plans present a serious threat to remaining Mohave ground squirrel populations. As a result of these concerns, it is important to develop conservation priorities for consideration and action during the environmental review of proposed projects and as part of conservation planning efforts for the California deserts.

The Mohave Ground Squirrel Technical Advisory Group (MGS TAG) is a long-standing committee of Mohave ground squirrel technical experts from the private sector, academia, and land management and regulatory agencies. The MGS TAG provides a forum for information sharing and formulation of recommendations to the California Department of Fish and Game and other agencies on the conservation of the Mohave ground squirrel. This document represents the MGS TAG's consensus view on actions required to conserve and recover this species.

## **1. Maintain Functional Habitat Connections between Known Populations**

A recent paper (Leitner 2008) identifies four "core areas" that are known to support relatively abundant populations of MGS. The core areas are recognized based upon evidence that Mohave ground squirrels have persisted for a long period of time (several decades), are currently found at multiple locations within each area, and are represented by substantial numbers of adult animals. The core areas are unique in having documented persistence of MGS through successive bouts of population increase and decline that appear to coincide with variation in the timing and amount of winter rainfall. In addition, there are four other areas in which there are known populations based upon recent studies. It is highly likely that other areas support Mohave ground squirrel populations, but more study would be needed to ascertain the locations and attributes of such areas (see "4. Conduct Research to Clarify the Distribution and Status of the MGS" below). In the absence of such studies, the eight areas of known MGS occurrence represent subpopulations that, without habitat

connectivity, likely would suffer from loss of genetic interchange and possibly local extinction following stochastic events such as drought.

Radio-telemetry studies in the Coso Range (Harris and Leitner 2005) and in the Little Dixie Wash area (Leitner in prep.) have shown that juvenile Mohave ground squirrels regularly disperse up to 5 miles from their birthplace. This long-distance dispersal behavior is shown by both juvenile males and females and is very likely to be important in maintaining genetic diversity and in allowing re-colonization of areas where local extinction has occurred due to prolonged droughts or other factors.

Suitable habitat for dispersal and gene flow must be maintained between these populations. Large-scale human development threatens important habitat connections in several parts of the species range. Connections in the form of contiguous, occupied habitat should be maintained between all populations to ensure the long-term conservation of the species. Maintenance of viable connections will require proper management of existing public lands and protection of private lands, either through conservation easement or fee title acquisition. The following discussion includes references to locations depicted on Figure 6 in Leitner (2008).

#### Edwards Air Force Base Core Area

Habitat connections between the EAFB core area and areas to the north across SR 58 between the Hyundai Test Track and Kramer Junction have already been reduced by residential and industrial developments. Acquisition of private land for conservation purposes is needed in key areas to maintain connectivity for Mohave ground squirrel movement across SR 58.

#### Little Dixie Wash Core Area

This core area is cut off to the south by the Koehn Dry Lake playa, which is flanked to the west and east by large areas of abandoned farm land in Fremont Valley. Also, to the south and east of Little Dixie Wash, there is extensive, rugged terrain with unsuitable, rocky substrates in the El Paso Mountains. To the north, there is a partial barrier of developed land extending from Inyokern Airport east to Ridgecrest. The most viable remaining connection to populations south or east of Ridgecrest is bounded by Ridgecrest to the North and the El Paso Mountains to the south. Acquisition of private land with suitable habitat to the east of the Little Dixie Wash core area would help to maintain connectivity with the north-south corridor along US 395 toward Kramer Junction and the EAFB core area.

#### Desert Tortoise Natural Area Known Population

Documented occurrences over the past 10 years demonstrate the existence of a Mohave ground squirrel population at the DTNA north of California City. This block of conservation land is bordered to the north, west, and south by private property that is used for livestock grazing and OHV recreation. The planned expansion of the DTNA to the east will help to establish a protected connection to Mohave ground squirrel

populations in the Pilot Knob area. Another connection extending south from the DTNA to EAFB should be secured by acquisition of suitable private land interspersed among existing blocks of BLM land.

### North-South Connection from Kramer Junction to Ridgecrest

The north-south corridor along US 395 from Kramer Junction to Ridgecrest is critical as a connection between the EAFB core area and populations to the north. Private land that could be acquired here includes some parcels in the eastern portion of Fremont Valley and up to 50 sections of “checkerboard” land south of the Atolia mining district.

### East of Ridgecrest along SR 178

The region east of Ridgecrest along SR 178 over to Searles Dry Lake is a critical connection between the Coso/Olancha core area and other core areas and populations to the south. From Ridgecrest west across Indian Wells Valley to the Inyokern Airport, there exists a partial barrier to north-south dispersal due to a 12-mile east-west strip of developed land along SR 178. To the east of Ridgecrest along SR 178 is a relatively undisturbed area that has been recently demonstrated to support a Mohave ground squirrel population (Sapphos Environmental, Inc. 2006). Almost all of the land between Ridgecrest and Searles Lake is under federal management (China Lake NAWS and BLM), so protecting this vital connection will depend upon actions by these two organizations.

## **2. Protect Known Core Areas**

The four known core areas are made up mostly of federal land. A core area is defined here as a polygon encompassing known occupied sites in these areas plus areas of suitable habitat extending out 5 miles. This differs from the core area definition offered by Leitner (2008), which included occupied areas only. The MGS TAG considers the extended area as part of the core to accommodate the known dispersal distance of juveniles and the normal population expansion or contraction experienced by the species following winters with high or low precipitation. Leitner (2008) also recognized the importance of the areas extending outward from currently-occupied areas, but considered them as buffers on the occupied areas.

The Little Dixie Wash core area is primarily BLM land, while the other three (Coso/Olancha, Coolgardie Mesa/Superior Valley, and Edwards Air Force Base) include large amounts of DOD land. Core areas have no official protection as such, although some include BLM land that receives consideration as part of the Mohave Ground Squirrel Conservation Area under the West Mojave Plan. Likewise, DOD policy and practice have generally added to our knowledge of MGS status on military lands and have provided good stewardship of the species. However, it is hoped that recognition of the importance of these areas will result in management action to avoid or minimize ground-disturbing impacts. Several steps could be taken to enhance conservation within core areas:

- Recognize the conservation value of Mohave ground squirrel core areas in the Integrated Natural Resource Management Plans for China Lake Naval Air Weapons Station, Fort Irwin, and Edwards Air Force Base.
- Acquire private inholdings within core areas where appropriate.
- Restrict OHV use to designated routes within BLM lands in core areas.
- Establish the core areas (as defined in this document) to include both the known occupied sites and areas extending out 5 miles from the sites where habitat is suitable (mountains and playas where rugged terrain or other vegetation or substrate conditions make the area unsuitable for MGS may be omitted). Apply appropriate conservation management to these core areas to protect colonizing juveniles.

The MGS TAG recommends additional work to assess the distribution and status of the Mohave ground squirrel on lands that have not been surveyed (see below). As new information becomes available, it is possible that other core areas and habitat linkages will be identified and need to be protected to ensure the long-term conservation of the Mohave ground squirrel.

### **3. Identify Development Zones with Minimal Impact on MGS Habitat**

Proposals for extensive conversion of natural habitat within the range of the Mohave ground squirrel pose a threat to functioning desert ecosystems and, if implemented, would represent a permanent loss of all biodiversity values.

However, there is a great deal of land in the western Mojave Desert that has already been converted. Such land appears to be suitable for large-scale development with minimal or no adverse impact on Mohave ground squirrel habitat and other natural resources. The MGS TAG recommends that lands previously converted from natural habitat for agriculture, mining, and other human development be considered first for new development projects. Less-disturbed natural lands within the known range of the Mohave ground squirrel should be considered for development only after development options on converted lands have been exhausted, and after careful consideration of potential impacts to the Mohave ground squirrel and other natural resources.

The following actions should be taken to ensure that development projects minimize impacts to biological resources:

- Identify lands not suitable for Mohave ground squirrels as the areas most appropriate for new development. Lands already converted for agriculture (and in many cases subsequently abandoned for this land use) offer the best opportunity to minimize impacts to natural resources, including the Mohave ground squirrel.
- Develop policies that would provide incentives for development in such areas.
- Siting new projects to minimize the need to develop extensive infrastructure (e.g., roads, transmission lines) would also minimize impacts to MGS habitat.

### **4. Conduct Research to Clarify the Distribution and Status of the MGS**

Although a great deal has been learned in recent years about the distribution and status of the Mohave ground squirrel, there are still large geographic areas where our knowledge is inadequate. More effort should be invested in surveys that could identify new populations in areas that have not been investigated in recent years. Insofar as possible, these efforts should utilize random methods for selection of study sites and should supplement traditional trapping methods with alternative detection techniques that have been demonstrated to be effective. Geographic areas that merit further study include:

- Both north and south ranges of China Lake NAWS
- Interior of Fort Irwin, especially areas surveyed prior to 1996
- Area west and north of Barstow toward Harper Lake and Coolgardie Mesa
- Northeastern corner of Los Angeles County and adjoining areas of San Bernardino County west of US 395
- East of the Mojave River between Barstow and Lucerne Valley
- North-south corridor along US 395 between Ridgecrest and Kramer Junction
- North and east of Searles Dry Lake
- Both sides of Highway 14 between Highway 58 and Red Rock Canyon vicinity

## **5. Conduct Research to Improve Mohave Ground Squirrel Detection Capabilities**

Improved survey techniques to increase detection probability would aid in closing knowledge gaps, such as estimating population densities, building habitat suitability models, and determining the extent of occupied range. Closing these gaps would in turn aid in monitoring populations and managing habitat for conservation of the species. There is promise in audio detections, camera trapping, and other techniques. The TAG should recommend and evaluate continued exploration of survey techniques and work toward more effective and efficient survey techniques.

## **Consider Other Potential Conservation Measures**

The MGS TAG considers the five actions described above as the most critical immediate needs for conservation of the Mohave ground squirrel. Other actions, including translocation of squirrels out of project sites prior to construction and captive breeding to augment productivity of natural populations, are sometimes discussed as conservation tools for this species. For the reasons described below, the MGS TAG considers these activities to be problematic and not viable options for management of the Mohave ground squirrel. No resources should be diverted from actions that would benefit the Mohave ground squirrel to implement actions that could be considered experimental, at best.

### Translocation

There have been suggestions that Mohave ground squirrel conservation could be carried out by translocating individuals from areas to be impacted by development to conservation lands. This has been done with desert tortoise (*Gopherus agassizii*), so it

might seem worth evaluating for the Mohave ground squirrel. In fact, Mohave ground squirrels have been translocated in at least one case. Unfortunately, no follow-up studies were required in this previous case, so we have no way of knowing if the experiment was successful. It seems very unlikely that translocation would be practical or effective with this species. First, Mohave ground squirrels are dormant underground for about 6 months (August-January) and it is impossible to find their hibernation burrows. Second, translocation would be quite harmful during much of their active season. Females are pregnant in March and nursing dependent young during April into early May. Both males and females require abundant forage in early summer to fatten enough to survive dormancy. Moving them during the period of fat storage could put them in habitat that might be lacking in nutrients and where they might be competing with resident animals. In general, the effect of adding new animals is likely to be harmful to residents at the translocation site as well as to the newly translocated individuals. Extensive pilot studies would need to be conducted to evaluate the translocation option. This does not seem like a high priority when compared to protecting suitable habitat.

### Captive Breeding

Mohave ground squirrels are quite asocial and intolerant of other individuals during almost all of their active season. Reproductive females, of course, are associated with their offspring during the period of lactation and then for about two weeks after weaning. Beyond this, their only contact with others of the same species appears to be during part of a single day when they are receptive and may mate with several males. Getting the timing right would require remarkable skill on the part of the technician in charge. Otherwise, males and females placed in close contact at the wrong time would very likely injure each other in fights. Like most rodents, Mohave ground squirrels are quite capable of reproducing on their own if they are given sufficient habitat with suitable cover and forage vegetation. Protection of existing suitable habitat is the most important conservation action for the Mohave ground squirrel.

### **Literature Cited**

- Harris, J.H. and P. Leitner. 2005. Long-distance movements of juvenile Mohave ground squirrels, *Spermophilus mohavensis*. *The Southwestern Naturalist* 50:188-196.
- Leitner, P. 2008. Current status of the Mohave ground squirrel. *Transactions of the Western Section of The Wildlife Society* 44:11-29.
- Sapphos Environmental, Inc. 2006. State Route 178 Drainage Improvement (EA 438900), Biological Technical Report. Prepared for California Department of Transportation-District 8, San Bernardino, CA. Prepared by Sapphos Environmental, Inc., Pasadena, CA.

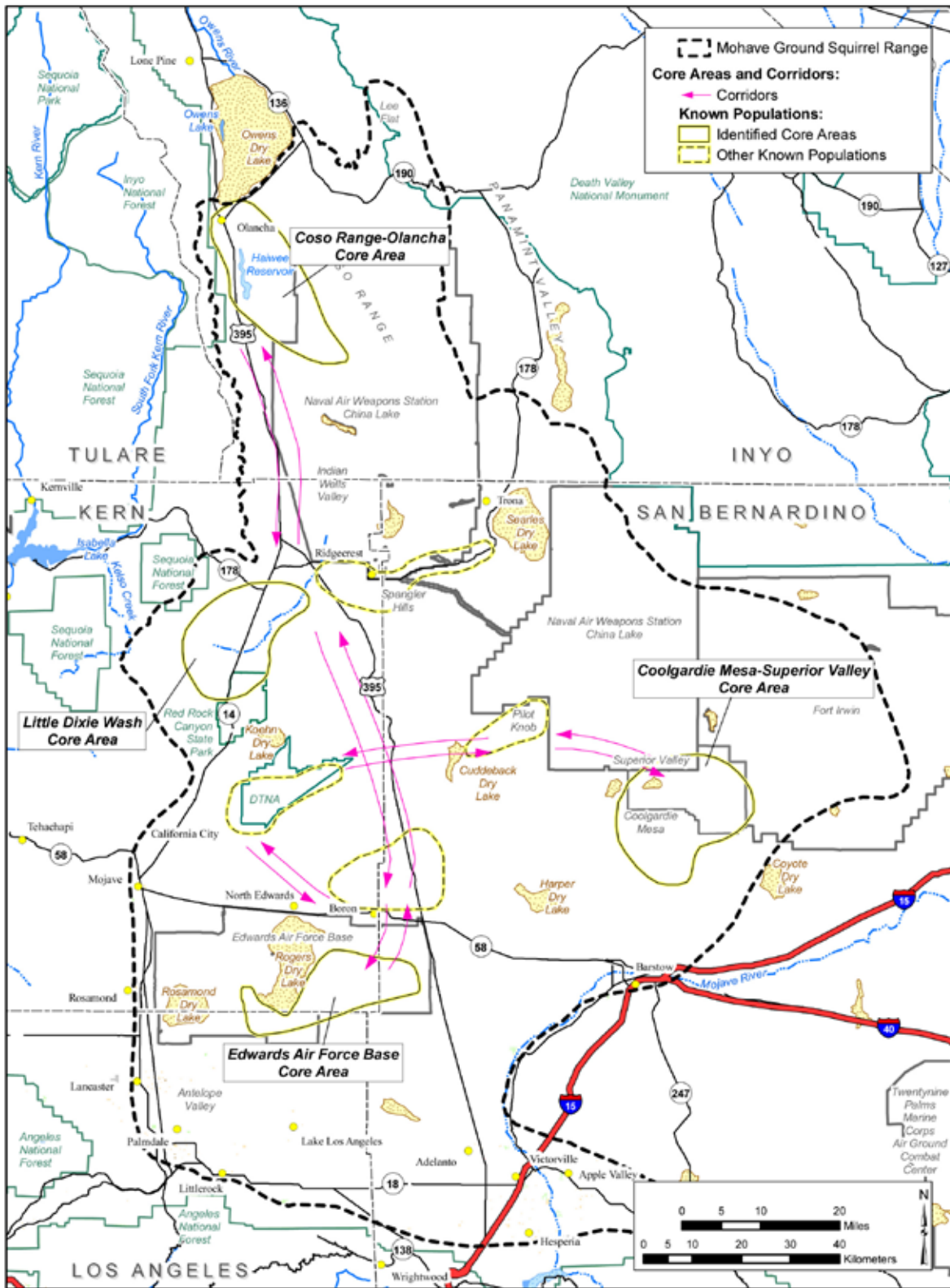


Figure 6. Map of potential habitat corridors that may provide connectivity between identified core areas and other known Mohave ground squirrel populations.