MOHAVE GROUND SQUIRREL CONSERVATION PRIORITIES
REVIEW DRAFT

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October 24, 2009

The Mohave ground squirrel (*Xerospermophilus mohavensis*) has a restricted geographic range in the western Mojave Desert and is listed as Threatened by the State of California. It has suffered from habitat loss as a result of human development in the Mojave Desert and the recent push to expand renewable energy production presents a serious threat to remaining populations. As a result of these concerns, it is important to develop conservation priorities and to act on these priorities.

Here is a preliminary attempt at defining the priority actions that are required in order to conserve and recover this species.

Maintain Connections between Known Populations

A recent paper (Leitner 2008) identifies four "core areas" that still support relatively abundant and widespread populations. The core areas are recognized based upon evidence that Mohave ground squirrels have been persistent for a long period of time (several decades), are currently found at multiple locations within the area, and are represented by substantial numbers of adult animals. In addition, there are four other areas in which there are known populations based upon recent studies. There may well be other areas that still support viable populations, but more studies will be needed to provide that evidence.

Radio-telemetry studies in the Coso Range (Harris & Leitner 2005) and in Little Dixie Wash (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.

Suitable habitat for dispersal and gene flow must be maintained between these populations. Large-scale human development (including but not limited to) renewable energy projects threatens maintenance of connections in several parts of the species range.

Edwards Air Force Base Core Area

Connections between the EAFB core area and areas to the north across SR 58 between the Hyundai Test Track and Kramer Junction are restricted by residential and industrial developments. This is area of interest for solar development because of availability of transmission lines. Speedy acquisition of private land for conservation purposes is needed in key areas to maintain suitable habitat connections 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. To the north, there is a partial barrier of developed land extending from Inyokern Airport east to Ridgecrest. Acquisition of private land to the east would help to maintain a connection to the north-south connection 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. The DTNA is an isolated area of conservation land almost entirely surrounded 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 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 (REF). 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 be up to these two organizations.

Protect Known Core Areas and Establish Buffer Zones around Core Areas

The four known core areas are made up mostly of federal land. The boundaries of these areas were drawn carefully so as to include only known occupied sites (Leitner 2008). Although juvenile Mohave ground squirrels can disperse up to 5 miles from their birthplace, the core area boundaries do not reflect this biological reality. 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. 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 buffer zones of up to 5 miles around core areas where habitat is suitable (mountains and playas can be omitted). Apply appropriate conservation management to these buffer zones to protect colonizing juveniles.

Identify Solar Energy Development Zones with Minimal Impact on MGS Habitat

To date, a number of solar energy projects have been proposed within the range of the Mohave ground squirrel, posing a serious potential for land use conflicts. Commitment of land supporting functioning desert ecosystems to solar development represents a permanent loss of all biodiversity values.

However, there is a great deal of land in the western Mojave Desert that appears to be suitable for the development of utility-scale solar facilities and that would have minimal or no adverse impact on desert biological resources, including Mohave ground squirrel habitat. Much of this land is in private ownership and has been previously disturbed by agriculture, mining, and other human development. This zone runs along the SR 14 corridor from California City in the north to Lancaster and Palmdale in the south. Its western edge follows the base of the Tehachapi Mountains down into the western Antelope Valley. Its eastern edge extends from California City south along the western boundary of Edwards AFB. In Los Angeles County the zone expands eastward through former agricultural lands to Saddleback Butte and Lake Los Angeles. A number of developers have proposed projects within this region that will utilize a range of solar technologies, so it has already been recognized as suitable for this purpose. Much of the undisturbed land within this zone is beyond the western edge of the Mohave ground squirrel range as it is presently understood. Although there have been extensive protocol surveys in the wind resource area west of SR 14, no Mohave ground squirrels have been

detected here. Furthermore, there are very few Mohave ground squirrel records in this zone east of SR 14. The following actions should be taken to ensure that solar energy development to meet California goals is achieved while minimizing biological resource impacts:

- Evaluate this geographic zone during the development of the Desert Renewable Energy Conservation Plan as a priority area for siting solar facilities.
- Identify particularly suitable areas within this zone – for example, abandoned farm land close to transmission facilities.
- Develop policies that would provide incentives for siting solar facilities in this zone.

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. Here are geographic areas that would merit further study:

- 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

Consider Other Potential Conservation Measures

<u>Translocation</u>

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 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 in order to fatten enough to survive dormancy. Moving them during the period of lipid 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 deleterious to residents at the translocation site as well as to the newly translocated individuals. Extensive pilot studies would need to be conducted in order 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 very nicely on their own if they are given sufficient habitat with suitable cover and forage vegetation. Best to work on conserving the habitat!!

Literature Cited

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Leitner, P. 2008. Current status of the Mohave ground squirrel. Transactions of the Western Section of The Wildlife Society 44:11-29.