

SURVEYS FOR AND EXCAVATIONS OF SUSPECTED MOHAVE GROUND SQUIRREL BURROWS

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Herein, we (A) present rationale for discontinuing focused burrow surveys to determine if Mohave ground squirrel (MGS) may occur on a given project site, and (B) suggest that additional data be collected during authorized burrow excavations to study the efficacy of continuing this practice.

I. BACKGROUND

A. Burrow Surveys

The possibility of identifying MGS burrows is an issue of great interest to project proponents and to the California Department of Fish and Wildlife (CDFW). If it were possible to reliably identify such burrows at project sites within the range of the MGS, protection of the species from construction impacts would be much easier and the requirement to obtain a CDFW incidental take permit could be justified.

Unfortunately, we believe that it is not possible to reliably identify or differentiate burrows that are being used by MGS from those used by other rodent species. We will explain the reasons for our position.

- 1) MGS spend at least 5 months of the year in a state of physiological dormancy underground in specially prepared burrows. During this period, which lasts from at least September 1 through January 31, it is impossible to find their burrow entrances. Just before entering dormancy, the animals clear away any excavated soil and plug their burrow entrances from inside. During radiotelemetry studies some years ago in late summer and early fall, Philip Leitner often detected the radio signal from a dormant MGS and was able to pinpoint its position underground. Extensive searching around the area failed to reveal any sign of the burrow entrance. It makes perfect sense that these animals would be expert at hiding their location from badgers and other predators while they are dormant. The result is that if you see an open burrow between September 1 and January 31, it almost certainly does not belong to a MGS.

- 2) During the remainder of the year (February 1-August 31), MGS burrows are generally open during the daytime. However, there is no reliable method to distinguish their burrows from those of other rodent species. Burrow entrances used by MGS cannot be differentiated from those used by other desert rodents based upon size or shape. Furthermore, the size and shape of burrow entrances can vary greatly from place to place depending upon soil particle size and cohesion. In particular, the ubiquitous white-tailed antelope squirrel (*Ammospermophilus leucurus*) uses burrows whose characteristics overlap those of MGS burrows. Nor are there clear criteria for reliably distinguishing the burrows of kangaroo rats (*Dipodomys* sp.) from those of desert ground squirrels.
- 3) Philip Leitner had a unique opportunity to test his ability to distinguish MGS burrows from those of other desert rodents. In May 2011 he found an area southeast of Kramer Junction where MGS occurred. He observed two adult female MGS with several juveniles and identified the burrows that they were using. He took photographs of some of the burrows and also made measurements of the internal width just inside the entrances of 4 burrows. The burrow widths ranged from 7.0-9.5 cm (2.8-3.7 inches).

At the end of June 2011 he was tasked with carrying out MGS clearance surveys at the site of a large solar facility about 15 miles away in an area where MGS could occur. During the clearance surveys, rodent burrows were often observed. There were 6 sites where burrows were found that had the potential to be occupied by MGS. Burrow entrances were found in these 6 areas that had widths within the range observed for the known MGS burrows identified in May. Live traps and trail cameras were deployed at each of these sites. The live traps were operated for 3 days and white-tailed antelope squirrels were captured at 5 of the 6 sites. When released, these animals were seen to enter nearby burrows. Trail cameras were also placed in these 6 areas and operated for 6-8 days. White-tailed antelope squirrels were detected at 5 of the sites and they were seen entering and emerging from burrows. At the remaining site, kangaroo rats were observed in nocturnal photographs and were observed using the burrows in view of the camera.

These observations provide solid evidence that the characteristics of burrow entrances known to be used by MGS overlap with those used by white-tailed antelope squirrels and kangaroo rats, making it impossible to associate a given burrow with a given species based on any physical properties.

- 4) There are other factors that make it difficult to determine the identity of the species using a particular burrow. For example, if a MGS or white-tailed antelope squirrel is released after being trapped and enters a nearby burrow, it is tempting to assume that this hole is its regular home. A moment's reflection will tell you that the animal may simply be going into the nearest refuge, not necessarily a burrow that it uses routinely. Furthermore, given the overlap in the sizes of burrow entrances used by MGS and white-tailed antelope squirrels, it is very likely that a given burrow could be used by both species on different occasions.

B. Burrow Excavations

- 1) Excavating every rodent burrow (often referred to as “rat-holing”) on a project site in an effort to prevent impacts to MGS is currently a standard requirement in incidental take permits issued by the CDFW. For example, an incidental take permit issued in 2014 by Region 4 in Fresno, CA stated “...any potential MGS burrows present within the portion of the Project site to be disturbed shall be fully excavated by hand by the Designated Biologist”. Similarly, a take permit issued in 2014 by Inland Deserts Region in Ontario, CA stated “The Authorized Biologist shall fully excavate by hand all burrows within the Project Area that are suspected or known to be occupied by Mohave ground squirrels.”
- 2) There are no known cases in which this procedure has resulted in saving a MGS from harm. In fact, there are numerous reports that mammal species are rarely, if ever, encountered during burrow excavations. In 2013 in Ridgecrest where MGS occur, Ed LaRue’s crew of five biologists excavated 692 rodent burrows over a three-day period and found one long-nosed snake and two scorpions; no mammals were observed. In 2008 in Joshua Tree (which is outside the MGS range but telling nonetheless), Ed LaRue’s crew of five biologists spent approximately 340 hours finding and excavating 11,100 apparent rodent burrows. They found 31 side-blotched lizards, 6 desert horned lizards, 5 Mojave rattlesnakes, 3 western banded geckos, 2 glossy snakes, and 1 western whiptail. Although most of the burrows were judged to be rodent burrows, only 4 white-tailed antelope squirrels and 2 kangaroo rats were flushed as the burrows were excavated.

II. RECOMMENDATIONS

A. Burrow surveys should not be required and should not alter current management for the following reasons:

- 1) Since MGS burrows are not visible during their dormant period from September 1 through January 31, there is no justification for conducting burrow surveys at this time of year. This is consistent with the requirement to perform protocol trapping only during their active period between March 15 and July 15.
- 2) Since there is no objective basis for differentiating miscellaneous rodent burrows from MGS burrows, there is no justification for requiring biologists to perform burrow surveys even during the MGS active period.
- 3) Since it is impossible to reliably identify MGS burrows, there is no reason to establish buffers around miscellaneous rodent burrows found on proposed project sites or to require that such burrows be trapped to remove MGS.
- 4) Furthermore, it is unreasonable to require a CDFW incidental take permit based on the presence of miscellaneous rodent burrows, since there is no way to demonstrate that these burrows were created by MGS.
- 5) We suggest that current management, which relies on protocol trapping, continue to be the basis for requiring (or not) incidental take permits.

B. Burrow excavation should be accompanied by additional data collection for the following reasons:

- 1) Although there is no evidence that excavating burrows in impact areas will allow biologists to move MGS out of harm's way, it does serve the useful purpose of rescuing other species, particularly reptiles.
- 2) For projects authorized by incidental take permits, we suggest that biologists record the numbers of rodent burrows excavated and the numbers and types of animals that are either handled or flushed from the burrows.
- 3) In time, CDFW should analyze these data to determine the efficacy of burrow excavation and decide if the practice should continue.

III. CONCLUSION

As stated in the CDFW (2003) MGS survey guidelines, (1) if a project proponent conducts protocol trapping with negative results, the CDFW will stipulate for one year that the project site harbors no MGS. And (2), if the project proponent should assume presence of MGS and mitigate accordingly, agency-approved minimization and mitigation measures would fully offset project impacts to the species.

We do not believe that current management, as stated above, should be replaced, or altered by results of burrow surveys. Although we do not suggest that burrow excavations be discontinued as they do provide benefits to various non-targeted species, we do recommend that CDFW require more rigorous data collection and eventually analyze the data to determine if burrow excavation is efficacious and warranted.

IV. LITERATURE CITED

California Department of Fish and Game. 2003. CDFG [currently CDFW] unpublished guidelines. Mohave Ground Squirrel Survey Guidelines. January 2003; minor process and contact changes in July 2010). Sacramento, CA.