

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

MOHAVE GROUND SQUIRREL SURVEY GUIDELINES

(January 2003; revised July 2010, November 2019)

Purpose and Introduction

The California Department of Fish and Wildlife (CDFW) provides these guidelines for surveys to determine presence or probable absence of the Mohave ground squirrel (*Xerospermophilus mohavensis*, MGS). Such surveys may be conducted as part of the environmental review process for proposed projects subject to the California Environmental Quality Act (CEQA) and California Endangered Species Act (CESA) within the geographic of MGS, which is listed as Threatened under CESA. As part of the assessment and disclosure requirements of CEQA, proposed projects that would disturb or remove MGS habitat or might result in direct take of MGS must determine whether the species is present on the project site.

These guidelines have general application to projects as described in the following section; however, it is essential for project proponents or their biological consultants to confer with the appropriate regional CDFW office prior to implementing a survey program for MGS to ensure the surveys meet the site-specific conditions of the project area.

Incorporation of camera-trapping into survey guidelines: Numerous studies have proven the value of trail cameras (camera-traps) in detecting MGS and other desert wildlife. While both live-trapping and camera-trapping have pros and cons as detection techniques, the potential for camera-trapping to improve our ability to detect MGS on proposed project sites has led CDFW to recommend the use of camera-traps as an adjunct to live-trapping in this version of the survey guidelines. It is our intent that camera-trapping be an optional, but highly recommended, survey technique to be used in combination with live-trapping in the 2020 and 2021 field seasons. Upon review of survey results from these two years, along with other camera-trapping survey results, CDFW may revise these guidelines to include camera-trapping as a standard technique for all surveys.

Project Application

CDFW intends for these survey guidelines to apply to projects that would negatively affect native vegetation on less than 65 ha (160 acres) of area or to linear projects less than 8 km (5 miles) in length. For larger projects, CDFW requires special survey protocol(s) to be developed through its consultation with either the project proponent or the local lead agency (if appropriate) or both entities.

Application of positive results to project area: A project is an action that results in temporary or permanent removal or degradation of potential habitat. CDFW considers a project site to be an area of land controlled by the project proponent, including but not limited to the portion proposed for removal or degradation of potential habitat. CDFW considers the entire project site to be occupied by the Mohave ground squirrel if one or more MGS individuals are observed or captured on any trap grid on the project site.

Longevity of survey results: Once a project site is determined to be occupied by MGS, it will be considered occupied in subsequent years, given the relatively low detectability of MGS using standard survey methods and the dynamic nature of site occupancy during population boom and bust cycles. Negative survey results are valid until the start of the next survey season (March of the subsequent year).

Qualifications and Required Authorizations

Studies that include trapping for the Mohave ground squirrel shall be authorized by a Memorandum of Understanding (MOU) issued by CDFW's Wildlife Branch, or by another permit as determined by CDFW, and shall be undertaken only by a qualified biologist. A qualified biologist is a biologist who has demonstrated pertinent field experience in capturing and handling ground squirrels or other small mammals in desert/arid communities and who has been permitted by CDFW to work without supervision. Each biologist setting traps, opening traps containing captured animals, or handling captured animals must be named in the MOU as an authorized person, whether qualified or not to work without supervision.

Visual Surveys

Visual surveys to determine Mohave ground squirrel activity and habitat quality shall be undertaken during the period of 15 March through 15 April. All potential habitat on a project site shall be visually surveyed during daylight hours by a biologist who can readily identify the Mohave ground squirrel and the white-tailed antelope squirrel (*Ammospermophilus leucurus*).

If visual surveys reveal the presence of MGS on the project site...

If no MGS is observed during visual surveys, then live-trapping and camera-trapping are recommended to further investigate the potential for MGS occurrence on the project site.

Live-trapping Surveys

To assess presence and relative abundance of Mohave ground squirrels on a project site, a small mammal trapping program should be conducted, according to the following guidelines:

1. Live-trap grids will be established in representative high-quality habitat patches within the project site. Standard configurations of 100 traps spaced at 35 m (115 feet) apart are ten by ten traps for non-linear projects and 4 by 25 traps for linear projects.
2. At least one 100-trap grid should be established for each 32 ha (80 acres) in non-linear project areas and for each 1.6 km (1 mile) of linear projects. Grids should be placed in the best available habitat to maximize the potential to detect Mohave ground squirrels. Where more than one 100-trap grid is placed, the grids should be no closer than 300 m (984 feet) from each other.
3. Traps shall be standard box-type live traps (Sherman or equivalent) at least 30 cm (12 inches) in length and may be either solid-wall or ventilated (wire mesh or perforated sheet aluminum). Please note the different temperature thresholds for closure and trap check interval for solid-wall versus ventilated traps, below.
4. Bait should consist of rolled oats, mixed grains, or bird seed. A small amount of peanut butter should be mixed into the dry bait to increase attractiveness.

5. Traps should be opened within one hour after sunrise and closed within one hour before sunset, unless ambient temperatures exceed safety limits described below.
6. Trapping shall occur over 5 consecutive days during three trapping periods:
 - a. March 15 through April 30;
 - b. May 1 through May 31; and
 - c. June 15 through July 15.
 - d. At least two weeks should separate the three trapping periods on a project site.
7. The biologist conducting the trapping study will complete the MGS Survey and Trapping Form (Appendix A) and the MGS BIOS Database Survey Results Form [also provide online links].

Camera-trapping Surveys Conducted in Conjunction with Live-trapping Surveys

Camera-trap surveys conducted in conjunction with the live-trapping surveys described above are strongly recommended. Based on anecdotal information from several studies over the past 10 years, it appears camera-trapping, used in conjunction with live-trapping, can provide additional information on Mohave ground squirrel presence and activity within a project area. For the 2020 and 2021 survey seasons, CDFW recommends camera traps be incorporated into survey programs. After completion of the 2021 survey season, CDFW will consult with the MGS Technical Advisory Group to determine whether the benefits of camera trapping outweigh its additional effort and expense and whether to formalize camera-trapping as part of the survey guidelines.

For the 2020 and 2021 survey seasons, the follow camera-trapping methods are recommended:

1. Five camera stations should be incorporated into each 100 live-trap grid on either linear or non-linear project areas. Camera stations should be distributed throughout the live-trap grid and at least 140 m (460 feet) apart. Recommended camera station layouts are shown in the attached figure.
2. Recommended specifications and settings for cameras are presented in Appendix B.
3. Camera stations should consist of the camera mounted on a T- or U-post that is tilted to the north, so the camera is aimed at the ground a short distance from the post. The center of the field of view should be about 140 cm (55 inches) from the camera. Aiming the camera to the north minimizes glare and backlighting of the subject.
4. Bait should be placed at the center of the camera's field of view. Standard trap bait should be presented using methods that do not result in large subsidies of food for squirrels and other animals, such as ravens. Recommended methods include bait tubes and caged bait boxes. Feed blocks and free bait are not recommended. Bait containers should be staked to the ground to prevent removal. A wooden stake topped with peanut butter as a scent attractant should also be used at the station. A small amount of bait available for removal should be scattered around the bait station and replenished during daily live trap checks.
5. Cameras should be deployed at the start of the each of the three live-trapping sessions and run for at least the 5-day duration of each session.
6. Images of animals recorded at the camera stations should be identified to species and provided as a list with project site name, camera trap location, and date. Please note additional

observations such as age, sex, and reproductive condition (if discernable). These results should be included with the live-trapping survey report.

Camera-trapping Surveys Conducted without Live-trapping Survey

At this time, CDFW is not prepared to recommend camera-only surveys for project sites. If a biologist or project proponent would like to attempt a camera-only survey program on a project site, please contact the Wildlife Branch and Regional office listed in Appendix C to discuss.

Measures to Ensure Health and Welfare of Ground Squirrels

The following measures are intended to reduce the risk of harm to Mohave ground squirrels and other animals captured in live traps.

1. A maximum of 100 traps shall be operated by each biologist authorized to independently handle Mohave ground squirrels during trapping, either as a Principal Investigator (PI) or Independent Researcher (IR) named on a CDFW 2081(a) Memorandum of Understanding. Additional field personnel (such as Field Assistants named on an MOU) may be used to help with trapping, but the limit of 100 traps per PI or IR must not be exceeded.
2. The lead biologist or other authorized Independent Researcher shall remain onsite through the day while traps are open. During trap placement and trap checks and handling, no other work (including use of mobile phones) shall be conducted.
3. Shade shall be provided for each trap by covering the trap with a shade device, such as a cardboard A-frame or other covering, which shall be affixed to the ground or trap to ensure it remains in place during windy conditions. Shade coverings shall extend at least 15 cm (6 inches) beyond all edges of the traps. Traps shall be placed under vegetation to
4. The extent feasible to help provide shade throughout the day and especially in the afternoon. Traps shall be oriented with the long dimension aligned north-south to minimize solar heat input at noon.
5. When traps are open, temperature shall be measured at least once per hour at a shaded location within the sampling grid, approximately 30 cm (12 inches) above the ground.
6. Trap check intervals:
 - a. When the measured air temperature is 29°C (85°F) or less, solid-wall traps shall be checked at least once every four hours. When the air temperature is between 29°C (85°F) and 32°C (90°F), then traps should be checked at least once every two hours.
 - b. For wire mesh or vented box traps, these temperature ranges may be increased by 1°C (2°F); in other words, check ventilated traps at least once every four hours when measured air temperature is 30°C (87°F) or less and at least every two hours when temperature is between 30°C (87°F) and 33°C (92°F).
7. Trap closures due to high ambient temperatures:
 - a. Solid-wall box traps shall be closed when the measured air temperature exceeds 32°C (90°F). Trapping shall resume on the same day after the measured air temperature falls below 90°F (32°C).
 - b. Ventilated traps shall be closed when the measured air temperature exceeds 33°C (92°F). Trapping shall resume on the same day after the measured air temperature falls below 33°C (92°F).

c.

8. Upon completion of a survey session at a project site and before using the traps on a different site, all traps (or at least all traps that had a capture) shall be cleaned and sanitized using water and a cleaning agent such as detergent, trisodium phosphate, or the like.

Other Considerations

These additional measures are recommended to minimize the impact of trapping studies on the environment and to facilitate law enforcement activities.

1. Each live trap and camera shall be clearly labeled with the Scientific Collecting Permit number of the biologist(s) trapping the site. A “legacy” SCP number (pre-2019) may be used if traps were labeled prior to issuance of a new SCP number.
2. Dogs may not accompany biologists during trapping surveys.
3. Upon completion of work, all equipment, supplies, and refuse (including “biodegradable” items) shall be removed from the project site.
4. Incidental observations of all [special status species](#) (Threatened, Endangered, Candidate, and Species of Special Concern) shall be reported to the [California Natural Diversity Database](#). This is a requirement of both these guidelines and MOUs for work on the Mohave ground squirrel.
5. All relevant CDFW paperwork shall be carried by the lead biologist onsite. These include copies of Scientific Collecting Permits, MOUs, and Lists of Authorized Individuals.

Literature Cited

Appendix A. Field Survey Form and Capture Data Summary Form

(see separate documents)

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Appendix B. Recommended Settings for Camera Traps

Camera specifications and settings:

1. At least 1 photo per second when triggered
2. Trigger speed of <0.5 seconds
3. Recovery speed of ≤ 1 second
4. Minimum 60 Mb/s download speed of SD card
5. Memory cards should be at least 32 GigaByte capacity

Camera Setup and Operation:

1. 24-hour camera operation
2. Face camera north
3. Keep shrubs and other potential wind-triggers out of field of view
4. Place bait approximately 4-5 ft from camera
5. Place bait in center of field of view
6. Test camera trigger at bait location before leaving

Bait must be present every day. Other considerations for station and bait placement are presented in the main part of the survey guidelines document.

Appendix C. CDFW Points of Contact

Wildlife Branch (Statewide Coordination):

Scott Osborn

Central Region:

South Coast Region:

Inland Deserts Region:

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