

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE MOHAVE GROUND SQUIRREL SURVEY GUIDELINES

(January 2003; revised July 2010, October 2023)

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*, hereafter MGS), a species listed as threatened under the California Endangered Species Act (CESA). Such surveys may be conducted as part of the environmental review process for proposed projects subject to the California Environmental Quality Act and California certified state regulatory programs, (hereafter collectively referred to as CEQA) and CESA within or near the geographic range of MGS¹. As part of the assessment and disclosure requirements of CEQA and CESA, proposed projects that would disturb or remove MGS habitat or might result in take² (as defined by section 86 of the California Fish and Game Code) of MGS should either determine whether the species is present on the project site through surveys or assume MGS presence and proceed with CESA incidental take authorization through Fish and Game Code section 2081.

Surveys conducted according to these guidelines will also provide information regarding the relative value of the project site to support MGS populations. All surveys should be conducted in three trapping sessions, which will standardize minimum survey effort for projects in the MGS range and facilitate improved understanding of MGS detections across different projects. The guidelines also incorporate a standard definition of vegetation alliances (Thomas et al. 2004) for characterizing the vegetation onsite and documenting the most common associated perennial and annual plants. Standardizing survey effort and the description of site habitat characteristics provides a uniform basis for CDFW and others to assess pre-project conditions and develop mitigation strategies for projects that impact MGS.

While these guidelines have general application to most projects, 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 consider the site-specific conditions of the project area and the nature of the project. Lack of consultation with CDFW prior to implementing an MGS survey program may cast doubt on a negative finding (“absence”) determination.

¹ Depending on habitat features within and near the proposed project, CDFW may recommend surveys be conducted at sites outside the MGS geographic range boundary. Consultation with the appropriate CDFW regional office is recommended to determine whether surveys are necessary for sites near, but outside, the generally accepted geographic range boundary.

² California Fish and Game Code section 86: “Take” means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill”.

These revised guidelines incorporate the use of camera-trapping into surveys. Numerous anecdotal studies have demonstrated the value of trail cameras (camera-traps) in detecting MGS and other desert wildlife. Both live-trapping and camera-trapping have pros and cons as detection techniques. However, due to the potential for camera-trapping to increase the likelihood of MGS detection on proposed project sites, CDFW now strongly encourages the use of camera-traps as a survey technique in combination with live-trapping to facilitate MGS detection. Upon review of MGS survey results from 2024, 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

These survey guidelines are recommended for projects that would impact less than 65 ha (160 acres) of area or to linear projects less than 8 km (5 miles) in length. For larger projects, CDFW recommends the development of a special survey protocol(s) in consultation with the CDFW regional office, the project proponent, and the CEQA Lead Agency.

Application of positive results to project area: In the context of these MGS Survey Guidelines, a project is an action that results in temporary or permanent removal or degradation of potential MGS habitat. CDFW considers a project site to be a land parcel or parcels that include(s) the area in which all project related activities will occur, including site preparation, vegetation removal or trimming, grading, clearing, construction of the project, staging area for equipment and material, utility relocation and access roads, and including but not limited to the portion proposed for removal or degradation of potential MGS habitat. CDFW generally considers the entire area of suitable MGS habitat on a project site to be occupied by MGS if one or more MGS individuals are observed or captured on any trap grid on the project site. Final delineation of occupied areas within a project site should be conducted in consultation with CDFW's regional office staff.

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 cycles of expansion and contraction. In the absence of other MGS detection data for the site, surveys conducted according to these guidelines that result in no detection of MGS ("negative" survey results) are interpreted to mean that MGS are not present on the project site for the survey year. In other words, negative survey results are valid until the start of the next survey season (March of the subsequent year).

Qualifications and Required Authorizations

Surveys that include live-trapping for MGS 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 individual, whether or not they are qualified to work without supervision.

Visual Surveys

Visual surveys of the project site prior to planning or implementing an MGS trapping study are recommended to ensure best placement of trapping grids. If conducted during the period of March 15 through April 15, the visual survey may also reveal the presence of MGS on the project site through visual observations. All potential habitat on a project site should be visually surveyed during daylight hours by a biologist who can readily identify MGS and the white-tailed antelope squirrel (*Ammospermophilus leucurus*, AGS).

Live-trapping Surveys

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

1. Live-trap grids should be established in representative patches of the best available MGS habitat within the project site to maximize the potential to detect MGS, as determined by the qualified biologist for the project. 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. 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 should be standard box-type live traps (Sherman or equivalent) at least 30 cm (12 inches) in length and may be either solid-wall aluminum or steel wire mesh. Perforated-wall aluminum traps may be used unless the trapping study will also involve trapping of nocturnal rodents. If nocturnal trapping will also be conducted, then only solid wall traps should be used due to the potential for injury of captured nocturnal rodents in perforated wall or wire mesh traps.
4. Bait should consist of rolled oats, mixed grains, or bird seed. Other seed and grain mixes may be used where personal experience has shown a particular brand or mixture is effective in attracting MGS. If using a simple bait, such as rolled oats, a small amount of peanut butter should be mixed into the dry bait to increase attractiveness.
5. The times for trap opening and closure for MGS detection should depend on the forecast high temperature of the day and the actual air temperatures as measured on the project site.

- a. On days forecasted or expected not to exceed 32°C (90°F), trap opening should begin no later than one hour after sunrise. Assuming air temperature as measured onsite does not exceed 32°C (90°F), then the traps should remain open for a minimum of 10 hours.
 - b. On days forecasted or expected to exceed 32°C (90°F), trap opening should begin at first light, with the expectation that traps may need to be closed after the first or second trap check. When traps are closed due to high temperatures four hours or more after opening, the effort may be considered a full trap-day. If traps are open less than four hours, an additional day of trapping on the grid should be conducted to make up for the short day.
 - c. Additional information on trap check intervals and trap closures on hot days are described below in the Health and Welfare section.
6. Trapping should occur for 5 consecutive days during each of the three trapping periods:
 - a. March 15 through April 30;
 - b. May 1 through May 31; and
 - c. June 1 through July 15.
 - d. At least two weeks should separate each of the trapping periods on a project site.
 7. Captured ground squirrels (both MGS and AGS) should be marked using a non-toxic permanent marking pen. To facilitate identifying previously-captured ground squirrels in camera-trap photos, marks should be made on the dorsolateral pelage of the animals.
 8. Live-trapping results should be reported to CDFW using the CDFW MGS Survey Form 2024. Please reference Appendix A, Directions for MGS Survey Form Spreadsheet, for guidance on filling out the forms within the spreadsheet.
 9. Live-trapping programs should adhere to the Measures to Ensure the Health and Welfare of Mohave Ground Squirrels section of these survey guidelines (see pp. 5-6).

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

CDFW strongly recommends MGS camera-trap surveys be conducted in conjunction with the live-trapping surveys described above. 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 MGS presence and activity within a project area. For the 2024 survey season, CDFW recommends camera-traps be incorporated into MGS survey programs. After completion of the 2024 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 MGS survey guidelines.

For the 2024 survey season, the following camera-trapping methods are recommended:

1. At least 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. Currently, CDFW is not recommending a particular layout of the camera stations within the trapping area, so long as they are well-distributed within the area.
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 placing the bait in bait tubes or 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 may also be used at the station. A small amount of bait available for removal may be scattered around the bait station and replenished during daily live-trap checks.
5. Camera-trap locations should be selected to provide escape (shrub) cover within 1.5 m (5 ft).
6. Cameras should be deployed at the start of each of the three live-trapping sessions and run continuously for at least the 5-day duration of each session. Longer durations of continuous operation of camera-traps provide greater confidence that lack of MGS detections can be correctly interpreted as absence, so CDFW recommends longer camera-trap operation where possible.
7. If one or more cameras are non-operational for one or more days, then the validity of negative survey results may be compromised – consult with the CDFW regional office for site-specific recommendations.
8. Images of all animals recorded at the camera stations should be identified to species and summarized in a list with project site name, camera-trap location, and date. Please note additional observations such as age, sex, and reproductive condition (if discernible). These results should be included with the live-trapping survey report. See Appendix A for additional details on reporting camera detections in the CDFW MGS Survey Form 2024.

Use of the Wildlife Insights Platform for Analysis and Archiving of Camera Survey Images

CDFW is transitioning to the use of the Wildlife Insights platform as a permanent repository and analytical tool for wildlife camera images. Wildlife Insights has the potential to save substantial time in image analysis and could simplify reporting requirements for surveys. Availability of the

Wildlife Insights platform as a location for submitting and archiving survey images will be announced in future versions of these MGS Survey Guidelines and will be posted on the CDFW MGS website, as well as discussed during MGS Technical Advisory Group meetings.

Camera-trapping Surveys Conducted without Live-trapping Survey

At this time, CDFW is not recommending camera-only surveys for project sites. A biologist or project proponent who would like to propose a camera-only MGS survey program for a project site should contact the CDFW regional office with review responsibility for the project.

Characterizing the Project Site Habitat Characteristics and Weather During Trapping Sessions

To provide context for survey results and to characterize the habitat value of the project site for MGS, a general description of the vegetation and other habitat attributes on each trapping grid should be provided. The surveyor should determine and record the vegetation alliance, defined by Thomas et al. (2004), for each trapping grid, along with the five most abundant perennial plant species occurring on trapping grid, if present. Any annual plants comprising an estimated 10 percent or greater ground cover within the grid should also be recorded. The general geomorphological features of the site (e.g., bajada, alluvial plain, wash) should be recorded, along with the dominant soil types.

Standard weather conditions should be recorded at least once per trapping day for each grid. Shaded air temperature within 50 cm (20 in.) of the ground should be recorded during the hottest portion of the day, typically mid-afternoon, in the deep shade of a natural object (shrub, tree) or human body (not in the shade of a vehicle). An estimate of the percent cloud cover and wind speed should be recorded at the same time.

See Appendix A for additional details on recording and reporting site characteristics and weather conditions in the CDFW MGS Survey Form 2024 spreadsheet.

Measures to Ensure Health and Welfare of Mohave Ground Squirrels

The following measures are intended to reduce the risk of harm to MGS and other animals captured in live traps and should be implemented for all survey programs described in the Live-Trapping Surveys section above (pp. 3-4).

1. A maximum of 100 live traps should be operated by each biologist authorized to independently handle MGS during trapping, either as a Principal Investigator (PI) or Independent Researcher (IR) named on a CDFW 2081(a) MOU. 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. On days the air temperature is forecasted or expected to exceed 32°C (90°F), the PI or other IR should remain onsite for the duration of the day while traps are open. On cooler days (air temperature below 32°C (90°F), the PI or IR is not required to remain onsite between trap checks; however, one or more Field Assistants must remain onsite in the absence of the PI or IR and the PI or IR must be reachable by phone or text.
3. During trap placement, trap checks, and animal handling, no other work (including use of mobile phones) should be conducted.
4. Shade should be provided for each trap by covering the trap with a shade device, such as a cardboard A-frame or other covering, which should be affixed to the ground or trap to ensure it remains in place during windy conditions. The covering should provide complete shade for the trap throughout the day.
5. Traps should be placed under vegetation to the extent feasible to help provide shade throughout the day and especially in the afternoon. Traps should be oriented with the long dimension aligned north-south to minimize solar heat input at noon.
6. When traps are open, temperature should be measured at least once per hour at a shaded location within the sampling grid, approximately 30 cm (12 inches) above the ground.
7. Trap check intervals:
 - a. When the measured air temperature is 29°C (85°F) or less, traps should be checked at least once every four hours.
 - b. 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.
8. Trap closures due to high ambient temperatures: traps should be closed when the measured shaded air temperature within 50 cm (20 in.) of the ground exceeds 32°C (90°F). Under these circumstances traps may remain closed for the remainder of the day.
9. 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 of any species) should be cleaned and sanitized using water and a cleaning agent such as detergent, trisodium phosphate, or similar product.

Other Considerations

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

1. Each live trap and camera should be clearly labeled with the Scientific Collecting Permit (SCP) 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 while setting or checking trap lines.
3. Upon completion of work, all equipment, supplies, and refuse (including “biodegradable” items) should be removed from the project site.

4. Incidental observations of all special status species (Threatened, Endangered, Candidate, and Species of Special Concern) should be reported to the California Natural Diversity Database. This is also a requirement of MOUs for work on the MGS.
5. All relevant CDFW paperwork should be carried by the lead biologist onsite. These include copies of SCPs, MOUs, and Lists of Authorized Individuals.

Reporting

The following reports fulfill both the requirements of MGS MOUs and the CESA permitting process.

Project-specific reports should be submitted to the appropriate CDFW regional office contact to support the environmental review process for the project. The CDFW MGS Survey Form 2024 spreadsheet must be included with project-specific reports.

Current MGS MOU holders should refer to the **Annual Report** section of their MOU for additional requirements. For persons considering applying for an MOU, the annual report of all MGS trapping projects is submitted to CDFW's Wildlife Diversity Program MOU contact by January 31 of each year. The annual report includes the components outlined below:

1. A summary of MGS survey activities during the year in standard scientific report format. If several survey projects were conducted and separate reports were generated for each project, individual reports may be bundled.
2. Any publications, abstracts, journal articles, or other reports you produced should be included.
3. Live- and camera-trapping results, including a record of site habitat characteristics and weather conditions, should be summarized in the CDFW MGS Survey Form 2024 spreadsheet.
4. CNDDDB records should be submitted for all special status wildlife and plant species tracked in CNDDDB. These include records for any type of detection of these species, including photos, live-trapping, visual, and acoustic observations. MGS detections do not need to be submitted to CNDDDB – these observations will be available to CNDDDB through submittal of the MGS Survey Form 2024 spreadsheet.
5. Information about live captures of any wildlife species, including non-special status species, is required by the surveyor's SCP. Please follow the requirements of the SCP in filling out form DFW 1379a.

Appendix A. Directions for MGS SURVEY FORM Spreadsheet

The CDFW MGS Survey Form 2024 is to be used for submitting MGS live-trapping and camera-trapping survey results to CDFW. There are four tabs in the Excel Workbook to record information: 1) project and site information, 2) live-trapping results, 3) weather conditions, and 4) camera survey results. Please review the guidance below before entering data into the form.

Because the form is new for 2024, CDFW welcomes suggestions for improvement of the form. Please submit comments to Scott Osborn (scott.osborn@wildlife.ca.gov).

Site Information tab

Project Information

- Project Name is the formal or informal name of the project to be reviewed by CDFW. Use the same name as listed on supporting CEQA documents, if applicable.
- Project Site Area (acres) is the total property or parcel area in which the proposed or potential project will occur.
- Area of Potential MGS Habitat (acres) is based on the consulting biologist's habitat assessment of the site. Mitigation requirements may be based on the estimate of potential habitat and habitat quality, so CDFW strongly recommends the area of potential habitat is estimated in consultation with CDFW during pre-survey consultation.
- Habitat Assessment Date(s) should be provided for reference.

Trap Grid Information

Space is provided for up to 5 trap grids for a project. Please add more columns if more than 5 grids are trapped on a project site.

- *Trap Grid Configuration* describes the array of live traps. Typical arrays include 10 x 10, 4 x 25, 2 x 50, or Other. If the *Other* configuration is used, please ensure CDFW has approved the alternate array during pre-survey consultation.
- *Latitude and Longitude* should be provided for the approximate center of each trap grid in Decimal Degrees, along with the *Datum* used.
- *Elevation* (feet) should be estimated for the mid-elevation point of the grid.
- *Slope* (%) is the approximate average slope of the grid.
- *Aspect* (compass degrees) is the approximate average aspect of the grid.
- *Landform* describes the general geomorphology of the trap grid. More than one landform may occur within a trap grid. Typical landforms in the geographic range of MGS include:
 - Alluvial fan
 - Alluvial plain
 - Stream channel

- Playa
- Dune
- Rock outcrop
- Other (Name)
- *Substrate Type* describes the general soil type(s) on the trap grid. More than one type of substrate may occur within a trap grid. The main types are listed, but combinations may occur (e.g., silty-sand):
 - Cobble
 - Gravel
 - Sand
 - Silt
 - Clay
 - Loam
- *Vegetation Alliance and Associated Perennial and Annual Plant Species*. Indicate the vegetation alliance for each trap grid, based on the key and descriptions in Thomas et al. (2004). In addition to the dominant/definitive perennial species indicated by the alliance name, the five most abundant other perennial plant species occurring on site, if present, should be listed. Any annual plant species estimated to comprise 10% or more of trap grid ground cover should also be listed, in decreasing order of prevalence.

See attached Vegetation Alliance List (Thomas et al. 2004).

- *General Assessment of Disturbance Impacts* is a list of disturbance impacts observed during habitat assessments and trapping. Each type of impact should be subjectively rated as *Severe*, *Moderate*, or *Minimal*.
 - Humans present – onsite human activity within one month observed or detected through sign
 - Trash – Presence of current or recent (one year) dump sites or scattered trash, including windblown trash
 - Roads or OHV impacts – Dirt, graveled, or paved roads, or OHV trails present
 - Livestock present – Livestock seen or recent (less than 1 year old) sign detected
 - Livestock sign – Older sign (feces, browsing sign)
 - Ravens – Ravens observed onsite during assessments or trapping
 - Other

Live Trapping Results tab

The fields for the *PI/Reporting Biologist's Name* and *Project Name* are automatically filled in from the information entered in the Project Information tab.

- Enter the trapping results for each grid's trapping session in a separate row.
- The number of trap-days equals the number of traps on the grid multiplied by the number of days of trapping.

- Number of MGS is the number of individual MGS captured. During surveys, all ground squirrels should be marked using a non-toxic permanent marking pen so recaptures are not counted in the total number of individuals.
- Number of individual AGS captured.
- The Notes/Comments field may be used to record incidental observations of MGS or other noteworthy observations for the trap session on a grid.

Weather Summary tab

Basic weather conditions should be recorded each day on each grid during the mid-day/afternoon trap check:

- The date and time of the weather data. Date and time should be formatted as mm/dd/yyyy hh:mm, with a space between date and time values. Use 24-hour clock values for time.
- Air temperature (Celsius degrees) within 50 cm above the ground surface, recorded in the shade of a natural object (shrub, tree) or human body. Do not record temperature in the shade of a vehicle.
- Estimated percent cloud cover, recorded in 10% bins (i.e., 0%, 10%, 20%, etc.)
- Wind speed should be recorded the attached Beaufort Scale. Beaufort Scale values may be derived from observations or from use of hand-held anemometers.

Camera Trapping Results tab

The fields for the PI/Reporting Biologist's name and Project name are automatically filled in from the information entered in the Project Information tab.

- Enter the *Grid Name or Number*, then each camera's results for each session should be listed on a separate row.
- Enter the *lat-lon* in decimal degrees for the location of each camera station.
- Enter the *start* and *end dates* and *times* for each camera station for each session. The fields for start and end date/time are formatted as mm/dd/yyyy hh:mm, with a space between date and time values. Use 24-hour clock values for time.
- *Number of photos* = the number of photos recorded by the camera in the session.
- *Total number of MGS photos* is the raw, uninterpreted number of photos containing images of MGS.
- The *Number of MGS Detected* fields require some interpretation of the images. ***It is not required that these fields be completed.*** The intent is for the biologist to report the numbers of adults versus juveniles and males versus females, and unique individuals, if possible.
- Month of observation, general appearance, size, and condition of reproductive organs may provide clues to age and sex.

- Markings made during live-trapping may be discernable in photos, allowing for identification of unique individuals.
- Even without markings, inferences may be made of unique individuals. For example,
 - A set of three photos of MGS taken within one minute at the bait station, showing a similar-sized lactating female can reasonably be interpreted as a single adult female.
 - If another adult female image is taken at the same camera station more than 30 minutes later or on a subsequent day, the image should be counted as an additional detection, unless unique markings make it clear that the same individual is revisiting the station.
- *First and Last MGS Detection Dates* provide information on the seasonality of aboveground activity at the site.
- *Number of Days MGS Detected* is an indication of persistence of activity at the station.

Vegetation Alliance Name List

This list is taken from the Mojave Desert Ecosystem Project: Central Mojave Vegetation Database Final Report.³ Please see the report for complete descriptions of the vegetation alliances, along with a key to classification.

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| <i>ACACIA GREGGII</i> SHRUBLAND ALLIANCE | <i>EPHEDRA VIRIDIS - ARTEMISIA TRIDENTATA</i> SHRUBLAND ALLIANCE |
| <i>ACHNATHERUM SPECIOSUM</i> HERBACEOUS ALLIANCE | <i>ERICAMERIA NAUSEOSA</i> SHRUBLAND ALLIANCE |
| <i>ACHNATHERUM HYMENOIDES</i> HERBACEOUS ALLIANCE | <i>ERICAMERIA PANICULATA</i> INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE |
| <i>ALLENROLFEA OCCIDENTALIS</i> SHRUBLAND ALLIANCE | <i>ERICAMERIA TERETIFOLIA</i> SHRUBLAND ALLIANCE |
| <i>AMBROSIA DUMOSA</i> DWARF-SHRUBLAND ALLIANCE | <i>ERIOGONUM FASCICULATUM</i> SHRUBLAND ALLIANCE |
| <i>ARTEMISIA NOVA</i> DWARF-SHRUBLAND ALLIANCE | <i>FORESTIERA PUBESCENS</i> TEMPORARILY FLOODED SHRUBLAND ALLIANCE |
| <i>ARTEMISIA TRIDENTATA</i> SHRUBLAND ALLIANCE | <i>GRAYIA SPINOSA</i> SHRUBLAND ALLIANCE |
| <i>ATRIPLEX HYMENELYTRA</i> SHRUBLAND ALLIANCE | HERBACEOUS DUNES SPARSE VEGETATION ALLIANCE |
| <i>ATRIPLEX POLYCARPA</i> SHRUBLAND ALLIANCE | <i>HYMENOCLEA SALSOLA</i> SHRUBLAND ALLIANCE |
| <i>ATRIPLEX SPINIFERA</i> SHRUBLAND ALLIANCE | <i>HYPTIS EMORYI</i> INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE |
| <i>ATRIPLEX CANESCENS</i> SHRUBLAND ALLIANCE | <i>JUNCUS COOPERI</i> SEASONALLY FLOODED HERBACEOUS ALLIANCE |
| <i>ATRIPLEX CONFERTIFOLIA</i> SHRUBLAND ALLIANCE | <i>JUNIPERUS OSTEOSPERMA</i> WOODED SHRUBLAND ALLIANCE |
| <i>BACCHARIS SERGILOIDES</i> INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE | <i>KRASCHENINNIKOVIA LANATA</i> DWARF-SHRUBLAND ALLIANCE |
| <i>CERCOCARPUS LEDIFOLIUS</i> SHRUBLAND ALLIANCE | <i>LARREA TRIDENTATA - AMBROSIA DUMOSA</i> SHRUBLAND ALLIANCE |
| <i>CHILOPSIS LINEARIS</i> INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE | <i>LARREA TRIDENTATA - ENCELIA FARINOSA</i> SHRUBLAND ALLIANCE |
| <i>COLEOGYNE RAMOSISSIMA</i> SHRUBLAND ALLIANCE | <i>LARREA TRIDENTATA</i> SHRUBLAND ALLIANCE |
| <i>ENCELIA FARINOSA</i> SHRUBLAND ALLIANCE | |
| <i>ENCELIA VIRGINENSIS</i> SHRUBLAND ALLIANCE | |
| <i>EPHEDRA CALIFORNICA</i> INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE | |
| <i>EPHEDRA FUNEREA</i> SPARSE VEGETATION ALLIANCE | |
| <i>EPHEDRA NEVADENSIS</i> SHRUBLAND ALLIANCE | |

³ Thomas, K., T. Keeler-Wolf, J. Franklin, and P. Stine. 2004. Mojave Desert Ecosystem Project: Central Mojave Vegetation Database Final Report. U.S. Geological Survey, Western Ecological Research Center and Southwest Biological Science Center.

CDFW MGS Survey Guidelines

LEPIDOSPARTUM SQUAMATUM INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE
MENODORA SPINESCENS DWARF-SHRUBLAND ALLIANCE
NOLINA PARRYI SHRUBLAND ALLIANCE
PANICUM URVILLEANUM SPARSELY VEGETATED HERBACEOUS ALLIANCE
PHRAGMITES AUSTRALIS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE
PINUS FLEXILIS WOODLAND ALLIANCE
PINUS LONGAEVA WOODLAND ALLIANCE
PINUS MONOPHYLLA SPARSELY WOODED SHRUBLAND ALLIANCE
PINUS MONOPHYLLA – (*JUNIPERUS OSTEOSPERMA*) WOODLAND ALLIANCE
PLEURAPHIS RIGIDA HERBACEOUS ALLIANCE
PLEURAPHIS JAMESII HERBACEOUS ALLIANCE
PLUCHEA SERICEA SEASONALLY FLOODED SHRUBLAND ALLIANCE
POPULUS FREMONTII SEASONALLY FLOODED WOODLAND ALLIANCE
PROSOPIS GLANDULOSA SHRUBLAND ALLIANCE
PROSOPIS PUBESCENS SHRUBLAND ALLIANCE
PRUNUS FASCICULATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE

October 2023 Revision

PSOROTHAMNUS SPINOSUS INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE
PURSHIA STANSBURIANA SHRUBLAND ALLIANCE
PURSHIA TRIDENTATA SHRUBLAND ALLIANCE
QUERCUS TURBINELLA SHRUBLAND ALLIANCE
QUERCUS CHRYSOLEPIS FOREST ALLIANCE
SALAZARIA MEXICANA SHRUBLAND ALLIANCE
SALIX (EXIGUA) TEMPORARILY FLOODED SHRUBLAND ALLIANCE
SALVIA DORRII DWARF-SHRUBLAND ALLIANCE
SARCOBATUS VERMICULATUS SHRUBLAND ALLIANCE
SCHOENOPECTUS AMERICANUS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE
SPOROBOLUS AIROIDES INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE
SUAEDA MOQUINII INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE
TAMARIX SPP. SEMI-NATURAL TEMPORARILY FLOODED SHRUBLAND ALLIANCE
VIGUIERA PARISHII SHRUBLAND ALLIANCE
VIGUIERA RETICULATA INTERMITTENTLY FLOODED SHRUBLAND ALLIANCE
YUCCA BREVIFOLIA WOODED SHRUBLAND ALLIANCE
YUCCA SCHIDIGERA SHRUBLAND ALLIANCE

Beaufort Wind Scale on Land

The Beaufort Wind Scale was devised in 1805 and has been modified for use on land. While different versions have been developed, they are all based on the same premise; wind speed may be estimated by observing how wind affects objects around us.

Beaufort Scale Value	Description	Wind Speed	Conditions
0	Calm	< 1 mph < 1 km/h	Calm. Smoke rises vertically.
1	Light Air	1 – 3 mph 1.1 – 5.5 km/h	Smoke drift indicates wind direction. Wind vanes cease moving.
2	Light Breeze	4 – 7 mph 5.6 – 11 km/h	Wind felt on exposed skin. Leaves rustle and wind vanes begin to move.
3	Gentle Breeze	8 – 12 mph 12 – 19 km/h	Leaves and small twigs constantly moving. Light flags extended.
4	Moderate Breeze	13 – 18 mph 20 – 29 km/h	Dust and loose paper raised. Small branches begin to move.
5	Fresh Breeze	19 – 24 mph 30 – 39 km/h	Branches of moderate size move. Small trees with leaves begin to sway.
6	Strong Breeze	25 – 31 mph 40 – 50 km/h	Large branches in motion. Whistling heard in overhead wires. Plastic garbage cans tip over. Umbrella usage difficult.
7	High Wind	32 – 38 mph 51 – 61 mph	Whole trees in motion. Effort needed to walk against the wind.
8	Gale	39 – 46 mph 62 – 74 km/h	Some twigs broken from trees. Cars veer on the road. Walking is seriously hindered.
9	Strong Gale	47 – 54 mph 75 – 88 km/h	Some branches break off trees and some small trees blow over. Temporary signs and barricades blow over.
10	Whole Gale	55 – 63 mph 89 – 102 km/h	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles peel off roofs.
11	Violent Storm	64 – 73 mph 103 – 118 km/h	Widespread damage to vegetation. Many roofing surfaces are damaged. Damaged asphalt tiles may break completely away.
12	Hurricane	74 mph + 119 km/h +	Very widespread damage to vegetation. Some windows may break. Severe structural damage. Mobile homes, poorly constructed sheds and barns are damaged. Flying debris possible.

Appendix B. Recommended Specifications and Settings for Camera Traps

Camera specifications and settings:

1. At least 1 photo per second when triggered
2. Trigger speed of <0.5 second
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 1.5 m (5 ft) from camera
5. Place bait station within 1.5 m (5 ft) from escape cover
6. Place bait in center of field of view
7. 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.