# MOHAVE GROUND SQUIRREL CAMERA STUDY 2015

# SURVEYS OF APN 0501-011-02, APN 0501-011-04, AND APN 0501-011-06

# SAN BERNARDINO COUNTY

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## ABSTRACT

The state-listed Mohave ground squirrel (*Xerospermophilus mohavensis*) occupies a small geographic range in the western Mojave Desert of California. Because of the great interest in development of renewable energy in this region, there is strong demand for mitigation lands that are known to support this species. The systematic use of trail cameras is an extremely effective method for detecting the presence of Mohave ground squirrels. We used this technique to survey for Mohave ground squirrels on three adjacent privately-owned parcels in San Bernardino County during March and May 2015. No Mohave ground squirrels were detected during sampling on these properties in March. However, both adult and juvenile Mohave ground squirrels were shown to be present on all 3 properties during the late May camera trapping session. Thus, these three properties are not only suitable habitat for this species but have also been demonstrated to support a reproductive population. We conclude that they are highly appropriate as Mohave ground squirrel mitigation lands.


## INTRODUCTION

The Mohave ground squirrel (*Xerospermophilus mohavensis*) is listed as a Threatened species under the California Endangered Species Act. It is found only in a relatively small geographic area in the western Mojave Desert of California. Because of the great potential for renewable energy development within its range, there is a strong demand for privately-owned mitigation property that is demonstrated to support Mohave ground squirrel (MGS) populations.

We were asked by Wildlands to conduct a survey for the presence of MGS on three adjacent privately-owned parcels of undeveloped desert land to the north of Harper Dry Lake in San Bernardino County (Figure 1). These parcels are of interest to Wildlands as potential mitigation lands. We proposed the use of trail cameras to detect the species on these properties, using a methodology that has proved very successful in previous surveys on public lands. For example, we carried out an extensive study of MGS distribution in 2011 and 2012 using Reconyx® trail cameras (Leitner and Delaney 2014). MGS were detected at 73 of 123 randomly-selected study sites covering a substantial portion of the geographic range of the species.

## METHODS

### *SITE SELECTION*

Camera study sites were selected using standard criteria to identify suitable MGS habitat. Favorable features included sandy to gravelly soils, moderate to dense shrub cover, and a good diversity of important forage plant species. All study sites were located in Creosote Bush Scrub, a plant community dominated by creosote bush (*Larrea tridentata*).

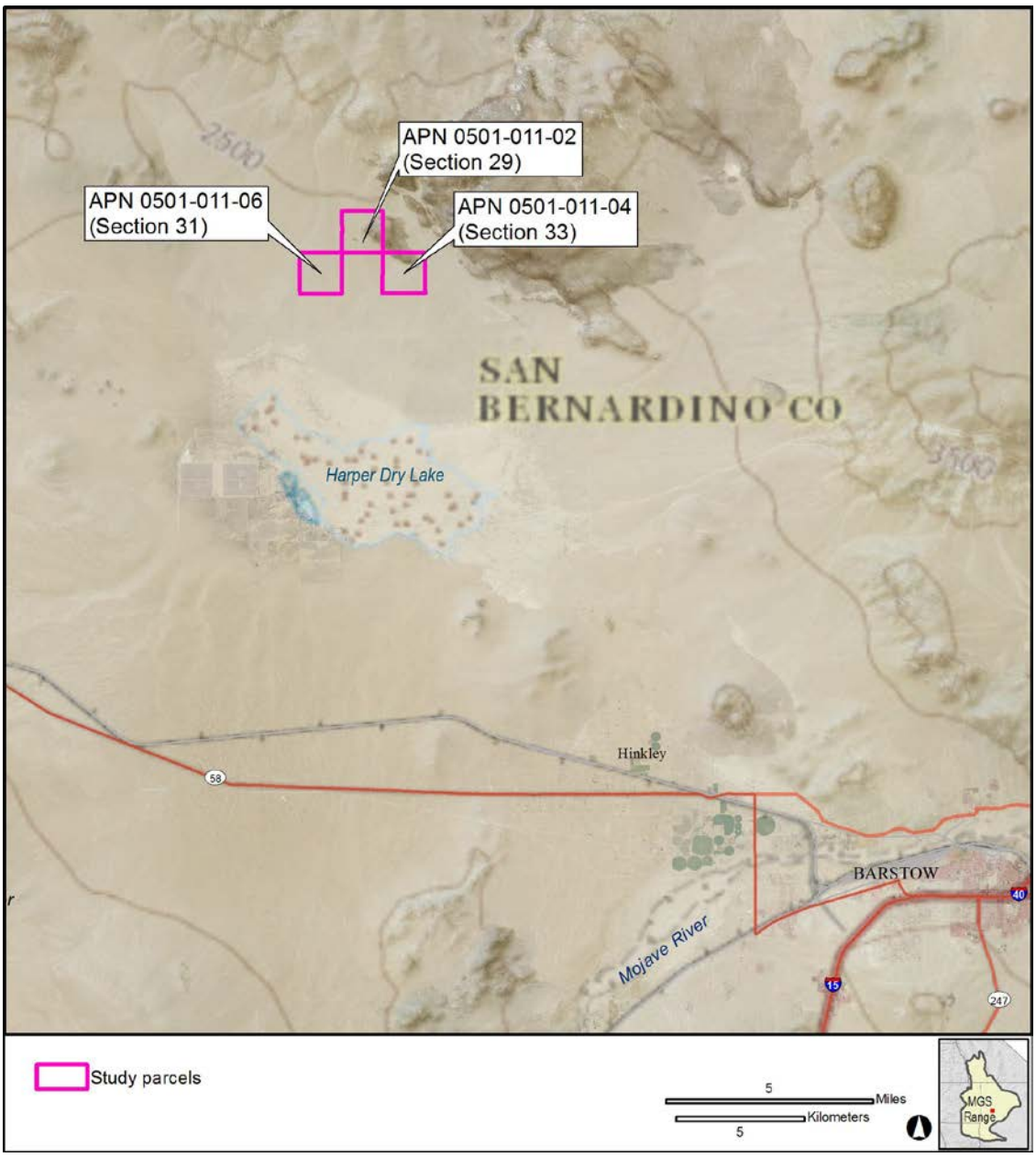


**Figure 1. General location of the properties surveyed in March and May 2015.**

The 3 properties that were surveyed are shown in Figure 2. One camera study site was established on each parcel for the March survey. These sites were designated Section 29-A, Section 31-A, and Section 33-A. In order to more adequately sample Sections 29 and 33, alternative camera sites were selected for the May survey (Section 29-B and Section 33-B). The same site in Section 31 was used for both March and May surveys (Section 31-A and Section 31-B). Appendix A provides the UTM coordinates of the camera sites.

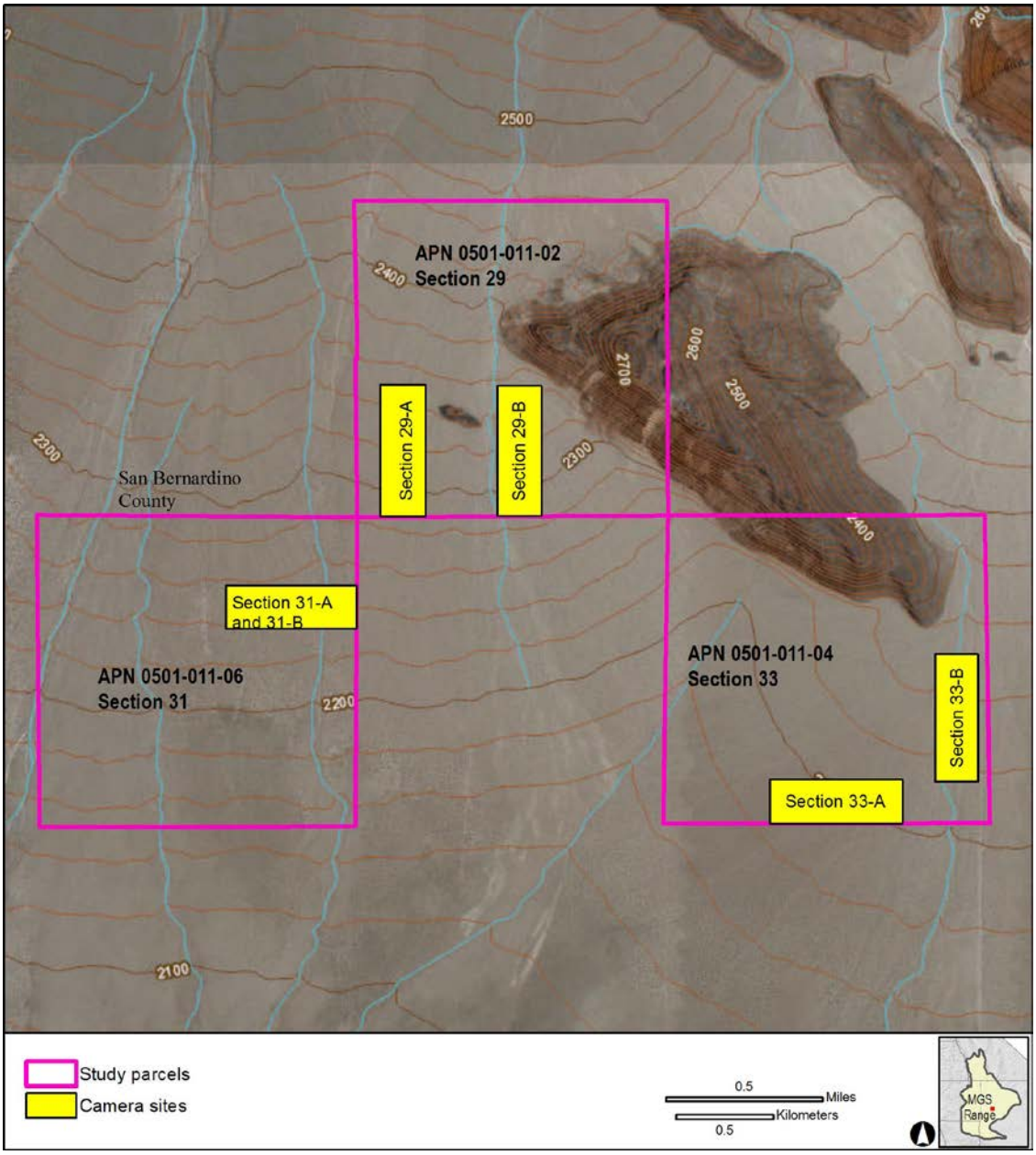


**Figure 2. Map of the properties surveyed in March and May 2015 showing locations of camera sites.**

## *SAMPLING SCHEDULE*

Camera trapping was carried out during the spring activity period of the MGS. Two sampling sessions were conducted, the first during mid-March and the second in late May (Table 1). The March sampling period was scheduled at a time when all adult MGS were expected to be active above ground. During the late May sampling period both adult and juvenile MGS were active and juveniles were beginning to disperse from their natal sites.

**Table 1. Sampling schedule of camera study.**

| SITE NAME | SESSION 1 | SESSION 2 |
|---|---|---|
| Section 29-A | March 20-24 | |
| Section 31-A | March 20-24 | |
| Section 33-A | March 20-24 | |
| Section 29-B | | May 25-29 |
| Section 31-B | | May 25-29 |
| Section 33-B | | May 25-29 |

### *OPERATIONAL PROCEDURES*

At each study site, camera stations were established at 10 locations. The camera stations were arranged in 2 parallel lines with 5 cameras each. The 2 lines of cameras were oriented east-west or north-south. At all sites the 2 lines were placed 150 m apart and camera stations within each line were separated by 150 m. The 150 m spacing was selected because it is similar to observed median values of maximum within-day distances moved by adult female MGS (Harris and Leitner 2004), thus increasing the likelihood of sampling a number of home ranges.

At each camera station, a 1.5 m steel post was driven into the ground at a slight angle and a Reconyx® trail camera was attached. Cameras were operated 24 hr/day for 5 consecutive days during each of the 2 sampling periods. Bait consisting of mixed grains (barley, oats, and corn) plus peanut butter was placed in front of each camera when it was first installed. On subsequent mornings, a member of the study team visited each camera station to replace bait and check camera battery condition. Cameras were serviced at or before dawn so that all camera stations were fully functional before MGS became active in the morning.

From time to time during each sampling session, SD cards with stored images were removed from the cameras and labeled. The images were then down-loaded and stored in duplicate on 2 external hard drives. Images were examined by members of the study team and wildlife data were entered on Excel spreadsheets. Wildlife images were classified by species and the date and time of visitation were recorded. Information regarding intra- and inter-specific behavioral interactions was noted as well.

## RESULTS

### *MARCH SAMPLING PERIOD*

No MGS were detected during the March sampling period. White-tailed antelope squirrels (*Ammospermophilus leucurus*) were found at all study sites and were the only diurnal mammal species recorded. A single common raven (*Corvus corax*) was recorded at Section 31-A. Nocturnal detections were dominated strongly by kangaroo rats (*Dipodomys* sp.) and kit foxes (*Vulpes macrotis*) were present at all 3 study sites.

### *MAY SAMPLING PERIOD*

Both adult and juvenile MGS were recorded at all 3 study sites during the May sampling period (Figure 3). In particular, Section 31-B and Section 33-B had a large number of detections; on both sites MGS appeared at 9 of the 10 camera stations. Although MGS were present at just 2 camera stations on Section 29-B, individuals visited the cameras on all 5 days.


**Figure 3. Photograph of adult and juvenile MGS at bait in front of camera station.**

White-tailed antelope squirrels were detected at all 30 camera stations in May. Common ravens were recorded much more frequently than in March and visited cameras on all 3 study sites. Nocturnal kangaroo rat activity was noted at 28 of the 30 camera stations and a number of black-tailed jack rabbit (*Lepus californicus*) detections were recorded as well. As in March, kit foxes were found on all study sites.

## DISCUSSION

This camera survey was successful in demonstrating that all 3 of the properties under consideration support MGS populations. The occurrence of both adults and juveniles on all three study parcels in May clearly indicates that a reproductive population is present.

The absence of MGS detections during the March sampling period is difficult to explain. Adult male MGS become active above ground during the first few weeks of February, with adult females following in the latter part of February. The weather during the March camera session was favorable for MGS activity, with clear skies and warm days. It is possible that an abundance of green vegetation at this time allowed adult MGS to obtain adequate forage without making long movements and encountering camera stations. In any event, the results during the May sampling period convincingly showed that these study parcels provide excellent MGS habitat.

## ACKNOWLEDGEMENTS

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## LITERATURE CITED

Harris, J.H. and P. Leitner. 2004. Home-range size and use of space by adult Mohave ground squirrels, *Spermophilus mohavensis*. Journal of Mammalogy, 85(3):517-523.

Leitner, P. and D.K. Delaney. 2014. MGS camera study 2011-2012. Prepared for California Department of Fish and Wildlife, Sacramento, CA. 10 pp.

# Appendix A. Locations of 2015 Camera Study Sites

| SITE NAME | UTM COORDINATES[1,2] | | LEGAL DESCRIPTION[3] | | |
|---|---|---|---|---|---|
| | EASTING | NORTHING | SECTION | TOWNSHIP | RANGE |
| Section 29-A | 0473300 | 3886000 | Section 29 | 32 South | 44 East |
| Section 31-A | 0472500 | 3885050 | Section 31 | 32 South | 44 East |
| Section 33-A | 0475300 | 3884050 | Section 33 | 32 South | 44 East |
| Section 29-B | 0473900 | 3886000 | Section 29 | 32 South | 44 East |
| Section 31-B | 0472500 | 3885050 | Section 31 | 32 South | 44 East |
| Section 33-B | 0476150 | 3884700 | Section 33 | 32 South | 44 East |

[1] UTM Zone 11, North American Datum of 1983

[2] coordinates shown for northwest corner of camera site

[3] Mount Diablo Baseline & Meridian