Alternative Technique for Surveying and Monitoring Mohave Ground Squirrels

2010-11 Results

DRECP Briefing
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- Small herbivorous, endemic rodent found in desert-scrub habitat of the western Mojave Desert

- Smallest geographic range of *Xerospermophilus* ground squirrels in California, about 2 million hectares

- MGS are primarily on DoD (34.5%), BLM (31.8%) and private lands (31.0%)

- MGS are listed as threatened in CA

- MGS is a priority 1 Species-at-Risk for the Army

- MGS are currently being considered for federal listing
2010 Study Areas

- Study Area: Four locations were surveyed:
  1) Western Expansion Area, Fort Irwin;
  2) Goldstone Deep Space Communications Complex;
  3) Fort Irwin
  4) Coso (near long-term live-trapping site)
Study Objectives

- Confirm that ground squirrels readily visit bait stations and are not bothered by camera trap equipment.
- Compare the effectiveness of camera traps in detecting ground squirrel presence vs. live-trapping.
- Determine if MGS and RTGS are readily distinguishable using camera traps?
- Determine if MGS marked with unique shave patterns were distinguishable using camera trap systems.
2010 Approach

- Sixteen 840 x 105 m grids were surveyed in 2010 using camera traps
- Record ground squirrel presence using cameras (2 x 7 pattern, 14 cameras per grid)
- Monitor for the presence of MGS from Feb-June (Coso [Mar], WEA [Feb and Apr], Goldstone [May], Fort Irwin [Jun])
- Live trapped 4 grids for 5 consecutive days (with 2 days pre-baiting), followed by camera trapping using same test pattern
- Compare relative detection probability rates from live-trapping vs. camera trap (April and May)
Sample Camera Trap Data: Mohave Ground Squirrel
Round-Tailed Ground Squirrel
## Camera Traps vs. Live Trapping

**April 2010 (WEA)**

<table>
<thead>
<tr>
<th>Grid Name</th>
<th>Live-Trap Detections marked</th>
<th>Camera Detections marked/unmarked</th>
<th>Camera Detections unmarked only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid 29</td>
<td>2F</td>
<td>1F / 3F</td>
<td>4F</td>
</tr>
<tr>
<td>Playa Road</td>
<td>1F, 1M</td>
<td>1F, 1M / 1F</td>
<td>2F, 1M</td>
</tr>
<tr>
<td>S. Road North</td>
<td>4F, 4M</td>
<td>4F, 3M / 1F, 1M</td>
<td>4F, 3M</td>
</tr>
<tr>
<td>Cholla Garden</td>
<td>2F</td>
<td>1F / 2F, 1M</td>
<td>2F, 1M</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9F, 5M</strong></td>
<td><strong>7F, 4M/ 7F, 2M</strong></td>
<td><strong>12F, 5M</strong></td>
</tr>
</tbody>
</table>
April Detection Rates (WEA)

- Camera traps with detections = 28/56
- Camera-days with detections = 76/280
- Total visitations = 440 (95, 14, 174, 157)

- Live-traps with captures = 20/400
- Trap-days with captures = 24/2000
Study Area: Six locations were surveyed:
1) Lucerne Valley (12 grids),
2) South of EAFB (12 grids)
3) Kramer-Red Mountain Corridor (12 grids)
4) California City (12 grids)
5) South of China Lake (6 grids)
6) Searles Valley (6 grids)
Study Objectives

- Examine the effectiveness of camera traps at detecting the presence of MGS over large, diverse areas
- Determine if ground squirrels readily visit bait stations and are not bothered by camera traps
- Determine if MGS can be detected using camera traps throughout the active season (Feb-June)
- Determine if MGS and RTGS are readily distinguishable using camera traps
Approach

- Record ground squirrel presence using 2 x 5 grid pattern (10 cameras with 150 m spacing)
- Used Reconyx trail cameras: Models RC-60, HC500 and PC800 (0.2 trigger speed, no delay between HD photos)
- Record animal visitation 24 hours/day during weekdays
- Monitor MGS presence at a total of 60 grids from Feb-June using camera traps
Summary of Preliminary 2011 Camera Trap Results

- Surveyed 60 grids 3 times in 2011 using camera traps (~600 camera sites) between Feb-June
- Documented MGS, AGS, and RTGS presence at one or more locations
- Documented general visitation times
- Documented multiple visitations/day usually for all ground squirrel species
- Documented intra- and interspecific interactions
- Documented individual/group behavior
- Documented multiple non-target species
Intra-/Interspecific Interactions

AGS vs AGS

RTGS vs AGS

MGS vs AGS

MGS vs MGS
Sample Camera Trap Data: Examples of Non-Target Species Detections
MGS Presence Using Cameras

- South of China Lake – did not detect MGS at any camera stations (0 of 6 grids)
- Lucerne Valley – did not detect MGS at any camera stations (0 of 12 grids)
- Kramer-Red Mountain – detected MGS at a minimum 7 of 12 grids
- South of EAFB – detected MGS at a minimum 3 of 12 grids
- Searles Valley – detected MGS at a minimum 4 of 6 grids
- California City – detected MGS at a minimum 1 of 12 grids
Advantages of Camera Traps

- Detect MGS if they are present at similar or greater effectiveness as live-traps
- Does not require specialized qualifications/permits to operate, so is very cost effective
- Non-invasive technique that is not limited by weather conditions
- Documents activity patterns of animals
- Records multiple visitations per day by animals
- Documents intra-/interspecific behavioral interactions
Advantages of Live Trapping

- Collect definitive demographic data: sex, age, reproductive condition
- By marking animals, gain an indication of abundance
- Trapping is essential to obtain tissue samples for genetic work or to radio-tag individuals
Possible Future Uses of Camera Traps

- Determine the number of camera trap systems needed to fully sample conventional grid to directly compare with live-trapping surveys
- Utilize camera traps to locate future trapping sites to improve the cost effectiveness of live-trapping
- Investigate food preferences of MGS to possibly improve live-trapping effectiveness
- Investigate how MGS interact with live-traps to possibly improve trapping effectiveness
- Investigate if PIT tag reading devices can be effectively used in concert with camera traps/feeding stations
Camera Trap Research in 2012

- Fort Irwin, BLM, CDFG, MDEP, CSU-Stanislaus/ESRP and CERL have provided resources to expand MGS surveys using camera traps on non-DoD lands
- Continue large scale field test of the camera trap survey technique
- Provide data to help validate the PACT model that the CEC PIER program is evaluating
- Help to field test the MGS habitat suitability model that the USGS is developing
- Vegetation sampling data will be directly applicable with ongoing CDFG vegetation mapping projects
- Research findings will be applicable across DoD and non-DoD lands
- Project results will improve our knowledge of MGS distribution
Questions?