Mohave Ground Squirrel Technical Advisory Group
4-5 February 2019
Tenaya Lodge, Fish Camp, California

Yosemite Attenders: Scott Osborn, Denise LaBerteaux, Bruce Garlinger, Ed LaRue, Sharon Dougherty, Don Mitchell, Kathy Simon, Lisa Gymer, Phil Leitner, Erica Orcutt, Erin Whitfield, Sherry Heitkotter, Jacob Robinson, Omar Moquit, Corrina Tapia, Lyell Buttermore, Julia Peay, Dan Leavitt, Karissa Denney, Dave Dayton.

Partial List of Web-X Attenders: CJ Randel, Adam Waters, Misty Hailstone, Rachel Woodard, Stuart Richardson, Larry Zimmerman, Ryan Young, Becky Jones, Carolyn Damon, Tom Egan, Tricia Farmer, Lehong Chow.

When you search "MGS TAG" on the CDFW website, there is now a formal website with updated information. Presentations shared today and in previous and future meetings will be posted. Herein action items are underlined with **responsible parties in bold**.

Monday, February 4, 2019

Review Action Items: The actions items list distributed by Scott Osborn was discussed, updated, and briefly summarized as follows. There were 22 action items going back to 2016, including camera trapping; revised survey protocols (before June 30, Scott Osborn hopes to have a draft revised survey protocol, and preliminary introduction of camera methods; to be shared with the TAG in the fall and be implemented in 2020); standard conservation measures (quiescent); qualified biologist form; MGS clearance surveys (not actively being pursued, needs to be devised by CDFW and BLM); MGS awareness programs (also inactive at this time); collection of rainfall data at Helendale (no rain station); MGS alarm calls (these have been given to Cody Hanford of Transitions Habitat Conservancy); Redhorse live trapping in 2018 (not relevant, as they did camera trapping; the report will be ready soon, and Redhorse is supposed to live trap this spring at Edwards Air Force Base); bibliography (Ed still maintaining this and updated as needed); camera trapping protocol prepared by Phil Leitner, Dave Delaney, and Dave Hacker (has been previously distributed to TAG members); scat sampling (by Erica Orcutt); and several other items to be covered by Erica Orcutt tomorrow. Scott then shared vocalizations for MGS, antelope ground squirrel, round-tailed ground squirrel, and California ground squirrel now available on the CDFW website.

Field Efforts of 2018.

Fort Irwin Dense Urban Training (DUT) Camera Study (Bruce Garlinger). The proposed facility near the southwestern portion of Fort Irwin, just southeast of Goldstone's Mars Complex, will occupy about 4,000 acres and be used for urban warfare training representing a number of nations. Camera trapping occurred from April 25 to June 30, 2018 and included 44 cameras. Cameras were moved every couple of weeks. Bait blocks were used about 1.5 meters in front of camera. White symbols on Bruce's map did not have *Xerospermophilus*; green indicated positive sightings of round-tails. The abundance of empty, white symbols in the center of the study area coincided with hilly terrain and rocky substrates. Only round-tails and antelopes were found

within the DUT and along the various linear facilities; one MGS image was photographed. Camera #19 had an image of both an MGS and RTGS. **Bruce Garlinger** will send a reference for this report to Ed LaRue for bibliography update. Bruce found that lithium batteries last about 12 months in Bushnell and 15 months in Reconx but some failed in only three weeks in some of the Stealthcam cameras. Cameras were programmed to start at 05:00 hours and turn off at 20:00 hours. Bruce advised using cameras to observe MGS or RTGS and where there are positive encounters, perform live trapping for tissue samples. Several years ago Kathy Simon found an abundance of desert kangaroo rats in the Goldstone area, which is a species preferring sandier and drier habitats.

Coso and BLM Work in 2018 (Phil Leitner). Phil's 2018 work included Coso, BLM work in two Core Areas (Coolgardie Mesa and Little Dixie Wash), contact zone studies (around Hinkley), and three BLM potential development focus areas (DFAs; Bowling Alley, Searles Lake basin, Haiwee). There were good results at both Coso Basin (5 MGS) and Cactus Peak (7 MGS), with a good 2017-18 rainfall period and evidence of reproduction. In Little Dixie Wash, Phil trapped four grids (2017 = no MGS except at cameras) and caught MGS at two of four grids. At Coolgardie, Phil trapped three grids and caught 5 MGS at 1 site. There was reproduction at Little Dixie but not Coolgardie in 2018. At the contact zone west of Hinkley, there were MGS west of Harper Lake Road. Winter rainfall was low in late 2017 early 2018 and no reproduction. Phil had MGS at 4 of 16 camera sites in 2018. In 2012, there was an abundance of MGS east of Harper Lake Road following four years of good rainfall. The Development Focus Areas are Bowling Alley, Searles Valley, and Haiwee, which will all be live-trapped in 2019. Phil caught young MGS at Haiwee. MGS were detected at 3 of 4 camera sites in Bowling Alley and at all four live trap sites. MGS were observed at 1 of 4 camera sites at Searles Valley.

Other Reports from 2018.

Ed LaRue completed camera studies on the three sites under the Cuddeback-Kramer Management Plan (2016), including 320 acres at Cuddeback Lake and two square-mile sites southeast of Kramer Junction. The 2016 management plan called for camera work over five days but some have noticed that MGS may not appear until about seven days after bait placement. The real issue is the exorbitant number of AGS and MGS in dry years (2018) versus wet years (2017). Ed had 3,873 AGS at 64 cameras in the wet-2017 year and 124,751 AGS at 34 cameras in the dry-2018 year. In 2017, where there were 2 MGS images at 64 cameras (total of 460,960 images) there were 2,578 MGS images at 34 cameras (272,510 images) in 2018. He talked about the idea of "Camera Days," counting the cumulative number of days the cameras function and a relative measure among sites and years. The other significant finding was the large number of "empty images," with no obvious animals in wet, annual germination years versus dry years. During the wet year of 2017, there were 369,537 empty daytime images or 80% of 460,960 total images, compared to 2018 where there were 62,497 empty images or 23% of the 272,510 images. Ed is considering putting out bait blocks and/or PVC tubes in addition to the sandwich containers in 2019 to compare bait presentations. Don Mitchell shared that lithium batteries in cameras can be supplemented with solar panels. Ed and Sharon Dougherty also trapped three five-day sessions in the Bowling Alley, which are covered in Phil Leitner's report.

Kathy Simon reported that she trapped two sites, one in Pearblossom in Los Angeles County and one near Victorville and did not capture MGS at either site.

Field Plans for 2019.

China Lake South Range Camera Surveys. Dan Leavitt shared that there will be camera work on the South Range of China Lake, for the first time, ever. Six study areas have been identified on the South Range. The northern grid (Site 1) will be at relatively higher elevations near where a MGS was observed in the late 1980's. Site 3 is just west of the Mars antenna where Eremico detected RTGS in 2018. Site 4 is nearest Superior Valley where there has been an abundance of training. Site 5 is near the Grass Valley Wilderness area, and Site 6 is northwest of there. There will be five camera trap locations and five alternate locations within each study area.

Coso and Other Plans. Phil Leitner plans to trap Coso in March again in 2019, where he needs 12 to 14 volunteers. With reproduction there last year, Phil is hoping for a good capture rate in 2019. CDFW is able to help pay for food and lodging in 2019. In 2019, Phil will continue to trap the same grids at Little Dixie Wash and Coolgardie Mesa in late April to early May. There will be live trapping in the contact zone east of Harper Lake Road to gather tissue for genetic materials. Marjorie Matocq still has a lot of tissue collected from the region. In the contact zone, there seems to be reproduction at lower rainfall levels, which Phil thinks could be due to hybridization. The same level of trapping will be completed at the same three DFAs, and will be able to live trap in Searles in 2019 where only camera work was done in 2018. There will be trapping at six locations on Edwards Air Force Base to look for MGS-RTGS hybridization at Edwards.

Scientific Collecting Permit (SCP) and Memorandum of Understanding (MOU) (Scott Osborn). The new SCP system is up and running. This is supposed to streamline applications and tie in to online reporting. There was a recent email reminding all MOU holders that they are required to report their MGS observations. How do we deal with reporting camera results? For now, just report presence/absence in the tables provided by Scott a few years ago. There are both general use (for noninvasive work with common species) and specific permits (invasive work with sensitive species) and individual (SCP for one person and no one listed on their permit) versus entity SCPs (principle investigator can list miscellaneous people). If people are under direct supervision of a SCP holder, they do not need a SCP. "Direct supervision" means within several meters of the unpermitted person doing the work. The MOU is a 2081 CESA permit with a higher threshold of experience to obtain it, whereas the SCP can be acquired by less experienced people. MOU pertains to only listed species; Specific SCP will cover other non-listed, special status species. The LAI (List of Authorized Individuals) pertains to both SCP and MOU. The Specific SCP may apply to only a single project, but this is unclear. **Scott Osborn** will provide pertinent information from the SCP workshop that is being presented here this afternoon.

MOU Used to Designate ITP for Biologists and Monitors (Kathy Simon). There are people on on-call projects; e.g., Kathy covers Edison projects that require both surveys and monitoring, which can be at sites as small as a single pole. Pre-project work, such as surveys, is covered by the MOU. For projects that require take, there are either programmatic ITPs or still need a project-specific permit. Kathy suggested that anyone on an MOU's LAI automatically be approved for a new ITP or adding new people to an existing ITP. Sacramento defers to local field offices to approve or disapprove personnel for rat-holing, trapping, etc. Skill requirements for monitors and

personnel selection seem arbitrary between CDFW regions. Take of a listed species requires more than an SCP, namely an MOU. Lisa Gymer shared that ITPs differ among different projects, so every ITP requires new approval each time. It is best to acquire programmatic ITPs for larger companies, like large utility companies. Don Mitchell shared that there are situations where monitors will not handle the target species, such as big horn sheep, yet the monitors were required to have three years of experience with sheep. **Scott Osborn** will redistribute the standard qualifications form for individuals to complete to look for problems. At this time there is no requirement to have either a SCP or MOU to perform camera trapping.

MGS CDFW Conservation Strategy (Scott Osborn). CDFW has been working on this since the 1990's. As of fall 2018, there was a review draft. Scott and Nicole Cornelius are now looking at a complete edit, and will deliver it back to their supervisor in February. **Scott Osborn** will consider redistributing the Conservation Strategy to the MGS TAG.

Conservation Planning Topics

BLM, Desert Renewable Energy Conservation Plan. Not discussed.

Reintroduction Strategies for Renewable Energy Facilities. (Ryan Young) . In Pahrump, Nevada, proponents have been looking at vegetation mowing versus blading with the potential to reintroduce animals, in this case tortoises. There is a permeable perimeter fence that allows animals to come back in after the site has been developed. Advantages include protection from certain impacts like vandalism and pet collection, favorable microclimate, maintaining connectivity instead of creating sterile patches of non-habitat, Army Corps views mowing as a temporary versus permanent impact, etc. Disadvantages are there may be more weeds, potential for take during operations and maintenance activities, potential heat island effects at and adjacent to solar fields, etc. Brian Cypher has found favorable results in the Central Valley with San Joaquin kit fox and various kangaroo rat species. Ryan reported that habitat is recovering at the ISEGGs facility at Stateline, west of I-15, where the vegetation was mowed rather than bladed. Misty Hailstone shared that in addition to mowing there was also some seeding and watering in the Central Valley, which was not done at Pahrump. She found that mowing at Edwards was comparable to blading with resulting elimination of perennial vegetation. Ryan said that the timing of mowing is also important, like avoiding mowing during drought conditions versus mowing during favorable conditions. To see if MGS are recolonizing solar sites, there could be a requirement to require radio tracking of MGS adjacent to new solar facilities in MGS habitat, which would be funded by the developer.

Tuesday, February 5, 2019

Recap of Day One. Several people not here yesterday were in the room and on the phone. Yesterday's scheduled topics were summarized by Scott Osborn.

MGS Range-Wide Occupancy Modeling (Erica Orcutt). Sites were chosen in 2011 (wet) and 2012 (dry) where there was limited MGS information and potential for renewable energy development, where Phil and Dave Delaney performed camera work. Herbaceous sampling was performed in the wet year but not dry year. Camera stations were placed 150 meters apart. Phil and Dave also looked at shrub diversity and density. Green symbols in Erica's graphic represented MGS locations versus white symbols where no MGS were photographed. She looked at 60 sites where herb surveys were completed and 123 sites for shrub data. Her models assume that the population is "closed," so cannot include juvenile animals. There were more MGS in 2011 but many of them were juveniles. There were positive associations with MGS for *Eriastrum* spp. and *Malacothrix* spp. She also looked at total herb cover for native versus non-native annual species. Also found that higher levels of *Schismus* were associated with lower MGS levels. For shrubs, there was no positive association between shrubs and MGS occurrence. There was a negative relationship with creosote bush; as creosote bush densities increased there was less likelihood of MGS occurring. There was a positive relationship showing that higher shrub cover (excluding creosote bush) was associated with more MGS. Based on Julian dates, MGS detection increases overtime with slightly more detectability in May, and camera studies did not extend into June. Higher shrub diversity did not equate to higher detectability. Erica is planning to use data from live trapping for additional analyses.

Use of PRISM Data for MGS (Erica Orcutt). Precipitation data from PRISM climate models is part of Erica's PhD research. PRISM is developed and hosted by Oregon State University. It produces spatial maps and data of climate data for 30-year averages, daily and monthly precipitation, preliminary data for most recent six months (4 km resolution), and comparisons of long-term trends. Erica's reproduction maps show that most of the MGS range had 100+ mm of rain in 2017 and only to the north and west in 2018, where reproduction did occur. There is a PRISM web tool that allows you to determine rainfall and other data at a specific location. Erica is looking at precipitation from October to March as the critical period affecting annual germination in turn affecting MGS reproduction. It would be good to set up rain gauges to compare specific-site rainfall versus the PRISM model. The URL for the PRISM site is http://prism.oregonstate.edu/explorer/. Phil suggested that Erica could use the PRISM modeling to look at the southern part of the range where MGS were common in the 1970's but not detected since about 1991.

Other Science Updates, as Available.

UCLA Online Platform for Camera Data Analysis. Don Mitchell was recently contacted by students from UCLA about analyzing camera data. They were MBA students wanting to develop this tool as a website. This online platform would facilitate data sharing among scientists. There are some restrictions where the data belong to the client. It is beneficial to determine a way to analyze data for subject animals rather than sitting at the computer analyzing thousands of images. **Scott Osborn** will redistribute the draft camera trapping methodology to TAG members. Bruce mentioned "Zooniverse" as software used for this purpose. One goal would be to eliminate all images where there are no animals.

Phil Leitner's Questions. (Some additional discussion crept in to supplement Phil's questions, as reflected below).

What are the remaining priorities/unanswered questions and funding resources? BLM has provided funding for trapping in DFAs and the contact zone, which will be spent by the end of 2019. Department of Defense has provided some funding, typically associated with specific projects (Eremico's work at Fort Irwin). Project proponents such as solar projects can provide funding. Land managers such as Desert Tortoise Preserve Committee, Mojave Desert Land Trust, Transitions Habitat Conservancy, Wildlands, etc. all now have mitigation lands in the MGS range, so there is an infrastructure available if funding can be found.

Federal listing should not be used as a tool to acquire money, but would result in Section 6 money at the state level, for example. Candidate Conservation Agreements are working in the absence of new listing. The last two failed petitions for federal listing were put forth by the Defenders of Wildlife.

How would Core Area boundaries be changed given what we know now? Scott responded that the Conservation Strategy has somewhat updated the Core Areas. Kathy mentioned that we should continue to use models and ground test them for MGS presence.

What about volunteer trapping? Ed, Sharon Dougherty, and Lehong Chow have trapped six county parks in Los Angeles County over the past five years. There are still BLM lands in L.A. County that are in the area but all relatively close to the southern boundary of Edwards Air Force Base where camera trapping from March through July would be good. Scott showed a graphic with Core Areas and five-mile buffer areas. Someone could trap Bruce and Denise's DUT site on Fort Irwin for tissue from the photographed round-tailed ground squirrels. Goldstone would be easier to trap as it is proximate and there are no military maneuvers. There will be camera work, as described above, on the South Range of China Lake. Bruce caught squirrels both north and south of Adelanto that could be revisited. Kathy said there is some potential to trap the flight facility north of Helendale (400 tortoises inside that fence). Lee Flat in Death Valley may be another place to trap. Bruce recommended using cameras to detect squirrels then come in with live traps to collect tissue. The Mojave Desert Land Trust may be trapping at Palisades Ranch south of Helendale. Bruce indicated that current owners of Borax Mine will allow research on their conservation lands. Bruce and Denise may put out cameras in the Bird Springs Pass area where Denise had observed an MGS-like squirrel in their yard. In 2011, Phil and Dave Delaney had MGS on cameras southeast of Kramer Junction. Erica and Phil could use volunteers for some of their vegetation work during the first week of April. Panamint Valley and Brisbane Valley are locations perennially identified for trapping.

Genetics materials have been collected from MGS and round-tailed ground squirrels, which Marjorie Matocq has, so there is the potential to look at RTGS genetics. There is a need to establish a protocol to collect and analyze tissue data for genetics, which should be put into the updated trapping protocol. There is also the need to determine if hybrids between MGS and RTGS require an ITP (currently a hybrid indicates that an MGS is in the area). Hair samples and scat samples have been used for genetics but tissue is better. Erica wants to look at plant DNA in scat in the contact zone, possibly to see why MGS may reproduce in lower rainfall. For scat, Erica said

it is best to store scat in dry conditions so that she can do genetics analysis of ingested plants. She said that more rigorous vegetation sampling is needed at protocol trapping sites. There is the need to standardize how data are collected for plants. Trappers may collect plant species lists and more typically identify a few dominant species during protocol surveys and, like in the Bowling Alley, tally plants along transects within a meter or two of the centerline. Dan Leavitt said there is a group (Kramer Fisheries Science) studying genetics in fish that uses environmental DNA (eDNA). For MGS, materials may be collected from burrows, for example.

Priority areas for private land acquisitions? One idea is to acquire private lands within the MGS Core Areas. Phil indicated that the area along Highway 58, from Highway 395 to California City Boulevard should serve as a priority for private land acquisition. Solar developers are looking at this area (and the Bowling Alley) for development because of excess capacity at the substation at Kramer Junction. Denise indicated a connection between this area and the Desert Tortoise Research Natural Area (DTRNA) would be advisable. Another area that Phil identified is north of Inyokern and west of Highway 395 as a small corridor that is being developed for pistachios. We may also consider a programmatic formulaic approach to acquisition (see LaRue 2000 blue ribbon panel report for Fort Irwin expansion). **Ed LaRue** will share the 2000 Blue Ribbon Panel report on the Fort Irwin expansion project to the TAG.

With that, the MGS TAG finished presentations and discussions at about noon on Tuesday, February 5, 2019. These minutes were recorded by Ed LaRue, reviewed by Scott Osborn for accuracy, and subsequently distributed and posted on the CDFW website.