

Mohave Ground Squirrel Technical Advisory Group
26 and 27 October 2016
Bureau of Land Management, Ridgecrest, CA

Day 1 – 26 October 2016 (convened by Scott Osborn at 10:00 a.m.) Action Items follow each section with **red-font names** prefaced by a “●” symbol.

Attendees (one or both days): Scott Osborn, Phil Leitner, Tom Egan, Rachel Woodard, Bruce Garlinger, Denise LaBerteaux, Ed LaRue, Shari Heitkotter, Lehong Chow, Kathy Simon, Margaret Adam, Becky Jones, Tonya Moore, Carrie Woods, Curt Uptain, Howard Clark, Maribel Lopez, Anna-Maria Easley, Loren Dunham, Benessa Espino, Lisa Gymer, Agnieszka Napiatek, Erica Orcutt, Dave Hacker, Skip Moss, Ryan Young, Erin Whitfield.

Partial List of Web-X Attendees: Marjorie Matocq, Amy Fesnock, Brett Furnas, Jeff Aardahl, Scott Harris, Kim Marsden, Dave Delaney, Kelly Schmoker, Adam Walters, Mark Hagan, Nancy Frost, Larry LaPre, Reagen O’Leary, Kristen Mobraaten.

Field Efforts for 2016 and Plans for 2017

Denise LaBerteaux and Bruce Garlinger performed camera trapping studies at Borax in 2015 and 2016. The conservation easement was established in 2005 by U.S. Borax. It is located between the existing mine site and community of North Edwards on 2,530 acres. They’ve monitored since 2010, beginning with live trapping. In 2010, trapped MGS on Grid 2 (3 adult females), Grid 8 (1 adult and 8 juveniles), and Grid 4 (auditory detection). In 2011 caught only one adult female on Grid 16. In 2015, they used cameras instead of live trapping, using bait blocks, which were supplemented with four-way and peanut butter on top. In 2015, they sampled 20 of 64 grids on 40-acre parcels. Cameras were out for two weeks, including eight cameras per grid. They captured images of 11 MGS at 6 locations (8 adults, 3 juveniles) in 2015. In 2016, they sampled 34 grids. They photographed 34 MGS on 17 grids, including 10 adults and 24 juveniles, throughout the area (in 2015, all MGS were located to the north). Generally took several days for MGS to find the bait. Some individual MGS were detected on 12 of 14 days. Had an image of a red-tailed hawk with an antelope ground squirrel in its grasp. They began to see ravens in 2015 in June and July, although in 2016 ravens were common throughout the study. These camera studies are to be repeated every five years. There seemed to be good reproduction in 2016, although by June some MGS were very thin and may not make it through dormancy. Denise was seeing older and younger cohorts in 2016, suggesting early and later reproduction.

Ed LaRue trapped 1 protocol grid, 6 exploratory grids, and coordinated trapping of 11 grids in the Bowling Alley. One grid in Palmdale, one on Edwards Air Force Base near California City Boulevard (late January – early February), three in the northeast Los Angeles County area, two northeast of Kramer Junction, and 11 in the Bowling Alley. Cameras were use on grids northeast of Kramer, two of three LA County grids, and several Bowling Alley sites. Bowling Alley results are described later this afternoon. Northeast of Kramer Junction, had one pregnant female in a live trap on one site and one camera image of an adult on the second site, where 100 traps and 10 camera stations were run concurrently. There were a total of 15 MGS on 8 grids, including 13 in the Bowling Alley and these two. He used suet cages successfully to maintain grain for five days. Phil indicated he would not recommend trapping on the aerospace lands east of Palmdale.

Phil Leitner trapped the two Coso sites, including Cactus Peak and Coso Basin, and other sites within Key Population Areas and the Hybrid Zone. He trapped Coso sites from March 27 to April 2, 2016, so only adults. No reproduction in 2012, 2013, and 2014. They reproduced in 2015 and 2016. In 2016, he caught one MGS at Coso Basin (0 in 2015) and seven at Cactus Peak (4 in 2015). He trapped two Key Population Areas including Coolgardie Mesa (April) and Freeman Gulch (March) and grids west of Hinkley. No MGS were caught at Coolgardie and only one (a 120g pregnant female) in Freeman Gulch. These grids were 225 traps, 35-meter centers, on 500 x 500 meter grids for five days. In the Hybrid Zone, he trapped seven grids in May and June. In 2015, he caught MGS at 3 of 6 sites. In 2016, there were eight grids, with MGS caught at 2 of 8 grids (including the pregnant female caught by Sharon Dougherty). None of the genetics has been reported for five “MGS” in 2015 and 2016. In 2012, he camera-trapped 23 sites in the Hybrid Zone and got “MGS” images at 17 sites, including both MGS and RTGS at one site. In 2012 through 2013, in Hinkley Valley, all except two animals were pure RTGS. In 2014, he had mixed ancestry at two sites, with MGS at four sites, and no captures at three sites. It seems that pure RTGS are not moving as far west as the hybrids are, as all pure RTGS have been found just west of Hinkley, whereas hybrids have been found several miles west of Harper Lake Road.

Brett Furnas is working on CDFW drought monitoring that began in 2015 and continuing in 2016. He is monitoring many different species throughout the state using camera traps for mammals and automated recorders for bats and birds. He visited 230 sites for a total of four weeks between March and June in 2016 and another 100 sites are expected in 2017, including the Mojave. There were about 50 cameras in each ecoregion, including a total of 63 cameras within the MGS range. He stratified Mojave areas, identifying seven or eight different vegetation communities. He used three kinds of baits including cat food, oats/peanut butter, and salt block. At 229 sites in Mojave did not capture any MGS images, got antelope ground squirrel at 34% of the plots, RTGS at 4% of the sites, California ground squirrel at less than 1%, and rock squirrel (*Otospermophilus variegatus*) at 1% of the sites. [A fair amount of modeling methodology was described that I didn't capture.] These are the baseline or pilot data to which future results can be compared.

Lehong Chow trapped in the Bowling Alley, catching seven MGS to the south, one protocol grid at Pearblossom, and a camera study at Desert Tortoise Research Natural Area (DTRNA). She surveyed one grid near Pearblossom for an ongoing solar development. Most of the site was already under construction, so they put 100 traps in the residual areas, which were supplemented with cameras. They used both bait piles and bait tubes. She got more AGS detections when peanut butter was smeared on the tube and rebar, markedly fewer common ravens, and more AGS at the tubes. At the DTRNA (trapped on behalf of the Desert Tortoise Preserve Committee), they placed cameras on eight grids (each 10 traps), with two grids in the western expansion area and six to the east. No MGS were detected on any of the eight grids. Areas on the eight grids to the east were heavily disturbed by both OHV and sheep grazing. She suggested smearing peanut butter on both the tube and rebar to increase capture rates, which was not allowed in the DTTPC's methodology.

Skip Moss indicated he camera-trapped near Cantil. He ran four camera stations from February to August, with lots of ravens at the bait piles. Bait blocks were used later in his study, which attracted lots of antelope ground squirrels. He then used deer bait stations using four-way including a bucket with attached fan, which spreads the bait when the fan is engaged, up to six times a day for 1 to 30 seconds. Set-up cost is about \$50. When the apparatus was too low to the ground, AGS climbed into the bucket and ate the feed, so it had to be raised higher off the ground. For this method, the bait lasted longer and did not seem to attract ravens.

Plans for 2017 = Action Items • **Phil** has BLM money to trap Key Population areas and the Hybrid Zone for 2017 through 2019. • **Carrie** will talk to BLM about performing trapping inside the DTRNA. • **Ed** indicated he may trap BLM lands in northeast Los Angeles County, several potential protocol grids, and perhaps Bowling Alley. • **Aga** indicated that LSA will likely be able to trap one volunteer grid in 2017. • **Kathy** indicated she may seek permission to trap the aerospace facility near Helendale. Tammy Branston with LADWP has trapped some near Haiwee Reservoir and may continue to do so in 2017 (• **Scott Osborn** will add Tammy to the email distribution list). There will also be trapping by Phil Wasz at Fort Irwin in 2017 on about 4,000 acres.

Lunch Break

DRECP, the Bowling Alley, and Clearance Surveys.

Bowling Alley (BA). Most participants in the room had a chance to read the report. Initially, this report was envisioned as an MGS TAG document/product, to be provided to BLM. Today's discussion is aimed at getting feedback to make additional changes. Given Marjorie Matocq's expected schedule, reference to her genetics research will be deleted. Scott said additional review will be needed for CDFW members of the TAG to endorse the report. Ed reviewed the DRECP CMA language on the BA regarding whether it should ultimately be designated as a Development Focus Area (DFA). San Bernardino County discussions also might lead to a county designation for development on the private parcels of the BA.

Recap of survey effort this year. There was a table summarizing the results for the 11 grids, vegetation, and disturbance (fairly pristine, except for some sheep grazing). Other incidental observations of sensitive resources were reported. The report also referred to Phil and Dave's camera detections at three sites in 2011. Relatively good level of detections here compared to other long-term trapping sites. Lacking DRECP guidance on what the standards are for considering the area "important" to MGS, Ed tried to cover as many bases as possible. The study constitutes a large effort with fairly conclusive results. Is there a need for more trapping to demonstrate it's an important area?

Curt: We should overlay the vegetation map with Phil's map of Key Population Areas. We need to discuss the importance of the area as both a linkage and/or core area. Tom Egan asked if there could be more vegetation work (i.e., winterfat and hopsage surveys) on the east side of Highway 395. Phil has data for a dozen sites from the 2011 camera stations.

Scott: Does Ed's report satisfy the BLM requirements for more information?

Amy: BLM management asked why is the TAG rushing to make a recommendation well before the five-year deadline? Also, Amy can imagine slightly different interpretations of the data than are presented in the report. We need some certainty in terms of planning, with San Bernardino County also developing management actions. Amy: Is the BA a linkage or a Key Population Area? It is inside a Key Population Area, as identified in the current MGS Conservation Strategy? Would the area on the east side of Highway 395 meet the linkage function? Are there other context and surrounding area questions? What are they? Amy says the report doesn't address connectivity. Is there a difference in importance in terms of protecting Key Population Areas versus connectivity areas? Resident adults suggest that this is more than a connecting area. Although the BLM is very interested in the results, it also relies on CDFW and counties input and determinations. If CDFW said in its Conservation Strategy that this should be a Key Population area rather than a linkage area (which it currently does), BLM would accept that determination.

Scott Osborn indicated that the 2016 results support a determination that this should be considered more as a Key Population Area than a linkage area. Amy indicated that this would need to be formally identified as a Key Population Area in the CDFW Conservation Strategy, which it is in the current draft. Scott indicated that since CDFW is leading the MGS TAG, the results of this report may be enough, and the Conservation Strategy would not need to be the vehicle for BLM to accept this determination. Becky indicated that it is much easier for BLM to make this determination under the DRECP than for the CDFW to do it. On a number of occasions, Scott indicated that we should pursue various models to address some of the issues, such as landscape dispersal models.

Phil indicated that even if MGS were captured on the east side of Highway 395, it would still not address how wide a corridor needs to be. So, it's not clear that additional trap data will provide planners sufficient information to determine corridor width, among other things. It was agreed that it would be better to spend future limited volunteer time elsewhere rather than here. Aga indicated that the goal in February was to determine if the Bowling Alley was occupied, which the 2016 effort shows it is.

The decision to identify the BA as a DFA or not needs to be determined sooner rather than later so that developers do not begin to identify this area for preferred development. Given that Kramer Junction has energy capacity, it makes this area more attractive to energy developers. Carrie indicated that any new applications on BLM lands in the BA would be denied for the next five years. Several older applications have been filed but there are no active applications at this time. Tom Egan indicated that San Bernardino County is looking at this as an area to be developed, but that determination would depend on BLM's decision in the DRECP. Amy responded that if the county would not want to develop this area, then it would affect the BLM's decision-making process to keep or drop the BA as a DFA. Tonya indicated the county may have some concerns that the data were collected on public lands.

Amy indicated that BLM may be able to provide funds to perform additional studies in the BA. Now is the time to determine the goals, methods, and costs although money could not be forthcoming until January 2017 or possibly 2018. Additional money may need to be spent on further genetics studies.

Curt and Kathy suggested that the recommendations be taken out of the document and that it be presented as a technical report with results, only. If so, various entities, including the MGS TAG can reference the document and draw their own conclusions. There was consensus that Ed would withdraw the affiliation with the MGS TAG, make it a technical report of results, remove recommendations, not require CDFW approval, and make the report available to those entities that can use it. Ed indicated he would provide the revised report to the MGS TAG for additional comments.

Action items: • Ed should add Phil's and Erin Whitfield's data from south of the volunteer trap area to the report. • Ed will use the available vegetation map to more accurately plot MGS captures. • Ed should overlay the vegetation map with Phil's map of Key Population Areas. • Ed will revise the report as a results-only document without recommendations and without the MGS TAG endorsement, although it has been critiqued by the MGS TAG's scientists. He will provide the revised report to the MGS TAG for additional comments. • Kathy has a GPS coordinate on a visual MGS that she will provide to Ed. • Kathy has several cameras that she will check to see if there are any MGS on Grids 9 and 10. • Kathy or Lehong and Erin or Adam should complete CNDDDB database sheets for the MGS they captured (Ed has already done this for his three MGS captures). • Trappers should be sure to contact Carrie Woods for future trapping efforts in the BA and near Ridgecrest. • Scott Osborn will contact Brian Acord to see if Ed's report would suffice as a submittal for CNDDDB records. • Ed and Phil will identify additional potential studies for the BA so that Phil can present a proposal and discuss budgeting with BLM in January 2017.

After break discussion. So, what are the new data BLM needs from the BA? Dave Hacker's map from 2014ish, shows a "Leitner Cores and Patches" area included in a pale blue boundary line, which includes the BA. In the draft Conservation Strategy, the BA is depicted as a pink polygon referred to as the "Boron/Kramer Junction Key Population Area" and depicts red connectivity corridors north and south of the key area. On the "Hacker Map," Amy is often asked why the "core and patch" polygon has not been extended to the Borax conservation area (it appears to extend that far west in the Conservation Strategy map).

Additional efforts could be centered in saltbush areas and occur in June (Kathy disagrees because it may show only dispersing MGS). Bruce stressed that cameras may be better here, to be run from February through late June, for example. Amy indicated that if we can demonstrate that animals in the BA are pure MGS, then that would lend more support to protecting it. Amy is often asked by managers why an area should retain its Key Population status when it is threatened by hybridization, as in the Harper Lake-Edwards Key Population Area or where currently there appear to be fewer animals, such as in Coolgardie Mesa-Superior Valley and Little Dixie Wash. One key question is how wide does a corridor between Edwards and Fremont Valley need to be to facilitate connectivity. Another, is do MGS occur in the saltbush as residents and/or dispersing individuals? Should we be pit-tagging captured animals or is tissue material enough to identify related animals? Genetics may be able to identify lineages, which may be used to determine dispersal abilities based on subsequent captures. Maybe use the existing Kramer Junction LUZ facility to see how it affects dispersing individuals. Also, put radios on squirrels to see what dispersal is like in the area relative to plant communities.

Scott asked if we should be looking at the ability of MGS to disperse through developed areas; would they just run under the solar panels. There are no data to show that MGS will or will not disperse through such areas. Another approach would be to leave gaps adjacent to solar fields to facilitate dispersal through a certain area. Erica Orcutt is planning to do a radio telemetry study on MGS to look at habitat selection, dispersal, and other issues. And, indicated there is a professor at Davis who is looking at the effects of solar development on various animals.

Update on Dog Detections. Liana Aker has been using her dog at Fort Irwin to detect MGS versus other species. Progress has been very slow to avoid mis-training her dog. She hopes to bring the dog along to the next MGS TAG to demonstrate. Scott will ask Liana if she need more scat of various species.

Action Item: • **Scott Osborn** will ask Liana if she need more scat of various species.

Update on Mohave Ground Squirrel Draft Conservation Strategy. Scott indicated that the Conservation Strategy has been put on the back burner, with the latest draft in August 2016, and that the responsibility to complete it has been passed onto him. The main impediment right now is there are a few external comments that need to be addressed. For Scott, this is a third priority, behind two other large, overdue projects. Amy indicated that Kevin Hunting has told her that Scott is working on the strategy, which he says he isn't. Nancy Frost indicated that Region 5 has taxa teams, on which she is the lead. Their first species was the MGS, with the scope limited to Los Angeles County. The Conservation Blueprint looks at species accounts, threats, conservation goals, regional implementation, etc. to develop a land acquisition plan in LA County. Scott will provide Tom Egan's contact information to Nancy for coordination in L.A. County with regards to the Antelope Valley Resource Conservation Investment Strategy (RCIS). Given Ed's mostly negative results in LA County, Phil wondered where land acquisition would occur. Scott Harris indicated that he is looking at MGS occurrence around southern Edwards for potential acquisition.

Action Item: • **Scott Osborn** will provide Tom Egan's contact information to Nancy for coordination in L.A. County with regards to the Antelope Valley Resource Conservation Investment Strategy (RCIS).

Day one ended at 16:30, with intent to meet in the morning at 08:30.

Day 2 – 27 October 2016 (convened by Scott Osborn at 08:30 a.m.)

Update on Mitigation Measure Effort. Scott indicated that there has been talk over the years to standardize mitigation measures to offset impacts to MGS. Reagen O'Leary has taken the lead, with help from Aga and Ed. Reagen indicated that she needs clarification on the goals of the task. Craig Bailey of CDFW was uncomfortable with the exercise to edit take measures by outside entities. Reagen's focus at the February Wildlife Society meeting was on CEQA measures to minimize and avoid impacts, and take measures in incidental take permits (ITP) is a potential second task. Take criteria in ITPs include measures to avoid, minimize, and compensate impacts. Kathy pointed out that tortoise protection measures were slightly modified to pertain to MGS, so there is some inapplicability in the existing ITP measures. ITP measures are typically more specific with CEQA measures often being more general.

Scott agreed that it is appropriate for the TAG to continue to work on standardizing measures, even though currently they are specific and different in different regions. He would like to see this review and comments proceed. Since Reagen has been reassigned, Benessa would be the logical new CDFW contact person. It's appropriate to have biologists from all three regions involved. Reagen suggested categorizing measures as they fit into the three components: Avoid, Minimize, Compensate. "Underground Regulations" prohibit CDFW from putting forth mandatory measures with "or else" ramifications. There was then discussion about rat-holing.

Action Items: • **Benessa, Aga, and Ed** will reconvene as a subgroup along with pertinent CDFW biologists from other regions and discuss the next approaches. • Future generations of the tables will be sent to **Scott Osborn** to be distributed when appropriate.

Habitat Ground Truthing. San Bernardino County hired a consultant, who then enlisted Kathy Simon, to assess flood control features in the county for presence and impacts to listed species, including MGS. Suitable habitat in Rich Inman's model included areas with a value of 0.6 and above. This included 324 polygons that Kathy visited. At each one she looked at four criteria: Soils, vegetation, disturbance levels, and distance to recent MGS occurrences. She ground-truthed these areas to see if Inman's suitable habitat rankings met her four criteria given above. She recommended that the county consider trapping in areas where ground-truthing showed good to excellent value. Often the model showed there was habitat when there was none, in part because vegetation was not part of Inman's model. But there were still areas where the model identified habitats that didn't seem appropriate to Kathy until she visited them and concurred with the model. The resolution of the model is one kilometer, so it is difficult to apply to a linear feature like a flood control channel.

Recent Results from Genetics Studies; Discussion, Future Needs. Marjorie Matocq joined us at around 09:30. All the tissue collected over the past few years are being assessed and results are pending. She is assessing older samples to go beyond the microsatellite methods, which now allows her to assess tens of thousands genetic loci. This methodology is much more sensitive to determine hybridization. There is no huge hybridization impact on the genome as a whole, so impacts are localized. Single Nucleotide Polymorphisms (SNP) analyses look at specific locations in the genome, in the order of 50,000 to 60,000 loci. Casey Bell's masters degree looked at genetics for 268 MGS and 64 RTGS. Marjorie then accumulated years worth of tissue including 55 samples in the Hinkley area where hybrids were regularly found. There were 140 total samples that were analyzed through 2014. There were 18 samples in 2015 and 21 samples in 2016, so there have been 500 samples that are currently being assessed, including old and newer samples. She expects to report results in February 2017 at The Wildlife Society meetings in Reno, NV. Once the data are analyzed, Marjorie will be able to look at well-sampled areas for genetics relatedness among individuals and across the range. Genetically, the northern segment around Coso is most distinct, possibly due to separation by a river in the Pleistocene.

Scott wanted to know if the genetics work would help us answer questions about the importance of a given area, such as the Bowling Alley. Marjorie indicated that those analyses can be performed once this current batch of old and new samples is analyzed. This will show interrelatedness and gene flow within the range, showing genetic connectivity between proximate and distant regions. The concentration of DNA is much higher in ear-clipped tissue

than in hair or scat. Phil indicated that Marjorie is not currently interested in MGS scat, so we should stick to ear tissue. Phil indicated a recent contact expressed an interest in looking at food components in the scat, so scat samples may still be helpful. Samples that do not sequence well can be discarded. The ear punches are by far the best material. It is best to use 95% ethanol for storing tissue material, and completely dry tissue is acceptable as a second approach if ethanol is unavailable.

Marjorie indicated that the SNPs analyses may be able to determine how long hybridization has been occurring. F1 hybrids are a 50-50 mix of MGS and RTGS. Since there are F2 individuals with 75-25 mix, this indicates that hybrids are interbreeding. Phil was particularly interested in the 2004 sample from the northeast corner of Edwards that appeared to be pure RTGS, so this new analysis may be able to reassess that particular sample. Earlier studies have accurately identified hybridization and the SNPs will be able to determine how much genetic material of either species is in a given individual. Determining gene flow across large distances will be very difficult, so will need to rely on those regions where more tissue material has been collected. Marjorie is hoping that sequences will be back by about the end of November, and if she has a month to analyze the results, she would have results that she can share by January 2017. So, probably basic analyses will be report-worthy in January, in time for the February conference. She emphasized that we should all continue to collect tissue samples from all MGS.

Shari has tried collecting hair through hair snares. The problem is that you need to exclude hair samples from other species such as AGS. There is also the issue of multiple animals depositing hairs at a single trap. Phil had an associate in the early 2000's who found that even in using a microscope, she could not differentiate among hairs from squirrels versus other rodents.

Camera Trapping as a Method for Long-term Monitoring. Dave Hacker provided two handouts written by Phil Leitner and Dave Delaney dated 12 September 2016 on using camera traps to monitor MGS populations on mitigation lands and how to determine presence/absence, suggesting that camera trapping may be the most efficient means of monitoring and assessing presence. The comments will be forwarded to Phil and Dave for their consideration. Dave Hacker will incorporate CDFW biologists' comments into the current approach, provide that to Phil and Dave Delaney, who will then revise their approach as needed, then provide it to the MGS TAG for their input.

Long-term monitoring on mitigation parcels. Remember that we are developing guidelines rather than a protocol, so must be general yet specific enough to address issues given below. The methodology addresses two main questions, including intensity of camera trapping and frequency. The methods will address presence but would not address population density or demographics. For 160 acres, would attempt to perform 100% coverage. For larger parcels, would need to sample different vegetation communities. In the past, Phil and Dave have used 10 cameras spaced at 150 meters in two parallel lines. Phil found within-day movements are about 200 meters. So, presently, 10 cameras cover 160 acres. Should we put out one camera per 40 acres?

Frequency considers the fact that numbers of squirrels change drastically between years, so ideally would be able to sample every year. Realistically, would be best to sample plots at least every 2-3 years but not longer than 5 years. The window is judged to be March 15 through May 15, so we are looking at adults, only, and not recording juveniles. The current proposal is to trap for two five-day sessions separated by three weeks. Should we stick with two five-day periods? We may want to pre-bait stations, leave them out for longer periods of time, then adjust downwards if data support that (may expose cameras to theft, which is possibly more likely on weekends). Longer periods (i.e., a month) would result in more photographs and also require regular visits to supplement depleted bait.

Pertinent CDFW biologists have already reviewed these methodologies. The goals are to determine how management of a given site is affecting persistence of MGS in perpetuity, and also to inform managers how measures may need to be changed to address declines. So, this would apply to long-term monitoring as opposed to presence-absence surveys. It's important to have uniformity, so all project proponents are asked to do the same thing, which also lends itself to cross-comparisons among multiple management parcels. The methods must be consistent in terms of bait, delay periods between photographs, camera quality, how images of other species (competitors, predators, etc.) are used or deleted, etc.

Dave Delaney recommended pit tagging MGS and have readers at bait blocks. There are still concerns about collecting tissue or hair in conjunction with using cameras. Need to have a certain distance from the camera to the bait, avoiding wind-blown vegetation, orientation to the north to reduce glare, reduce raven use of the bait, bait presentation and how often bait is checked and supplemented, etc. CDFW also needs to identify the specific data to be submitted and reporting formats. We must be careful that bait stations do not provide predictable food sources to offending predators, particularly ravens.

For very large sites, need to look at variability in vegetation, substrates, slopes, etc. to ensure that all different habitat types on a given parcel are sampled. Again, can be less than 10 traps per 160 acres. Need to answer the basic questions of whether MGS is persisting and possibly an index of abundance, both leading to determine if management facilitates the persistence of MGS on the mitigation parcels. Persistence is important, so may want the initial effort to consist of consecutive years, then move into certain multiple-year intervals. Also, once the grid is established, want to reposition cameras in subsequent years in the same spot. We could determine 40-acre parcels within a vegetation type on a 160 acre parcel, then randomly select which 40-acre grid would be trapped at certain intervals. Will also need to determine the frequency of vegetation monitoring, which may be what CDFW is managing for.

Annual reports would be the opportunity to provide feedback to CDFW to determine how changes may be implemented. Given that the mitigation parcels are spread across the range, consistent monitoring will help determine regional fluctuations. The data may allow CDFW to identify preferred habitats that could be in Key Population Areas versus linkage corridors. May perform a belt transect near each camera site and consistently collect vegetation and disturbance data. Current management is mostly restricted to fencing sites to preclude impacts like sheep grazing and heavy OHV use. Rachel Woodard suggested that some of the mitigation fees could help establish control plots in Key Population Areas so that results on the mitigation parcels can

be compared to a control plot; i.e., if no MGS are captured on a mitigation parcel *and* the control plot, then we can say it is due to environmental conditions rather than be attributed to management failure. Reagen indicated that there are existing mitigation parcels that do not have funding associated with them. Given that a MOU is currently not required for camera trapping, we need to consider the qualifications of who performs the studies and who can review images and identify species (particularly MGS from RTGS).

Action Items: • **Dave Hacker** will incorporate CDFW biologists' comments into the current approach, provide that to Phil and Dave Delaney, who will then revise their approach as needed, then provide it to the MGS TAG through Scott for our input.

Climate Change and MGS Geographic Range. Kathy reported on Rich Inman et al.'s (June 2016) paper (Scott will forward the paper to all of us). This builds on an earlier modeling paper with scenarios that anticipate MGS response and habitat suitability to climate change, including expansions and reductions in the range. The modeling essentially shows a northern expansion and an eastern reduction. Another map shows current proposals for solar and wind according to the California Energy Commission. The next steps to improve the model would use more occurrence data, current conditions including vegetation, and upcoming genetics information. This is all speculative; there's no funding to perform a new model. Kathy asked if this is a tool that should be pursued. The analogous tortoise model is based on an abundance of data and has been very useful (mostly predicting tortoise occurrence according to Kathy, and politically useful according to Ed) but these data are mostly lacking for MGS. We don't know how much the revised model would cost. Resolution of the current models is at one square kilometer, which is mostly too large for specific projects. Such a model would be useful for CDFW and BLM biologists in their CEQA and NEPA assessments.

Action Item: **Scott Osborn** will distribute Rich Inman's June 2016 modeling paper to all TAG members.

New Topics or Additional Discussion.

Standard Form for MGS Qualified/Designated Biologists (DB): Ryan Young indicated he would like to develop a CDFW-specific qualifications form, with the same function as the USFWS' form used for tortoises. Ryan outlined the progression leading to authorizing a DB, which may take three to six months. CDFW typically approves, denies, or requests more information. So, the process needs to be streamlined and have some assurances. Ryan recommended that CDFW maintain an (1) internal list of previously approved DB so automatically approved; (2) if you have a MOU then you should automatically be a DB; and (3) MGS qualification form. Reagen indicated that the qualification form should also list on how many ITPs a prospective DB has been previously approved. There is a perennial problem with different agencies identifying different types of biologists; i.e., Authorized Biologist versus Designated Biologist.

Kathy said her Scientific Collecting Permit gives her blanket approval to handle tortoises (although there are other requisite documents, such as the ITP, that are also needed). Is it possible to have a list of approved personnel? Need to check with CDFW solicitor. Would not be linked to a MOU for various reasons, but a MOU holder should still be considered automatically

qualified. Currently, the system is based on a project-by-project basis, which Lisa Gymer pointed out is driven by species that are present and unique aspects of the proposed project. It would be best if you could fill the form out one time, and update it as new projects are added. Reagen indicated that a pdf form with electronic signatures could be a standardized approach. The form may also include type of activity (trapping versus handling), type of project (solar, pipeline, etc), etc. previously approved so that approval can be expedited. Scott indicated that internal policies and regulations are being considered and this approach is being reconsidered as we speak.

Action Item: • **Ryan** will develop a draft qualifications form, circulate it to all of us, and depend on us to give him feedback. • **Erin Whitfield** will send a recent example of a MGS qualifications form to Ryan.

Shrub Community Composition Changes: Phil Leitner provided a power point with lots of data that could not be captured here. He and Barbara Leitner have been conducting shrub surveys since 1988 and revisited some of these plots in 2016 to determine how certain parameters have changed. Assessments are performed in early June prior to deciduous shrubs losing their leaves. They used line intercept methods using 500 meter lines of trap stations, so 100 25-meter intervals were sampled. If the shrub did not have a living canopy, it was counted as dead. They looked at percent cover, number of plants, and average condition based on percent-live canopies. At the Cactus Peak site, found desert goldenhead fell from 4% to 2%, for spiny saltbush (*Atriplex confertifolia*) went from over 4% down to 0.4%, and winterfat dropped from 1.8% down to 0.98%, for a few examples. Total live cover in 1988 was 22%, now 14%. For dead cover, in 1988 it was 1.3% and is up to 10% in 2016. Analogous data at Coso Basin show the same trend.

He also looked at sites northeast of Kramer Junction where belt transects were sampled in 2011-2012 and revisited in 2016. The focus here was spiny hopsage and winterfat, which are important components of MGS diet, particularly in dry years. Phil then showed camera sites where MGS images were captured and also visual sightings. The total number of winterfat and hopsage ranged from 0 south of Rand Mountains up to 900 west of Fremont Peak. He has found that a total of 300 winterfat and hopsage seems to be a threshold above which there can be some predictability of MGS occurrence. Within the Hybrid Zone, between Hinkley and east of Kramer Junction, only 1 of 23 sites had more than 100 combined hopsage and winterfat plants. Phil continues to look at the relationship of elevated levels of these shrubs with MGS occurrence to predict occurrence.

Funding for Coso 2017: Phil indicated that field work for this study is largely provided by volunteers. The cost includes \$4,000 for motel and \$2,000 for food. Some have asked if this project should continue, or that union folks take it over. A primary value of continuing to study the plot is that it provides the longest running continuous data set that can be compared to data collected elsewhere in the range. Nancy discussed the possibility of applying for State Wildlife Funds. Ed indicated that Circle Mountain would provide \$3,000 if that will ensure the 2017 trapping effort occurs. BLM money may be available for 2018.

Trapping Protocol Notes: Scott Osborn recently provided a draft revision to the existing presence-absence trapping protocol which, if approved by CDFW, would require trapping the full five days even if an animal is trapped days 1-4. Given how seldom the protocol is revised, it is important that any other recommendations be submitted to Scott immediately. Additional

recommendations included revising or dropping visual surveys and requiring tissue collection. Kathy indicated that the proponent usually earmarks funds for the entire 15 days, and in one case, the validity period was extended out to several years when the full 15 days was trapped after a MGS had been captured. One reason to stop trapping upon detection, which is common to other species, is to minimize stress and harassment. The downside is it lacks demographics data, fails to capture additional animals that would have been trapped on subsequent days or sessions, and restricts the opportunity for tissue collection. There was some discussion about which range map should be used; Gustafson's 1993 range map is the definitive one. There should also be times that trapping should occur outside the recognized range for potential to expand the range. The protocol currently calls for trapping within five miles of the range. Scott will help identify the pertinent regional biologists to discuss specific trap configurations, but it is the responsibility of the assigned regional biologist rather than him to make this determination.

- *Action Items:* All **TAG members** are asked to send specific recommendations to change the trapping protocol to Scott.

MGS Data Submission MOU Amendments: All miscellaneous reports need to go to the pertinent regional biologist. Annual reports are to be submitted to Scott, who will give them to appropriate people. There will be a second email to which annual reports are submitted so that technicians can organize the data. All MGS records are to be submitted to CNDDDB. Scott will soon send out a blanket MOU revision describing this information. Several people have overdue MOU's, so folks will have to work on email confirmations while delinquent MOUs are being processed. There is no requirement to have a scientific collecting permit (SCP) to handle MGS, so long as there is CESA authorization or if the person is listed on an MOU. Ironically, you do need a SCP to collect and handle antelope ground squirrels.

- *Action Items:* **Scott Osborn** will soon send out a blanket MOU revision describing this information.

History of the MGS TAG: In about 1998, Kristin Berry identified funding from California Energy Commission (Marc Sazaki) that could be used for MGS studies. Phil and Kristin then performed some trapping studies around Kramer Junction and DTRNA. Kristin suggested that a group of biologists should get together to discuss MGS issues in the late 1990's or early 2000's. CDFW got involved in the second or third year, and took on the lead in about 2002 or 2003. Becky Jones was the early CDFW lead biologist. The 2003 revision of the trapping protocol resulted from MGS TAG input. John Gustafson was the person who stated there would be three trapping sessions to replace the two sessions that were required prior to that. Although not technically the MGS TAG, in 1992 there was a group assembled to discuss Kern County's petition to delist the MGS. This resulted in Gustafson's 1993 status review of the MGS, which concluded it should not be delisted. The Mountain Lion group got involved with a threat of a law suit that took the issue to the state Supreme Court, which denied the listing based on faulty procedure.

Schedule next meeting. We should have the next meeting in the spring, likely in Ridgecrest, at a date to be determined through a Doodle Pole.

These minutes were recorded by Ed LaRue and are subject to his interpretation. They were reviewed by several MGS TAG members, including Phil Leitner and Scott Osborn, prior to being considered finalized.