# Western Riverside County
# Multiple Species Habitat Conservation Plan (MSHCP)
# Biological Monitoring Program

## Los Angeles Pocket Mouse (*Perognathus longimembris brevinasus*) Survey Report 2007

## 12 March 2008

# TABLE OF CONTENTS



# LIST OF TABLES AND FIGURES



# LIST OF APPENDICES

NOTE TO READER:

This report is an account of survey activities undertaken by the Biological Monitoring Program for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The MSHCP was permitted in June 2004. The Biological Monitoring Program monitors the distribution and status of the 146 Covered Species within the Conservation Area to provide information to Permittees, land managers, the public, and the Wildlife Agencies (i.e., the California Department of Fish and Game and the U.S. Fish and Wildlife Service). Monitoring Program activities are guided by the MSHCP species objectives for each Covered Species, the information needs identified in MSHCP Section 5.3 or elsewhere in the document, and the information needs of the Permittees.

While we have made every effort to accurately represent our data and results, it should be recognized that our database is still under development. Any reader wishing to make further use of the information or data provided in this report should contact the Monitoring Program to ensure that they have access to the best available or most current data.

The primary preparer of this report was the 2007 Mammal Program Lead, Bill Kronland. If there are any questions about the information provided in this report, please contact the Monitoring Program Administrator. If you have questions about the MSHCP, please contact the Executive Director of the Western Riverside County Regional Conservation Authority (RCA). For further information on the MSHCP and the RCA, go to www.wrc-rca.org.

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# INTRODUCTION

Los Angeles pocket mouse (*Perognathus longimembris brevinasus*; "LAPM") is a California species of special concern that historically ranged from the San Fernando Valley eastward to the city of San Bernardino and southeast to the Aguanga area of Riverside County (Williams et al. 1993). Typically, LAPM is detected in fine, sandy soils associated with alluvial or aeolian (windblown) deposits, but is currently believed to be in decline because of habitat loss due to agricultural and urban development (Jameson and Peeters 1988, Williams et al. 1993, Dudek & Associates 2003). The current distribution of this elusive species across the Western Riverside County MSHCP Plan Area is not well understood, but is likely limited to patches of intact habitat within larger areas of conserved lands.

Species-specific objectives for LAPM under the MSHCP call for the conservation of 2000 acres of suitable habitat in each of 7 Core Areas: 1) Davis Unit of San Jacinto Wildlife Area (SJWA) – Lake Perris State Park, 2) The Badlands, 3) San Jacinto River – Bautista Creek, 4) Anza Valley, 5) Southwest Riverside County Multi Species Reserve, 6) Potrero Valley, and 7) Temecula Creek. Each Core Area must support a stable or increasing population with at least 30% of suitable habitat occupied, as measured over any 8-consecutive year period (Dudek & Associates 2003). Accurate measurements of LAPM population trends are made difficult by seasonal changes in the detectability of the species. Los Angeles pocket mouse spends much of its life underground, with ephemeral bouts of surface activity offset by intervals of subterranean activity, aestivation, and torpor (French 1976, 1977).

We began surveying monthly for LAPM in February 2006 with the aim of 1) delineating its distribution across Core Areas where we had previously captured the species and 2) defining a pattern of seasonal surface activity. We extended our effort into 2007 at Silverado Ranch and the Davis Unit of SJWA where we had been conducting surveys in 2006. We also collected soil at each trapping grid where we captured LAPM from 2005 to 2007 in an attempt to further describe soil types associated with LAPM-occupied sites.

**2007 Survey Goals:**

A) Define pattern of seasonal surface activity.

B) Delineate LAPM distribution across Core Areas.

# METHODS

We selected monitoring sites at Davis Unit of SJWA and Silverado Ranch in 2006 based on where LAPM were detected during Stephens' kangaroo rat (*Dipodomys stephensi*; "SKR") surveys and personnel training in 2005 (see *Western Riverside County MSHCP Los Angeles Pocket Mouse Survey Report 2006*). We placed trapping grids in the vicinity of original LAPM detections with additional grids set at further distances in an attempt to delineate LAPM distribution. We initially established nine 9 x 9 grids (70 m x 70 m; 81 traps each) at the Davis Unit of SJWA, but focused our 2007 surveys on only 3 of these because LAPM were not detected on the remaining 6 grids and a lack of available personnel required us to streamline our effort (Figure 1). We added a third grid at Silverado Ranch in 2007 because we detected LAPM at this location during 2006 SKR surveys.

We conducted LAPM surveys in 2007 from 22 to 26 January, 20 to 22 February, and 29 to 31 March. We sampled 2 of 3 grids per month at each site based on monthly capture success of 2006 efforts in an attempt to define a pattern of LAPM surface activity over the entire 14-month sampling period (Appendix A). We used 12″ x 3″ x 3.5″ Sherman live traps baited with large white Proso millet and modified with paper clips to restrict trap doors from closing completely and potentially damaging animal tails. We closed traps after checking them at the midpoint of each night (e.g., midnight) and rebaited them the following evening.

Trapping crews followed standard operating procedures developed by the Biological Monitoring Program for animal handling and data collection (Appendix B). In general, we recorded weight (100-g Pesola spring scale), sex, age class (adult, subadult, juvenile), reproductive condition (non-reproductive, scrotal, pregnant, lactating, perforate, plugged), capture history (new, recapture), and trap location of each LAPM. We then marked the ventral side of individuals with a non-toxic marker and released them at their original trap location. Animals that were recaptured during a survey effort were released after sex, reproductive condition, and trap location were recorded. Processing times ranged from 1 to 3 min per animal depending on the animal's capture history. We also processed all non-target Covered Species (e.g., SKR) and marked them with a non-toxic marker. All non-covered species (e.g., deer mouse) were released after recording trap location and species. Field personnel handled animals and recorded data only after demonstrating proficiency during field- and office-based trainings conducted by experienced Biological Monitoring Program staff (Table 1).

We also detected LAPM incidentally while conducting 2007 SKR surveys at the Davis Unit of SJWA (8 to 19 May) and Silverado Ranch (3 to 7 April, 9 to 14 July, 30 July to 4 August). We sampled SKR populations in these areas using 7 x 7 (90m x 90m; 49 traps each) grids and modified Sherman live traps (see above), baited with large white Proso millet.

**Table 1.** Western Riverside County MSHCP Biological Monitoring Program field staff conducting Los Angeles pocket mouse surveys in 2007.

| Name | Agency | Position |
|---|---|---|
| Bill Kronland | Regional Conservation Authority | Mammal Program Lead |
| Angie Coates | Regional Conservation Authority | Field Biologist |
| Ariana Malone | Regional Conservation Authority | Field Biologist |
| Carol Thompson | Regional Conservation Authority | Field Biologist |
| Debbie De La Torre | Regional Conservation Authority | Field Biologist |
| Lynn Miller | Regional Conservation Authority | Field Biologist |
| Rosina Gallego | Regional Conservation Authority | Field Biologist |
| Ryann Loomis | Regional Conservation Authority | Field Biologist |
| Valerie Morgan | Regional Conservation Authority | Field Biologist |
| Ricky Escobar | Regional Conservation Authority | Field Biologist |
| Espie Sandoval | Regional Conservation Authority | Field Biologist |

Trapping crews followed the same standard operating procedures used for trapping LAPM and handled animals only after being trained in demonstrating proficiency at handling procedures.

## Soil Analysis

We collected 3 soil samples at each of 16 trapping grids where we detected LAPM between 2005 and fall 2007. Nine of the 16 sampled grids were designed to target LAPM, with 8

of these located at the Davis Unit of SJWA and 1 at Silverado Ranch. We collected the other 7 sets of soil samples on SKR grids at Silverado Ranch ($n$ = 4), Davis Unit of SJWA ($n$ = 2), and Lake Perris State Park ($n$ = 1; where LAPM was detected in 2006). Field personnel visited each site between March and October 2007 after completing training on soil collection methods conducted by Kerwin Russell, Natural Resources Manager with the Riverside Corona Resource Conservation District.

We collected soil cores at the northeast corner, southwest corner, and center of each grid with a 2-inch-diameter auger at a depth of 1 m. We collected soil at a 60-cm depth when substrate (e.g., rock) prohibited the auger from reaching 1 m, and shifted the sample location up to 1 m from the original site and within the grid perimeter when 60 cm could not be reached. We removed organic material from each sampled location before collecting soil cores, and placed auger contents from each location into uniquely labeled cloth bags.

We allowed soil samples to dry completely before sifting them through 6 Hubbard sieves (sieves 5, 10, 35, 60, 120, and 230), and then determined the percent total weight of sand (sieves 5, 10, and 35), silt (sieves 60 and 120), and clay (sieve 230 and bottom pan) comprising each sample with a 200-g OHAUS digital scale. We averaged percent total weights across the 3 samples taken on each grid and used these values to classify soil at each site where LAPM were detected according to a standard U.S. Department of Agriculture texture triangle (Figure 2). We inadvertently sifted soil samples together from 2 Silverado Ranch grids, and subsequently disregarded these results from our analysis.

## RESULTS

We captured only 1 LAPM on single occasions at both the Davis Unit of SJWA and Silverado Ranch in January, and did not detect the species at either site in February or March 2007 (Table 2). We also did not capture any individuals on our most productive grid from 2006 (SJWA01). These results contradict our 2006 results when we were able to capture LAPM throughout the year. Consequently, we were unable to discern a pattern of LAPM above-ground activity.

We had slightly greater success capturing LAPM incidentally during SKR-targeted surveys, with 3 individuals detected on 2 SKR grids at the Davis Unit of SJWA in May, and 11 animals captured on 4 SKR grids at Silverado Ranch in July and August (Figure 1). We had not captured LAPM on 2 of these grids at Silverado Ranch prior to July 2007, suggesting that our previous assumptions of species distribution based on 2006 surveys at Silverado Ranch were erroneous (see *Western Riverside County MSHCP Los Angeles Pocket Mouse Survey Report 2006*). Our incidental detections at Silverado Ranch also support the notion that seasonal changes in LAPM detectability probably affect population estimates. Indeed, 2 of 4 SKR grids where LAPM were detected in July and August overlapped the footprints of the 9 x 9 grids that failed to capture the species in February and March of the same year.

**Table 2.** Species detections on 9 x 9 grids targeting Los Angeles pocket mouse at the Davis Unit of San Jacinto Wildlife Area and Silverado Ranch from January to March 2007.

| Site | Grid | Species | 22-26 January | 20-22 February | 29-31 March |
|---|---|---|---|---|---|
| Davis Unit of San Jacinto Wildlife Area | SJWA01 | **Los Angeles pocket mouse** | - | - | - |
| | | San Diego pocket mouse | 3 | 2 | 2 |
| | | Stephens' kangaroo rat | 2 | 2 | 3 |
| | | deer mouse* | 3 | 2 | - |
| | | cactus mouse* | 3 | - | - |
| | SJAW07 | **Los Angeles pocket mouse** | Not Sampled | - | Not Sampled |
| | | San Diego pocket mouse | | 2 | |
| | | Stephens' kangaroo rat | | 2 | |
| | | deer mouse* | | 2 | |
| | SJWA08 | **Los Angeles pocket mouse** | **1** | Not Sampled | - |
| | | San Diego pocket mouse | 3 | | 1 |
| | | Stephens' kangaroo rat | 3 | | 3 |
| | | deer mouse* | 1 | | - |
| | | cactus mouse* | 1 | | - |
| Silverado Ranch | SL01 | **Los Angeles pocket mouse** | - | - | Not Sampled |
| | | Stephens' kangaroo rat | 2 | 1 | |
| | | deer mouse* | 2 | - | |
| | SL02 | **Los Angeles pocket mouse** | **1** | - | - |
| | | Stephens' kangaroo rat | 2 | 2 | 3 |
| | | Dulzura kangaroo rat | 1 | - | 1 |
| | SL03 | **Los Angeles pocket mouse** | Not Sampled | Not Sampled | - |
| | | Stephens' kangaroo rat | | | 1 |

*Individuals of these species were not marked, therefore quantities indicate number of occasions trapped rather than individuals captured.

### Soil Classifications

We classified soil as sandy loam on 50% ($n$ = 8) and loam on 38% ($n$ = 6) of the grids where LAPM were detected (Table 3). The remaining 12% were evenly split between silt loam ($n$ = 1) and loamy sand ($n$ = 1). Average percent of sand comprising samples across all grids was 54.2% (SE = 1.9), and ranged between 73.3% (Silverado Ranch) and 40.7% (Davis Unit of SJWA). Average percent clay across all grids ($\overline{x}$ = 7.8%, SE = 0.7) ranged from 12.8% (Davis Unit of SJWA) to 3.5% (Silverado Ranch), and average percent silt ($\overline{x}$ = 37.9%, SE = 1.5) ranged from 51.7% (Davis Unit of SJWA) to 24.2% (Silverado Ranch).

## DISCUSSION

Our 2007 survey goals were to describe the distribution of LAPM in Core Areas where they had been previously detected and to define a pattern of seasonal surface activity. Lack of personnel prevented us from sampling a sufficient number of grids to address distribution and there was no apparent month-to-month pattern of activity. Transition between periods spent below and above ground may have been triggered by an environmental cue rather than some internal biological clock. Daytime heating of upper soil layers may have stimulated LAPM to emerge from burrows and remain active at or near the surface until ambient temperatures fell or

rose across some threshold (French 1977). Food availability may have also influenced the duration that LAPM remained above ground by extending surface activity into periods when temperatures would have otherwise required animals to go into subterranean bouts of torpor or aestivation (French 1976).

**Table 3.** Number of grids with Los Angeles pocket mouse detections classified by 4 soil-texture categories*.

| Site | sandy loam | silt loam | loam | loamy sand |
|---|---|---|---|---|
| Davis Unit of San Jacinto Wildlife Area | 6 | 1 | 5 | - |
| Silverado Ranch | 2 | - | - | 1 |
| Lake Perris State Park | - | - | 1 | - |

*Soil Classifications: loamy sand: 70-90% sand, 0-30% silt, 0-15% clay; sandy loam: 43-85% sand, 0-50% silt, 0-20% clay; loam: 23-52% sand, 28-50% silt, 7-27% clay; silt loam: 0-50% sand, 50-88% silt, 0-27% clay.

Our soil analysis lends support to the presumption that LAPM occurred primarily on fine, sandy soils. Indeed, clay comprised only a minor component of each sample, while sand made up over 50% of soil composition on most grids. Still, our picture of LAPM distribution across soil types in Core Areas remains incomplete as we continued to detect animals in areas previously believed to be unoccupied. We believe that there is a need to develop an LAPM habitat model based on current knowledge of the species distribution, and to refine this model with a sufficient number of sampling grids distributed across the landscape to apply mark-recapture analyses.

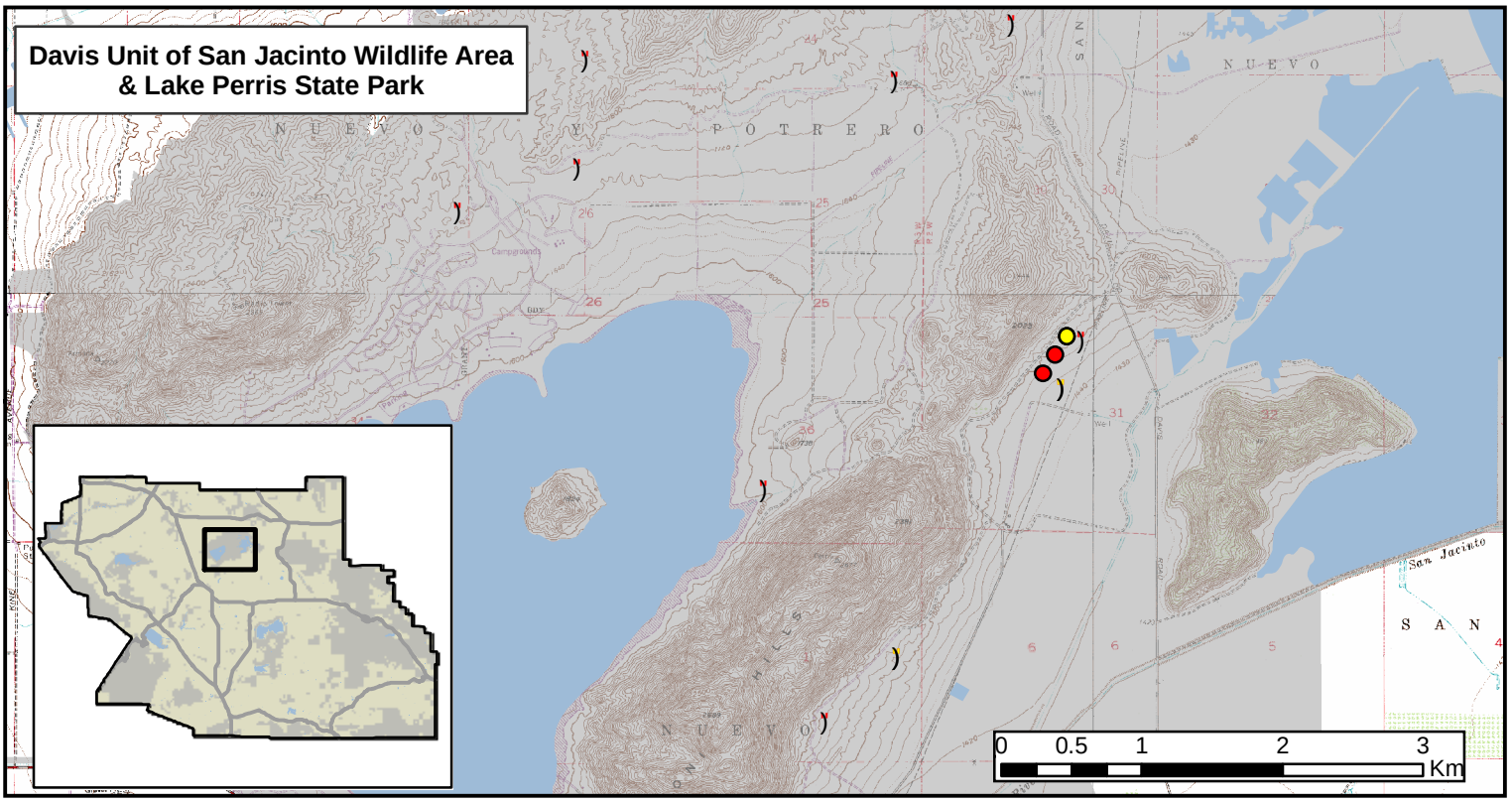
**Recommendations for Future Surveys**

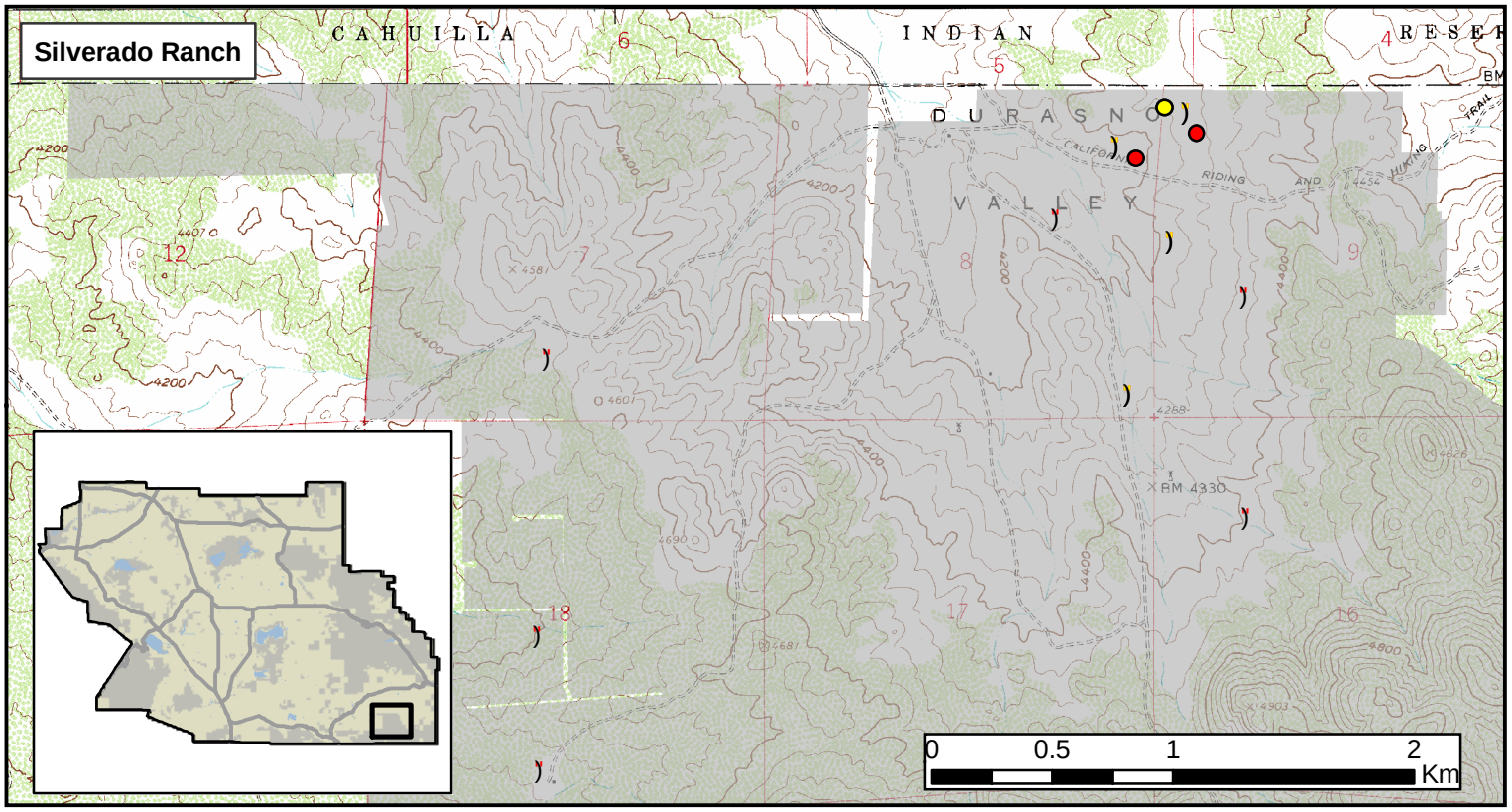
Habitat models and occupancy estimates should be based on data collected during periods when LAPM is most detectable. Therefore, we will focus future LAPM monitoring effort on modeling probability of detection with a closed-capture occupancy model included in Program MARK (White and Burnham 1999). This model relies on grid-level presence/absence data to adjust the percent occupancy of sampled grids using a probability of detection derived from maximum likelihood estimation (MacKenzie et al. 2002). Furthermore, using Program MARK will enable us to incorporate covariate data (e.g., soil temperature) into our model and examine the environmental conditions that can best explain LAPM activity and distribution.

We will also develop a working habitat model based on Biological Monitoring Program and historical detections of LAPM in western Riverside County (Dudek & Associates 2001). We will use GIS software to define soil and vegetation types where LAPM has been detected, and then identify similar habitats across conserved lands of the Western Riverside County MSHCP. We will focus future surveys on a single contiguous piece of conserved land that fits our habitat model in order to test our study design of modeling occupancy and detectability.

We will sample monthly from March to October on >30 randomly selected sites at the Davis Unit of SJWA and Lake Perris using 5 x 5 grids with 7-m spacing. Our 5-night survey efforts will occur during the fourth week of each month. We will record nightly soil temperature, measure vegetation attributes (e.g. percent ground cover), and classify soil texture at each grid, and use these as covariates when modeling occupancy rates and probability of detection. We plan to use the results from covariate models as a baseline indicator of LAPM surface activity at other Core Areas during subsequent surveys.

Figure 1. Los Angeles pocket mouse detections on 9x9 and 7x7 grids, 2007.




**Legend**

Lakes

Conservation Area

Planning Area Boundary

9x9 Grids

LAPM Detected

LAPM Not Detected

7x7 Grids

LAPM Detected

LAPM Not Detected

Date: 29 January 2008
Created By: Bill Kronland
UTM Nad 83 Zone 11
MSHCP Biological Monitoring Program

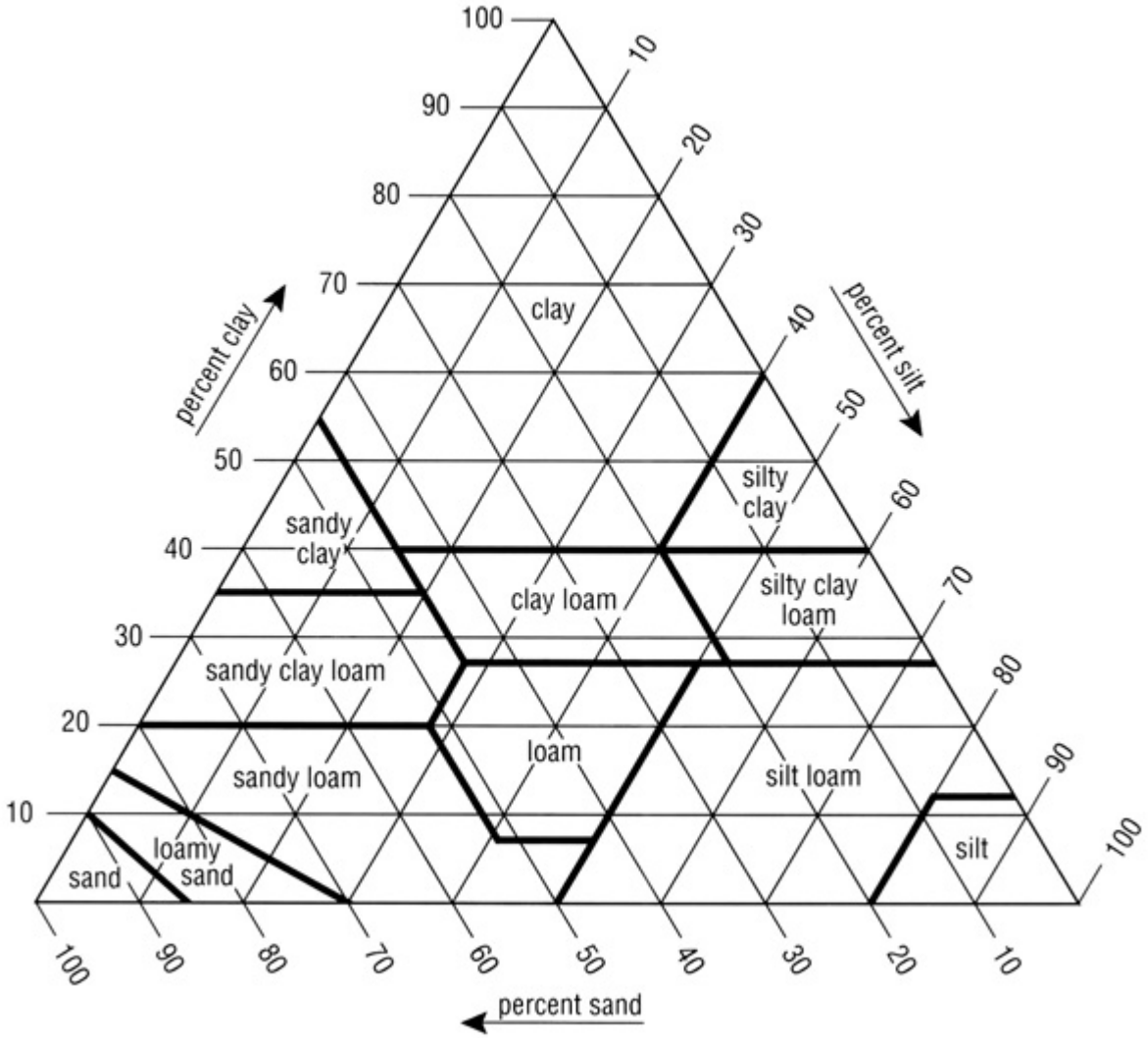



**Figure 2.** Soil texture triangle used to classify soils sampled on small mammal grids where Los Angeles pocket mouse was detected from 2005 to 2007 (*source*: USDA Natural Resource Conservation Service).

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# Appendix A: Number of Los Angeles pocket mouse detected during monthly surveys at Davis Unit San Jacinto Wildlife Area (February to December) and Silverado Ranch (October to December) in 2006.

Davis Unit of San Jacinto Wildlife Area

| | Grid Number | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Feb-06 | 3 | ND | 1 | ND | - | - | - | - | - |
| Mar-06 | 1 | - | ND | ND | - | - | - | - | - |
| Apr-06 | 4 | 2 | - | - | - | - | - | - | - |
| May-06 | 3 | - | - | - | 4 | 3 | - | - | - |
| Jun-06 | 5 | - | - | - | 5 | 5 | - | - | - |
| Jul-06 | 1 | - | - | - | - | - | 5 | 5 | 4 |
| Aug-06 | - | - | - | - | - | - | - | - | - |
| Sep-06 | 2 | - | - | - | - | - | 2 | - | - |
| Oct-06 | 3 | - | - | - | - | - | 2 | - | - |
| Nov-06 | ND | - | - | - | - | - | - | 1 | - |
| Dec-06 | ND | - | - | - | - | - | - | - | - |

Silverado Ranch

| | Grid Number | |
|---|---|---|
| Month | 1 | 2 |
| Oct-06 | ND | 1 |
| Nov-06 | ND | ND |
| Dec-06 | ND | - |

ND: grid surveyed, but Los Angeles pocket mouse was not detected.

- : gird not surveyed.

# Appendix B: Western Riverside County MSHCP Monitoring Program
# Standard Operating Procedures: Small Mammal Trapping

These are the standard procedures developed by the Western Riverside County MSHCP Biological Monitoring Program for trapping small mammals covered by the Conservation Plan. Individual projects may have specific procedures and requirements that vary from those described here. Variations from these standard procedures will be described in the Methods section of individual project protocols.

## I. Site Selection

Site selection criteria will be project specific, but generally involve the use of Geographic Information Systems (GIS) software (e.g. ArcGIS) to generate random points based on the current available knowledge of target species occurrence. Universal Transverse Mercator (UTM) coordinates will be assigned to each random point and field crews will use a Global Positioning System (GPS) unit to navigate to each site and verify that they conform to individual project selection criteria (e.g. species specific suitable habitat). Grids will be placed at each random point and consist of only one vegetation community (e.g. grassland) and soil type (e.g. sandy loam) specific to the target species to be surveyed. Grids will also be placed at least 100 m from each other and at least 70 m from vegetation communities that differ from those found on the grid site to avoid edge effects.

## II. Setting out Trap Lines

**Equipment:**

- Modified Sherman traps
- Millet
- List of random UTM points
- Ant powder
- Transect tape 100m
- Flagging/Pin flags
- Sharpie pens
- Trap carrying bags
- Handheld GPS unit/ Compass
- Trash bags

**Trap Grid Layout:** Grids will vary in size according to project specific goals, but will be installed following identical procedures regardless of design. Grids will be placed so that the area sampled comprises a homogenous vegetation community with random points representing southwest corners. We will adjust grid corners and record the new UTM coordinates in the event that the random point would result in a grid footprint covering multiple vegetation types. Diagonal distance between corners will be measured to ensure the gird is square ($a^2 + b^2 = c^2$), and the north-south and east-west lines will be marked with 100-m tapes. Pin-flags will be labeled and placed according to location within the grid and project specific intervals (e.g. SKR = 15 m). Trap lines will be labeled alphabetically and increasing eastward, with trap stations within a line labeled numerically (e.g. A1, A2…A7) and increasing northward (Figure 1). Note:

the number of trap lines within a grid and the number of stations on a line will differ according to project specific goals.

**Trap Placement and Setting:** Unfold the trap and push the front door until it engages with the treadle tab. The front door can easily be found by noticing that there is a crease on the left side of the trap when the door is facing you. There is also a "lip" at the top of the same side.

Lightly tap on the side or bottom of trap. A light tap will be about as hard as if you were trying to make a spider fall off the side of the trap. If the trap is set properly the door should snap shut, if it does not, adjust the sensitivity of the trap by pulling the tab forward or pushing it backward. Pushing back will make the door more sensitive, a forward pull will make it less

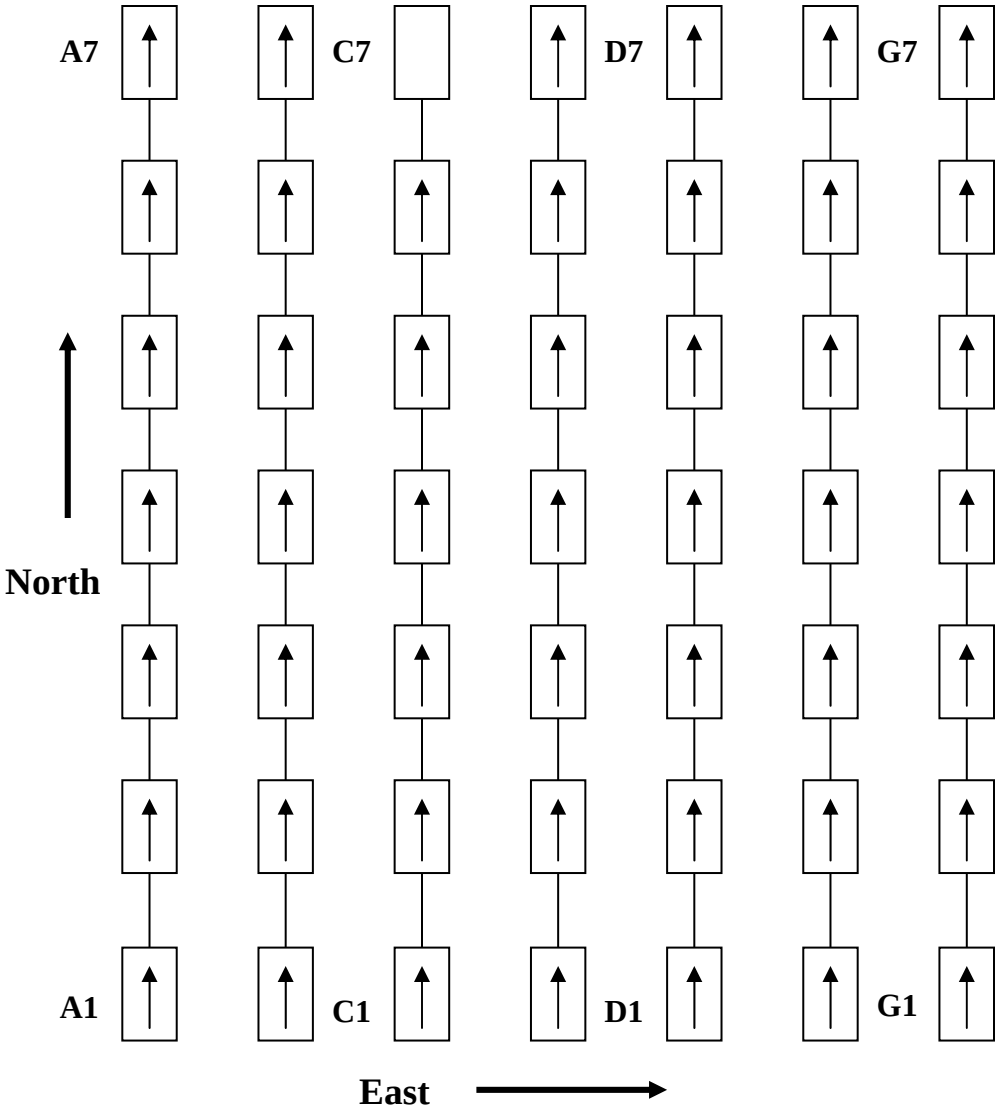


Figure 1.Grid design (7x7) for trapping small mammals. Boxes represent individual traps and arrows indicate direction that open doors face. Traps are labeled alphabetically and increasing to the east, numerically and increasing to the north.

sensitive. Please ask if you cannot find the tab.

Place the trap on the ground at the station with the opening facing northward once you are sure the sensitivity is correct (placing all the traps facing the same direction reduces the number of variables). Traps should be placed on a level surface so that the trap does not teeter and the trap entrance is flush with the ground. Use your boot to scrape out an even space if necessary. Traps should be placed parallel to the trap line as indicated in the trap placement diagram (Figure 1). Take about 1 tablespoon of millet and toss most of it into the trap. ***Make sure that the millet is in the back of the trap, behind the treadle***; otherwise an animal is likely to be too close to the door when it shuts and damage its tail

**Ant Caution:** Ants can kill animals in a trap. Sprinkle provided ant powder liberally under and in front of traps ff ants are present. Make sure that there are no ants inside the trap before you rebait it. If you are doing the last trap check of the day/night and there are ants, apply ant powder unless the grid is being closed. Do not set a trap if the ants are particularly thick and you feel they are too numerous for the powder to be effective. Be sure to record that the trap was not set.

## III. Checking Traps

Note: All of the procedures described below require training and experience. If you are not comfortable with the training you have received, or you are fearful that the methodologies used at your last job are not the ones used here, it is your responsibility to alert the Mammal Program Lead (Bill) or the Monitoring Program Coordinator (Karin). If you are scheduled for an activity you do not feel qualified to conduct, alert Karin or Bill as soon as possible. Do not ever conduct a procedure you are not comfortable with.

**Equipment per handler:**

- 1 Headlamp per person
- 3 Pesola® Scales: 20g, 100g and 300g
- 2 Rulers (1 short 1 long, 0 at edge)
- 1 Kestrel per handler
- 1 Manicure scissors for hair clipping
- 4 Animal handling bags (Ziplock®)
- Datasheets (>2 per grid, extras better)
- Grid quality control sheets (>1 per grid)
- Animal Mortality Record
- Clipboard 1 per recorder
- Several pens
- Species field guide/key
- Digital camera
- Waste bags for used millet
- Ant powder (pre approved only)
- Backpack
- Extra batteries
- Mag light flash light

Traps will be checked either once or twice per night. The first check (i.e. midnight check) will be approximately 5 hours after sunset, the second check will be just before dawn. Traps may be closed after the midnight check, but the midnight check can not be skipped in favor of a morning only check.

While checking trap lines, note pin-flag number and whether each trap was open, closed and empty, or closed with a capture. Make note of the status of each trap in the appropriate box

on your trap-check quality control sheet to ensure that no traps are missed. Mark "O" for open traps, "C" for closed with no capture, "R" for robbed traps, (traps that are open with no bait inside), and use the four-letter species alpha code for traps closed with an animal inside. Be sure to physically pick-up each trap to check for bait and ensure that treadles are set properly. Only record the status of the traps you or your handling/recording partner checked. Adjust the treadle on robbed traps.

When there is no animal in the trap: If the trap is open, visually check to see there is not a pocket mouse in the trap. We have captured several pocket mice in open traps when a surveyor picked up the trap. Additionally, place your hand inside the trap and push the treadle to the bottom of the trap to ensure that no mice are hiding under the treadle. Never close a trap without looking inside and checking the treadle first.

Pick up all open traps and dispose of the bait in your waste bag if the grid is being closed, otherwise reset and bait traps if another check is to occur later that night. Dispose of excess bait and place closed, empty traps *perpendicular* to the trap line if it is the final gird check of the night and grids will be opened the next day.

Pick-up closed traps and gently shake with the door facing upwards so that the contents move to the back of the trap. This will ensure that very small animals (e.g. pocket mouse) will not be crushed when you open the trap door. Slowly open traps that seem too light to contain an animal to ensure that a pocket mouse or small *Peromyscus* is not inside. Gently depress the treadle to check for animals underneath. Harvest mice, pocket mice and determined *Peromyscus* fit easily under the treadle. Fold traps and put them into a trap bag, or return it to the trap station as appropriate if you are absolutely certain that they contain no animals.

When there is an animal in the trap: If the door is closed pick up the trap and take notice of the weight. If it feels like an animal is inside follow the directions below. Use caution as occasionally non-mammal species may be captured. See rattlesnakes below.

To remove the mammal from the trap, hold the trap parallel to your body, door facing upward and the side of the trap with the split panel facing you. One hand should be on each side of the trap. Your right hand will be holding the bottom of the trap. Place a Ziplock® bag over the top of the trap. Pull the crease of the bag against the inside right corner of the trap. Wrap the excess portion of the bag around the trap away from you and hold it securely against the trap with your right hand. Open and extend the bag so that the animal will easily fall into it. Gently shake the trap so that animal moves to the back of the trap and will not be crushed by the door as you open it inwards. With your right hand through the plastic bag, open and hold the trap door. Invert the trap quickly and firmly with a downward shake so that the animal falls into the bag. Be firm but remember you have a live animal in the trap. As soon as the animal drops into the bag quickly grasp the plastic bag and form a tight barrier between the animal and the trap. Remove the bag completely from the trap. Watch for trap wires hooked into the bag.

Be aware of ants! Treat as needed as specified above.

Missing Traps: Make a methodical search if you can not find a trap at a station. Do another search once you are finished checking the grid and make note for bait and trapping crews if the

trap can not be located. You should look until you either find the trap or you are very certain it is not in the area. Involve other crew members in the search if they are available. If the trap can not be found and there will be a morning crew, leave notice for them so they can search in the daylight. You should be very reluctant to leave a trap unaccounted for. Any animal captured will die and if a predator has moved the trap and will likely return for a second helping.

If you suspect there is a Rattlesnake in the trap: The first thing you will notice when a snake is in a trap is that is feels abnormally heavy. Tap on the trap lightly and listen for a rattle if you are uncertain if a snake is in the trap. Note, however, that rattlesnakes tend to not rattle, even when disturbed, if the ambient temperature is particularly cold. Do the following if you hear a rattle or are otherwise certain that a rattlesnake is in a trap: 1) Look around and choose location that is free of obstacles. 2) Place the trap on the ground with the door facing you. 3) Pull the pin out of the bottom-left side of the trap being careful to mover backwards away from the trap. 4) The trap should collapse and the snake will be free to exit. 5) *Cautiously* use a shovel handle (located in field vehicle) to collapse the trap from a safe distance if needed (note that rattlesnakes can strike to distance of 1/3 to ½ their body length!). You can turn the trap upside down if that makes it easier for you to remove the pin. This procedure will free all snakes in a trap, but you need to be alert and prepared to move when you are releasing a rattlesnake. *Do not attempt to remove a rattlesnake if you are at all uncomfortable with the procedure*. Rather, ask an experienced crew member for help.

Make note of the incident on the data sheet in the notes section. Either repair the trap in the field or replace it with an extra one and repair it in the office.

## IV. Filling out the datasheet

**Trap ID:** Record the letter and the number of the trap where you catch an animal under 'Trap ID' on the data sheet.

**Weighing the animal:** Be sure to zero the Pesola® scale each night before attempting to weigh animals. Look at the scale while it is empty and see that it reads zero. If it does not, use the knob at the top of the scale to adjust it. Use the scale to weigh the animal and the bag. Fold the bag down then sideways and attach the clip of the scale in the center. The bag can also be twisted and held closed with the jaws of the scale. Wait until the animal is calm before reading the scale. Record this weight in grams under 'Total wt' on the data sheet. Save bag contents to weigh later.

**Handling the animal:** Place the bag with an animal inside against your thigh or the ground and trap the animal in a section of the bag without allowing its nose to get into a corner. Grasp the animal firmly by the scruff of the neck with the bag between your fingers and the animal. Unfold the bag to expose the animal. Identify the genus and species, mark the animal if appropriate, as discussed below, take the standard measurements as listed below and record them on the data sheet. Some species may require only one or two of the measurements. You will memorize these. Animals may also be color marked on their ventral side with a non-toxic marker, or may also receive a more permanent unique tag (e.g. PIT tag, ear tag). *NOTE: you may find it easier to handle the animal while outside of the plastic bag. This method is also acceptable.*

Recaptured animals: An animal is considered a "recapture" if it was previously captured during the particular survey effort that you are trapping. Recaptured animals are identified by the color mark on their ventral side that is unique to a particular trapping effort. Other marks will vary from project to project and may even vary from night to night. Be sure you are clear on the marking scheme being used anytime you are trapping. For recaptured animals, record the species, sex, and reproductive condition only. Marking is further discussed below.

Incidental deaths: Record the species and sex and under fate record "dead" if an animal is found dead in a trap. Place the deceased animal in two Ziploc® bags (one inside the other, both zipped closed) if it is a Covered Species. Bring the animal back to the office to be placed in the freezer for later disposition. Write the date, site, station and species on the bag with a sharpie. Fill out a mortality record form located in the trap kits for each dead animal or incident while you are in the field. Place the completed form on the Mammal Program Lead's desk when you return to the office. If the dead animal is a listed species (SKR, SBKR), also put a copy of the Mortality Record on Karin's desk. Designate one crew member to call Karin at home on Saturday morning if the mortality occurs on a Friday night. We are required to notify the Fish and Wildlife Service within 24 hours of finding a listed animal that is dead.

Incidental births: Place the mother on the ground and watch her if she enters a burrow if an animal gives birth while in the trap. Place the babies in the entrance of that burrow and leave them alone. Place the babies outside the trap and record the incident in the notes section on the data sheet if you do not know where she went.

Hot or Cold animals: Place cold animals (lethargic and unresponsive) in a pocket close to your body until it is revived. You can bring the animal into a heated vehicle if you are really worried, but be careful about placing the animal directly in front of heater vents. They are small and can overheat quickly. Release the animal at the station where it was captured once it begins to warm up and move around. An animal that is overheated will also be lethargic and may have moisture around its mouth. Cool it down an overheated animal by wetting its fur with plain water and fanning or blowing on the animal. Record the species and sex of the animal and make note of the incident and the outcome.

**Marking the animal:** Animals are marked by injecting a PIT tag, trimming fur, applying an ear tag, or coloring with a non-toxic marker. Always be clear about the marking method being used when you are checking traps or recording data.

Trimming fur: Mark the animal by clipping a small amount of guard hair on the right hind quarter (or other identified area). Though it is not necessary to clip down to the skin, the mark must be obviously visible. Other clipping patterns may be used (different location on the animal) you will be informed if this is necessary. Circle on the data sheet yes 'Y' or no 'N' for hair sample. Only Mark yes if a hair sample is collected. Place the collected hair in a coin envelope and record the following on the envelope: station number, grid name, date, morning or midnight trap check.
Marker: Write on the ventral surface of the animal with a specified color.

PIT tagging: See separate written instructions. Do not attempt this procedure without training and permission.

**Identify the species:** You should be comfortable with identification of local small mammal species. Use the field guide included in your mammal packet to help with identification as needed. You can also consult crew mates if there is confusion. Record the species on your data sheet the 4 or 6 letter code. Species codes are included in your mammal packet if you forget one. If you cannot identify a species, take and record all standard measurements, and take photographs of the animal for later identification. Do not spend too much time on this task. Record the capture as new or recapture on the data sheet.

**Sexing the animal:** Males and females can be differentiated using the following cues:

- Look first for an enlarged scrotum or signs of lactation (bare skin around enlarged nipples).
- Males have a greater distance between anus and genitals than females (in females the genitalia is typically within 1-2 mm of the anus). The skin between the anus and genitals tends to be hairless in females.
- Check for baculum: Using your finger or the tip of a pencil, gently push the genitalia upward (toward the animal's head). If a tiny boney spur protrudes from the genitalia, the animal is a male. Record the 'sex' on the data sheet.

**Reproductive status of the animal:** The categories of reproductive status are: scrotal, or not reproductive for males; pregnant, perforate, lactating, plugged or not reproductive for females. Record the status on the data sheet under 'condition'.

Females: Note if the individual is lactating by the presence of enlarged nipples with an area of bare skin immediately surrounding the nipple. Large extended abdomen indicating possible pregnancy. Perforate means the vagina is open. Plugged means a copulatory plug is present. This is a mucous plug that forms in the vaginal orifice a few hours after mating. It looks like a big mucus scab over the vaginal area.

Males: Look for the presence of an enlarged, deflated, or small wrinkled scrotum in males. Any visual indication of a scrotum is to be considered a reproductive individual.
**Age:** Note the age as juvenile 'J' or adult 'A' depending on pelage. Juveniles of all species are smaller and usually quite gray. They may appear to have large ears and feet in relation to the body size.

**Measuring the animal:** Be sure you are comfortable with all of these procedures. We follow *Ingles*, Mammals of the Pacific States. See attached Fig.A1, from p. 448.

Tail length: measure from the dorsal side (top) to the end of the tail bone (not the end of the hair).

Hind foot: Measure from the heel to the tip of the longest claw.
Ear: Distance from notch at front base of ear to distal-most border of the fleshy part of the ear. Do not push on or deform the ear with your ruler.

After processing the animal, remove it from the bag and gently release the animal by placing it on the ground at the trap station where it was captured. Weigh the bag and the contents and record that weight under 'bag wt'. Do not remove millet, waste, etc. from bag before obtaining bag weight. Carry a waste bag with you and after weighing the contents and the bag place the waste into your waste bag. The bag is then reused for the next animal unless it is torn or soiled. Record the fate of the animal as 'R' released, 'E' escaped, or 'D' dead on the data sheet.

**Minimum Measurements**: In most cases take all measurements on all animals. However, sometimes due to weather conditions, personnel shortages or other legitimate reasons minimum data may be recorded. At a minimum record species, sex, and reproductive status. If there is a crisis, you are authorized to make decisions about what to record and how to protect animals. See separately provided Mammal Trapping Guidelines for weather guidance.

The following measurements can be used to identify species. In most cases they should be collected, as a minimum.

- *Chaetodipus* – weight , ear at notch, hind foot length
- *Peromyscus* – all measurements on data sheet
- *Neotoma* – weight, color of top of hind foot, color of the base of hairs on the throat
- *Dipodomys* – weight, ear length, number of toes
- *Reithrodontomys* – weight, spots on ear bases? Grooves on upper incisors?
- *Microtus* – weight
- *Perognathus* – weight, spots on ears? Defines if LAPM

All other creatures, record species if known and release. Pictures should be taken if time permits.

**Closing Traps:** Follow check procedures but do not re-bait or re-set the traps. Instead, empty all bait and waste from the trap into a designated trash bag, close the trap and leave the trap perpendicular to the trap line. Treat for ants as needed.

**Grid quality control:** Once all traps are checked, verify that all traps have been checked by reading through the control sheet out loud. Each party the checked traps will say out loud which traps they checked starting with trap A-1 and finishing at the last trap (G-7 or H-8 or what ever). Sign the sheet recording that you verified that all traps had been checked.

After you are sure that all of the traps have been checked, count robbed and closed-but-empty traps and subtract them from the total number of traps on the grid. Record that number as the number of trap nights.

## V. Picking up Trap lines

**Equipment:**

Shoulder bags for carrying traps and pin flags
Rubber bands/Trap boxes
Waste bag for emptying traps

Collect traps as you check grids on the final check of a survey effort. Empty remaining millet and waste into a trash bag, and collapse the trap for easy carrying in the shoulder bags. Pin flags are to be left in the field, only during ongoing projects. Flagging placed to mark trails must be picked up on the way out of the grid for the last time during that trapping session. If we are using the grid again, the trail can be remarked when the grid is reopened. Count the traps at the end of the collection effort. Make sure all of the traps are accounted for after collection at each grid.

Sort them by letter and place rubber bands around sorted groups if they are to be collected. Again, make sure you have them all. We do not want to be responsible for trash in the Conservation Area.

## VI. Cleaning and storing traps

All traps must be cleaned and disinfected before being between sites. Make sure all millet and waste material are knocked out of the traps before soaking them in a 10% bleach and water solution for 10 minutes. Thoroughly rinse the traps with water and allow them to air dry outside preferably in the sun. Place the folded traps into the plastic buckets with lids once dry.