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

Stephens' Kangaroo Rat (*Dipodomys stephensi*)
Survey Report 2006

Photo: B. Moose Peterson

April 23, 2007

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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 2006 Mammalogy Program Lead, Debra De La Torre. 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

The Stephens' kangaroo rat (*Dipodomys stephensi*, "SKR") is federally listed as endangered and state listed as threatened. This species occupies a relatively narrow geographic range, being restricted to Riverside County and north-central San Diego County. It is relatively widespread throughout the MSHCP Plan Area, with the main blocks of occupied habitat concentrated in several Core Areas. SKR are primarily found in grasslands and open shrublands.

The MSHCP species objectives for Stephens' kangaroo rat requires species-specific monitoring and management to ensure its long-term viability in the Plan Area, including tracking population densities and maintaining sparse, open grassland habitats. Seven Core Areas for SKR are identified in the MSHCP and species objective 3 for SKR states:

> *"within the MSHCP Conservation Area, maintain at least 30 percent of the occupied habitat at a population density of medium or higher (i.e. at least 5-10 individuals per hectare; O'Farrell and Uptain, 1989) across all Core Areas. No single core area will account for more then 30 percent of the total medium or higher population density area."* (Dudek & Associates 2003).

Despite the monitoring that has occurred under existing conservation efforts, there are still large gaps in our knowledge of the population dynamics of SKR (Diffendorfer and Deutschman 2002). In their analysis of monitoring efforts pertaining to the Stephens' kangaroo rat, Diffendorfer and Deutschman (2002) stated that "effective management of SKR requires knowledge in two main areas: Understanding patterns of population change through time and across space (i.e., what/where?) and understanding the biological processes driving these changes (i.e., how/why?)". In 2006, the Riverside County Habitat Conservation Agency (RCHCA) began a 3 - 5 year study to collect data to understand both patterns of population change through time and the biological processes driving those changes in SKR populations at the Estelle Mountain and Steele Peak Reserves. The Biological Monitoring Program participated in the study by collecting data at 4 other reserves within the Conservation Area following the same seasonal timing and trapping protocols as the RCHCA. This report only reports on efforts by the Monitoring Program. The goals of the study are stated below.

Survey Goals

A) The Biological Monitoring Program is participating in a RCHCA study to:
1. Implement and refine the monitoring protocol proposed by Diffendorfer & Deutschman (2002), including:
    a. estimating population sizes 4 times a year at 4 locations across the range of SKR within the Conservation Area
    b. assessing the relationship between burrow density and SKR population size

B) In addition to the above goals the Biological Monitoring Program goals are as follows:
1. Collect presence/absence data for other covered small mammal species that co-occur with SKR

2. Develop and refine the vegetation protocol to collect data that will characterize the vegetation structure and species diversity at each trapping grid while also gathering information that may be correlated with SKR presence and abundance

METHODS

Protocol Development

The protocol used for surveys in 2006 was based on recommendations made by Diffendorfer and Deutschman in: *Monitoring the Stephen's (sic) Kangaroo Rat: An Analysis of Monitoring Methods For Future Monitoring* (2002). Grids were established as a 7 x 7 array (49 traps) with traps spaced 15m apart. Each trapping session lasted 3 nights, and grids were surveyed seasonally (spring, summer, fall, winter) beginning in summer 2006 (the winter and spring 2007 surveys will be covered in a future report). The MSHCP protocol did not incorporate all aspects of the proposed Diffendorfer & Deutschman (2002) proposed protocol. Exclusions included estimating demographic processes with 15 x 15 grids (225 traps), as this approach failed to address SKR species objectives. BACI (Before, After, Control, Impacts) experiments to identify environmental relationships are addressed using a vegetation survey protocol (Appendix A) that was developed by a Monitoring Program Lead Biologist for this project. Data gathered from this study are expected to contribute to our understanding of variables affecting SKR populations. A protocol was also developed for Passive Integrated Transponder (PIT) tagging of SKR, in order to facilitate unique marking of individuals and to document recaptures (Appendix B).

Personnel and Training

All field crew personnel studied mammal skins and relevant mammal field guides. Crew members were trained in the field to differentiate SKR from the similar and co-occurring Dulzura kangaroo rat (*Dipodomys simulans*; "DKR"). Habitat characteristics known to be important to SKR were also taught in the field. Training of crews in 2006 was conducted by MSHCP staff that were trained in 2005 by the CDFG, USFWS, and Steve Montgomery (SJM Biological Consultants). Methods for vegetation surveys were taught in the field by the Monitoring Program Botany Program Lead. PIT tag training was taught both in the office and in the field by MSHCP staff that had prior PIT tagging experience. Surveyors conducting SKR trapping, vegetation surveys, and burrow counts (both training and surveys) in 2006 included:

<u>SKR trapping staff</u>

- Debra De La Torre, Mammalogy Program Lead (Regional Conservation Authority)
- Adam Malisch, Lead Biologist (Regional Conservation Authority)
- Rosina Gallego (Regional Conservation Authority)
- Esperanza Sandoval (Regional Conservation Authority)
- Karin Cleary-Rose, Monitoring Program Coordinator (U.S. Fish and Wildlife Service)
- Ryann Loomis (Regional Conservation Authority)
- Carol Thompson (Regional Conservation Authority)

- Valerie Morgan (Regional Conservation Authority)
- Conan Guard (Regional Conservation Authority)
- Lynn Miller (Regional Conservation Authority)
- Matt Talluto (Regional Conservation Authority)
- Samantha Marcum (U.S. Fish and Wildlife Service)

Vegetation data collection staff

- Diane Menuz, Botany Program Lead (Regional Conservation Authority)
- Andrea Salzman (Regional Conservation Authority)
- Angela Hyder (Regional Conservation Authority)
- Annie Bustamante (Regional Conservation Authority)
- Christina Greutink (Regional Conservation Authority)
- Esperanza Sandoval (Regional Conservation Authority)
- Ricardo Escobar (Regional Conservation Authority)
- Theresa Johnson (Regional Conservation Authority)

Study Site and Grid Site Selection

Study site locations were chosen to cover the range of SKR within the MSHCP Conservation Area. The intent was to complement the RCHCA effort, and to include populations outside the Stephens' Kangaroo Rat Habitat Conservation Plan Area (Figure 1). The RCHCA's trapping effort involved the placement of 11 grids at 2 sites, Estelle Mountain and Steele Peak, with 10 and 1 grids respectively. Biological Monitoring Program trapping sites were located at Lake Perris, Lake Skinner, Potrero, and Silverado Ranch, and thus extended the survey effort over a greater part of the range of SKR within the Plan Area.

Grids were chosen using a habitat index initially created by Dudek & Associates (2003) (Appendix C) and by querying a GIS map of each study site for specific soil and vegetation attributes known to be associated with suitable habitat for SKR. Such attributes include slope and vegetation characteristics. Suitable habitat was overlaid with a grid of points 100m apart. Points were selected randomly from this grid. Each random point was visited to survey for kangaroo rat sign (burrows, tail drags, and dust baths) to determine that the area included suitable habitat for the SKR, and that it contained at least 100 m^2 of homogeneous vegetation so that a trapping grid could fit into the location. Most points surveyed did not contain sufficient space for these large grids or did not have kangaroo rat sign. Thick grasses and other non-native vegetation made it difficult to locate and place grids at all of the study sites. The grids (105m x 105m, ~1 ha) were marked with a 24 inch piece of rebar covered with a 5 foot piece of PVC at each corner. Each trap station was marked with a letter and number on a pin flag. Ten grids were established at each of the 4 survey locations (40 total).

Live-Trapping Survey Methods

This study incorporates trapping on a seasonal basis in order to track changes in populations throughout the year across the Conservation Area. We conducted 3 nights of live-trapping on each grid for 2 seasons, summer (August-September) and fall (November-December)

2006. Traps were baited with millet at dusk and trap checking began 5 hours after sunset and generally concluded within 3 hours after beginning. One crew member walked a trap line and recorded trap condition on a quality control data sheet as either open, robbed (bait taken without triggering the trap), closed but empty, or animal inside.

When an animal was captured a second crew member assisted in handling the animal and recording data on a field data sheet. Each animal was weighed, identified to species, marked by hair clipping and/or passive integrated transponder (PIT) tag (depending on the species), sexed, reproductive condition evaluated, measured, and released at the trap station where it was caught. SKR were marked with a PIT-tag, whereas other covered species, including Dulzura kangaroo rat (*Dipodomys simulans*), San Diego pocket mouse (*Chaetodipus fallax*), and the Los Angeles pocket mouse (*Perognatus longimembris brevinasus*) were marked by trimming fur. Additional data collected included: date, handler, recorder, grid name, start and end times, percent cloud cover, moon phase, and start and end temperatures. Standard Operating Procedures for mammal trapping and SKR trapping are included in Appendices D and E.

Data analyses consisted of tallying the number of new SKR captured at each grid during each of the 3 trap nights (as well as overall) and within each season (= "minimum number alive" index).

Vegetation Survey Methods

Vegetation data were collected at each of the trapping grids within 1 week of each trapping effort to maximize the similarity between the vegetation cover at the time of trapping and the time of vegetation sampling. In certain cases, such as at Lake Perris in summer 2006, there were as many as 2 weeks between trapping and vegetation surveys due to logistical conflicts. Vegetation was sampled in three 1m x 0.5m quadrats spaced 30m apart placed on 6 transects parallel to the 7 trapping grid lines. Transects were placed a random distance between the 2 adjacent trapping lines and the first sampling quadrat was placed randomly between 1m and 30m from the edge of the trapping grid.

In each quadrat, general vegetation and ground cover information was collected including the thickness of the thatch layer. Starting in fall 2006, information on the presence/absence of *Erodium spp.*, including dried, detached seeds, was included so that this important SKR food source could be recorded even after it had joined the litter layer. At Potrero in fall 2006, the percent of each quadrat affected by the Esperanza Fire of October 2006 was recorded. At all sites, percent cover and phenology information was recorded for the dominant 2 shrub or tree species, the 3 dominant species over 10cm tall and the 3 dominant species under 10cm tall. Identification was made to the species level whenever possible and unknown species were collected for later identification unless they were judged to be too desiccated to attempt identification. Total percent cover in each height category and the total vegetative cover in the plot were also recorded. Percent cover values could also be greater than the sum when overlap between species reduced total cover. The thatch layer depth was measured against a thin ruler at 5 places within the quadrat. Thatch was measured from the ground to the height of the litter. Data at each quadrat were collected by observers working alone.

Burrow Count Methods

Burrow counts were conducted on 4 randomly selected grids of the 10 grids at each site to determine if there was a correlation between the number of identified active kangaroo rat burrows and the number of SKR caught on the grid. Burrows were counted on transects running in an east-west direction against the north-south alignment of the grids. Every active burrow observed within 3m on each side of the trap line was counted. This resulted in 90m-long by 6m-wide transects. Burrows were considered active if the entrance was clean and without dead vegetation or other debris.

The burrow count and SKR capture data were assessed by grid and season for normality, and data transformations used as appropriate. Linear regression analyses were conducted by season to assess the association of burrow counts to the SKR minimum number alive index values.

RESULTS

The 2006 surveys were conducted at all 40 grids between 7 August and 20 December (Table 1). Most of the grids were trapped for 3 consecutive nights within each of the 2 seasons. However, there were exceptions to this which included the night of 13 December when a gate at Lake Skinner was locked improperly, blocking our access to grids LS04 and LS09. These grids were then trapped on the night of 15 December to complete the required 3 nights of data collection. Grid PR17 was found to be less than 200m from grid PR02, which contradicts a protocol guideline; therefore, this grid was closed and replaced with grid PR21. Additionally, grids PR21, PR04, and PR19 were not trapped during the 5-7 December session due to extremely high winds, but were trapped from 18-20 December. One Lake Perris grid, LP02 was deemed unacceptable as it crossed a road, consisted of very thick non-native grasses, was in direct conflict with hunting activities, and was therefore replaced with grid LP13.

Trapping Results

During a total of 11,760 trap nights, we captured SKR at 9 of 10 grids at Lake Skinner, 7 of 10 grids at Silverado, 10 of 10 grids at Lake Perris, and 10 of 10 grids at Potrero (Table 2). We captured a total of 504 SKR, 231 in summer and 273 in fall 2006. A total of 480 SKR were PIT tagged: 129 at Lake Perris, 167 at Potrero, 54 at Silverado, and 130 at Lake Skinner. During the summer session, more SKR were caught at Lake Skinner and Silverado, but during the fall session more SKR were caught at Potrero and Lake Perris (Table 2). Over 80% of the Potrero site was burned in the Esperanza Fire in October 2006. However, most SKR should have survived the fire in their burrows. Lower trap success at Potrero in the season following the fire may be a result of animals moving to forage in unburned areas.

The number of new SKR individuals captured was generally very low on the first trap night, and increased with each successive night (Table 2). This was particularly evident during

the summer trapping session. For all grids combined, 51% and 38% of the total SKR were captured on the third (last) night of trapping during the summer and fall sessions, respectively.

Other covered species caught during trapping are listed in Table 3. These included 26 San Diego pocket mice (*Chaetodipus fallax*) which were present on all sites except Silverado. A total of 164 Dulzura kangaroo rats (*Dipodomys simulans*) were captured and were present at all 4 sites. Three Los Angeles pocket mice (*Perognathus longimembris brevinasus*) were found at Lake Perris (1 individual) and Silverado (2 individuals) sites. Three desert woodrats (*Neotoma lepida*) were captured at Lake Skinner. Additionally, a single long-tailed weasel (*Mustela frenata*) was captured at the Silverado site.

Non-covered species caught included deer mice (82 individuals), western harvest mice (*Reithrodontomys megalotis*, 8 individuals), a meadow vole (*Microtus californicus*), cactus mice (*Peromyscus eremicus*, 3 individuals), and western toads (*Bufo boreas*, 3 individuals).

Vegetation Survey Results

Vegetation sampling occurred in 2006, but data entry and data quality control are not yet complete for an analysis. Results from this portion of the study will be included in the 2007 SKR report.

Total capture histories for all animals captured at all grids during summer and fall 2006 trapping efforts are presented in Appendix F.

Burrow Count Results

Burrow counts were conducted on 4 grids at each study site within 1 week after the completion of each trapping session (Table 4). Both the numbers of active burrows and new SKR captures were non-normally distributed; exponential transformations (ln[x+1]) successfully linearized these data. Regression results indicated that the number of active burrows was a poor predictor of SKR abundance during the summer session ($r^2 = 0.12$, $p = 0.20$). Results from the fall session were somewhat stronger ($r^2 = 0.55$, $p = 0.001$), but almost half of the variance in SKR abundance was still unexplained by the number of active burrows.

DISCUSSION

The goals of the 2006 trapping efforts were to implement and refine the SKR monitoring protocol's utility in terms of estimating population size, assess the relationship between the number of active burrows detected and the number of SKR captured, assess relationships between habitat characteristics and SKR abundance, and determine presence/absence for other covered species within the MSHCP Conservation Area.

The patterns of new SKR captures during both the summer and fall trapping sessions suggest that the field protocol that we implemented may not be sufficient to generate SKR

abundance estimates (= "minimum number alive" index). Numbers of SKR captured generally were insufficient to employ capture-recapture analyses, which would have provided true estimates of SKR abundance in the vicinity of each grid (based on the capture histories of individual SKR; see Pollock et al. 1990). Without these unbiased abundance estimates, we must rely on indices of abundance to assess the relative status of SKR among grids and/or through time. As applied here, the commonly used minimum number alive index (also called "M_{t+1}"; see McKelvey and Pearson 2001) is basically the number of unique SKR captured at each grid during a particular trapping session. For this index to be confidently used to assess abundance, the number of new SKR captured must be a relatively large proportion of the total SKR within the vicinity of the grid, and this proportion must be constant across all grids, study sites, and sessions. Ideally, all of the SKR within the vicinity of the grid would be "trapped out", in which case the index would technically become a true census of the local population.

Our 2006 trapping results indicated very low first-night trapping success, with increasing numbers of new SKR captures during the second and third nights – approximately 40% to 50% of the total (new) captures occurred on the last night of trapping. The percentage of captures on nights 1, 2, and 3 also were inconsistent between the summer and fall sessions. These issues provide little confidence in the minimum number alive index values, because substantial numbers of SKR in the vicinity of the grid may not have been captured.

Several modifications to the existing protocol could alleviate the problematic capture patterns described above. Increasing the number of consecutive trapping nights (to some unknown number >3) would allow greater opportunity to eventually capture more new SKR. So too would increasing the per-night trapping effort from 5-6 hours to full nights (dusk to dawn). The latter modification might also address potential differences in SKR movements (e.g., foraging behavior) between evening and morning hours; the currently used protocol provides for no trapping effort during the pre-dawn period. Trapping during the pre-dawn period was avoided to reduce cold induced mortalities, enable trapping to occur during the fall season, and to allow for Monitoring Program logistical needs. Lastly, it is possible that SKR are avoiding the traps until they have been "conditioned" for a day or more. Placing traps in the field (closed and unbaited) for several days prior to opening traps might increase first-night capture rates.

The above-described problems with generating an SKR abundance index may have affected our ability to assess whether burrow counts could be used as an index to SKR abundance. Without having confidence in the accuracy of the SKR's minimum number alive indices, it is difficult to correlate these values to the number of active burrows counted at the grids. During fall 2006, there seemed to be a generally positive relationship between burrows and SKR, especially when burrow counts were >100. However, this relationship was not apparent in the summer 2006 data. Large variations in the numbers of active burrows when no (or very few) SKR were captured suggest that burrow counts provide little power to predict SKR abundance. If the difficulties in generating the SKR abundance index can be resolved, we can more adequately re-assess the relationship between SKR numbers and burrow numbers.

The necessary accuracy of any SKR abundance index will depend on the monitoring objective. Most indices are capable of categorizing areas of high abundance from those with low abundance. When the goal is to only measure large differences in abundance, then index data do

not need high precision. However, most monitoring programs attempt to track populations through time, and here the ability to detect much-smaller changes in abundance typically is required. For the current SKR data, the minimum number alive indices may be suitable for defining 'very poor' habitats from 'very good' habitats; however, the majority of grids had capture rates between these extremes.

Of the additional covered species captured during 2006, the Dulzura kangaroo rat, San Diego pocket mouse, and Los Angeles pocket mouse all prefer open grassland and shrub-dominated habitats. The Silverado grids, although similar in habitat type, were much higher in elevation: Lake Skinner, Lake Perris, and Potrero fall within 300m-700m elevation, whereas Silverado is at approximately 1,300m elevation. This may be a limiting factor in the distribution of the San Diego pocket mouse which was not captured at Silverado. The Desert woodrat is typically found in chaparral habitats and was captured on a Silverado grid bordered by chaparral. The long-tailed weasel prefers habitats containing shrubs, chaparral, cropland, and field edges. The Silverado grid where the weasel was captured greatly resembles a field edge habitat.

Non-covered species captured included the meadow vole and the harvest mouse. Both of these are grassland species. The cactus mouse prefers rocky or shrubland habitat and was captured on grids containing shrubs. The western toad is a habitat generalist found in grassland, shrubland, chaparral and other habitats, and often uses rodent burrows.

Vegetation data from 2006 will be analyzed after the field data have been electronically compiled. Analyses will include assessments of whether certain habitat characteristics are associated with SKR abundance, whether changes in SKR abundance are related to changes in seasonal vegetation, and whether vegetation phenology is associated with SKR reproduction.

Recommendations for Future Surveys

We recommend that efforts be employed to address the increasing trend in new SKR captures for the three-night trapping sessions. This may be achieved by the implementation of several strategies, including increasing the trapping period (i.e., trap dusk until dawn), leaving traps out for several days prior to trapping in order to acclimate the animals to the new objects in their environment, or increasing the number of trap nights. Initially, we recommend that an additional 2 nights of trapping be added to each three-night session, for a total of 5 consecutive nights of trapping. Although this modification will not directly resolve the issue of low first-night capture rates, it is logistically more-feasible (e.g., from a labor-scheduling perspective, and in relation to corresponding trapping efforts by the RCHCA). If we continue to observe patterns of increasing new SKR captures, then the other strategies should be experimentally implemented. If we can confidently generate SKR abundance indices, then we will be able to more precisely assess how habitat characteristics and burrow counts are associated with SKR numbers.

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Table 1. Trapping periods for each site and grid in 2006

DATE	SITE	GRIDS
Summer		
7-9 Aug. 2006	Lake Perris	LP02, LP03, LP04
10-12 Aug. 2006	Lake Perris	LP07, LP08, LP10, LP11
15-17 Aug. 2006	Lake Perris	LP12, LP13,LP06,LP09
17-19 Aug. 2006	Potrero	PR01, PR05, PR18
22-24 Aug. 2006	Potrero	PR17, PR02, PR12
24-26 Aug. 2006	Potrero	PR04, PR10, PR19
29-31 Aug. 2006	Silverado	SO05, SO02, SO04
31 Aug - 2 Sept. 2006	Silverado	SO01, SO07
6-8 Sept. 2006	Silverado	SO101, SO01, SO05, SO104, SO103, SO102
12-14 Sept. 2006	Potrero	PR20, PR21
14-16 Sept. 2006	Lake Skinner	LS06, LS07
19-21 Sept. 2006	Lake Skinner	LS01, LS02, LS13
21-23 Sept. 2006	Lake Skinner	LS04, LS08, LS09, LS11, LS10
Fall		
1-3 Nov. 2006	Lake Perris	LP03, LP06, LP09, LP12, LP13
6-8 Nov. 2006	Lake Perris	LP04, LP07, LP08, LP10, LP11
12-14 Nov. 2006	Silverado	SO105, SO104, SO102, SO103, SO04
15-17 Nov. 2006	Silverado	SO01, SO02, SO05, SO07, SO101
5-7 Dec. 2006	Potrero	PR01, PR02, PR05, PR10, PR12, PR18, PR20
12 Dec.2006	Lake Skinner	LS06, LS07, LS08, LS09, LS10, LS04, LS06
13 Dec. 2006	Lake Skinner	LS06, LS07, LS08, LS10
14 Dec. 2006	Lake Skinner	LS04, LS06, LS07, LS08, LS09, LS10
15 Dec. 2006	Lake Skinner	LS04, LS09
18-20 Dec. 2006	Lake Skinner	LS01, LS02, LS03, LS11
18-20 Dec. 2006	Potrero	PR21,PR04, PR19

Table 2. SKR capture histories at 4 sites during the 2 trapping periods in 2006. The numbers "1", "2", and "3" represent captures during nights 1, 2, and 3, respectively.

		# of Unique SKR Captured							
		2006 Summer				2006 Fall			
Area	**Grid**	**1**	**2**	**3**	**Total**	**1**	**2**	**3**	**Total**
Perris	LP03	0	1	1	**2**	0	0	2	**2**
	LP04	0	0	2	**2**	1	0	1	**2**
	LP06	0	1	5	**6**	0	0	2	**2**
	LP07	0	0	0	**0**	0	1	2	**3**
	LP08	2	7	7	**16**	8	2	4	**14**
	LP09	0	0	1	**1**	1	0	0	**1**
	LP10	0	0	0	**0**	0	0	0	**0**
	LP11	0	3	3	**6**	0	1	1	**2**
	LP12	1	10	11	**22**	3	1	13	**17**
	LP13	0	0	0	**0**	0	0	0	**0**
	All Grids	**3**	**22**	**30**	**55**	**13**	**5**	**25**	**43**
Lake Skinner	LS01	0	0	0	**0**	0	0	0	**0**
	LS02	1	1	0	**2**	1	0	2	**3**
	LS03	0	0	0	**0**	0	1	0	**1**
	LS04	2	3	8	**13**	10	10	6	**26**
	LS06	1	0	0	**1**	0	3	2	**5**
	LS07	1	0	0	**1**	7	4	1	**12**
	LS08	2	2	5	**9**	3	6	5	**14**
	LS09	0	5	8	**13**	3	14	13	**30**
	LS10	0	0	3	**3**	5	9	3	**17**
	LS11	0	0	0	**0**	0	1	0	**1**
	All Grids	**7**	**11**	**24**	**42**	**29**	**48**	**32**	**109**
Potrero	PR01	0	6	6	**12**	0	1	1	**2**
	PR02	3	2	7	**12**	7	2	0	**9**
	PR04	0	5	13	**18**	0	3	5	**8**
	PR05	2	3	4	**9**	1	0	1	**2**
	PR10	2	3	5	**10**	2	1	6	**9**
	PR12	4	2	0	**6**	1	0	1	**2**
	PR18	14	11	10	**35**	1	8	9	**18**
	PR19	0	2	5	**7**	0	1	1	**2**
	PR20	0	0	4	**4**	0	0	0	**0**
	PR21	1	4	6	**11**	3	8	6	**17**
	All Grids	**26**	**38**	**60**	**124**	**15**	**24**	**30**	**69**
Silverado Ranch	SO01	0	0	0	**0**	1	0	0	**1**
	SO02	0	0	0	**0**	0	0	0	**0**
	SO04	1	3	1	**5**	7	2	4	**13**
	SO05	0	0	0	**0**	0	0	0	**0**
	SO07	0	0	0	**0**	1	0	0	**1**
	SO101	0	0	0	**0**	0	0	1	**1**
	SO102	0	0	0	**0**	0	0	0	**0**
	SO103	0	0	0	**0**	4	0	5	**9**
	SO104	0	0	0	**0**	0	0	3	**3**
	SO105	0	3	2	**5**	15	6	3	**24**
	All Grids	**1**	**6**	**3**	**10**	**28**	**8**	**16**	**52**

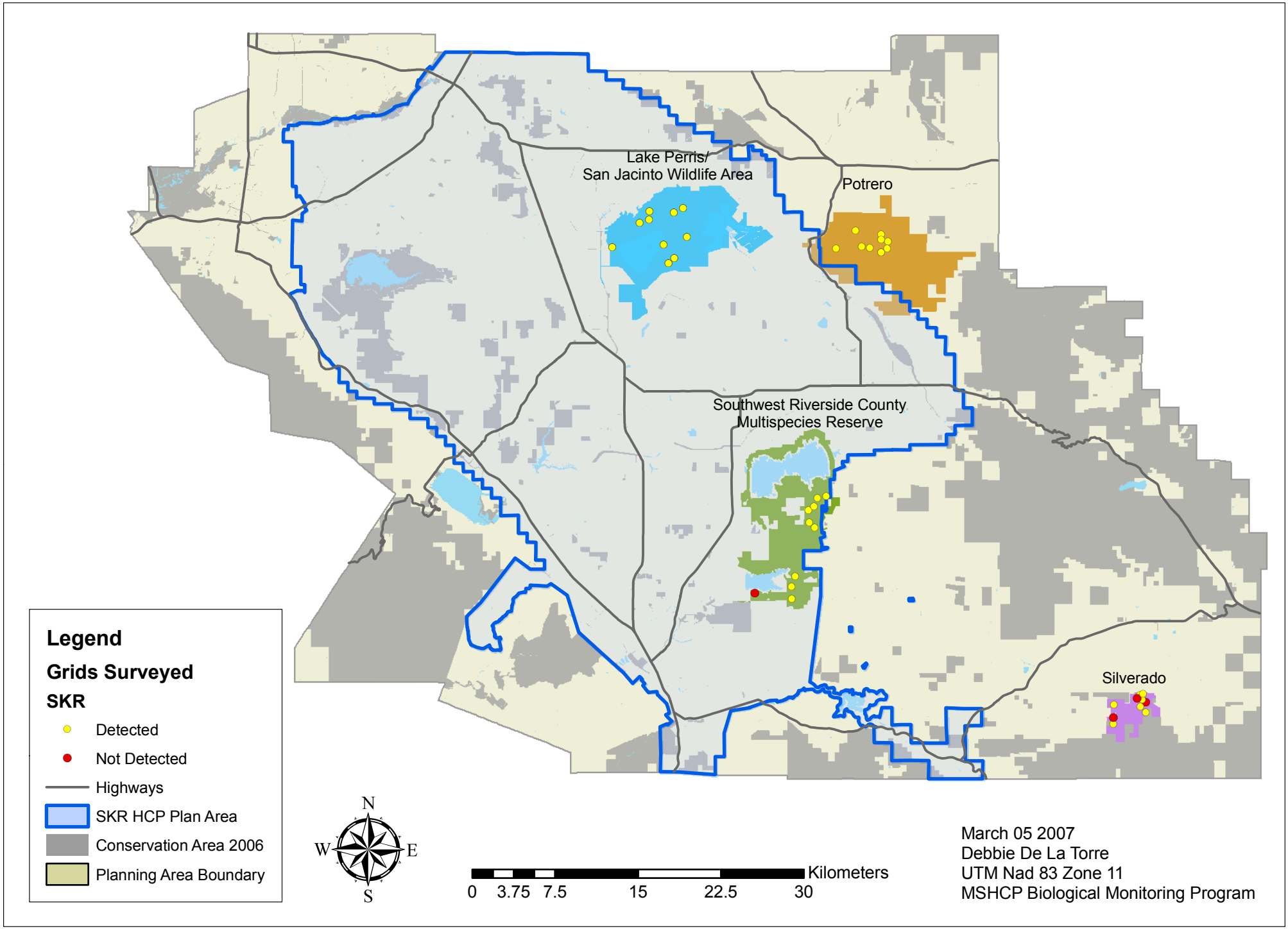
Table 3. List of co-occurring species caught at each of 4 sites during SKR trapping in 2006.

	Lake Perris	**Lake Skinner**	**Potrero**	**Silverado**
Covered species	*C. fallax,* *D. simulans,* *P. longimembris brevinasus*	*C. fallax,* *D. simulans,* *N. lepida intermedia*	*C. fallax,* *D. simulans,*	*D. simulans,* *P. longimembris brevinasus,* *M. frenata*
Non-covered species	*P. eremicus,* *P. maniculatus*	*P. maniculatus,* *R. megalotis*	*M. californicus,* *P. eremicus,* *P. maniculatus,* *R. megalotis*	*P. maniculatus,* *R. megalotis*
Non-mammal species	None	*B. borealis*	None	*B. borealis*

Table 4. Number of active burrows and SKR captured at each site for the 2 trapping periods in 2006.

		SKR Burrow Count Data			
		2006 Summer		2006 Fall	
Area	**Grid**	**# active burrows**	**# SKR captured**	**# active burrows**	**# SKR captured**
Lake Perris	LP07	28	0	15	3
	LP09	14	1	11	1
	LP10	18	0	7	0
	LP13	26	0	55	0
	All grids	**86**	**1**	**88**	**4**
Lake Skinner	LS06	28	1	59	5
	LS07	28	1	126	12
	LS08	121	9	152	14
	LS10	144	3	127	17
	All grids	**321**	**14**	**464**	**48**
Potrero	PR04	12	18	57	8
	PR10	43	10	72	9
	PR18	71	35	222	18
	PR19	5	7	39	2
	All grids	**131**	**70**	**390**	**37**
Silverado Ranch	SO101	20	0	5	1
	SO102	7	0	1	0
	SO104	16	0	6	3
	SO105	128	5	115	24
	All grids	**171**	**5**	**127**	**28**

Figure1: 2006 SKR Trapping Grid Locations and Grids with SKR Detections



Appendix A:

Stephens' Kangaroo Rat Vegetation Protocol

Survey methods:

Stephens' Kangaroo Rats (SKR) are trapped in 90m by 90m trapping grids. Traps are set up along 7 north-south trapping lines spaced 15m apart. Associated vegetation information is collected in six transects placed in between the 7 trapping lines. The exact placement of the vegetation transects is determined by random numbers that dictate where the transects start along the east-west axis and the north-south axis.

Cover sheet

At each SKR trapping grid, one cover sheet will be filled out. The cover sheet information will include the names of all of the people working on the grid, the grid ID (i.e., SO7) and the site name (i.e., Perris, Potrero, etc.). The UTMs of the southwest corner will be written down on the datasheet as well. Circle GPS if the UTMs are taken from a point saved in the GPS unit and Field if recorded from the field. Also include on the cover sheet the date.

The cover sheet also has random numbers for each of the transects. This will be explained under **Transect set-up.**

The plant collection information will be explained under **Unknown species.**

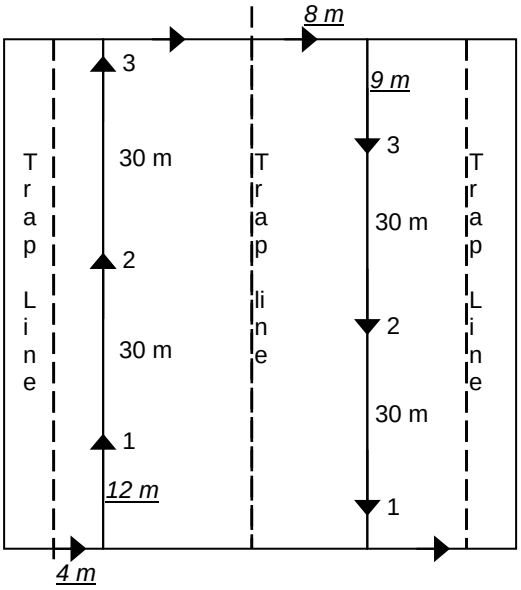
Write any grid-specific notes that you have under the notes section. For example, you might note that one of the corners was missing or that the plot is on a very steep hill.

Transect set-up

At each trapping grid, six transects will be set up in a magnetic north-south direction, perpendicular to the southern edge of the grid. Each data sheet will be used for one transect. Each transect will be made up of 3 quadrats. Random numbers will determine the exact positioning of each transect. In this protocol, X, a number between 1 and 15, will refer to the random Transect Meter number and Y, a number between 1 and 30, will refer to the random 1st Quad Meter number. The random numbers for each trapping grid are printed on the cover sheet for that plot.

- From the southwest corner of the grid, walk X^1 number of meters to the east, directly towards the next trapping line. If your number is 15, you should end up exactly on top of the next trapping line.
- From this spot, walk Y^1 number of meters directly towards the northern edge of the trapping grid. You should walk in a straight line parallel to the trapping lines on either side of you. This should be towards magnetic north.
- After you have walked Y^1 meters, stop and put in a flag. This is where the first quadrat will be placed.
- Walk 30m towards the northern edge and put in the second flag. Walk another 30m and put in the third flag.
- When all three flags have been put in for a transect, walk to the northern edge of the trapping grid and then walk to the start of the next trapping line. From there, walk X^2

meters to the east towards the next trapping grid. Then walk Y^2 meters towards the southern edge of the trapping grid, once again staying parallel to the adjacent trapping grid lines. Set up a flag once you have walked Y^2 meters. Walk 30m, set up flag 2, walk 30 more m and set up flag 3. The diagram below shows the results if the random numbers for the first transect are 8 and 25 and for the second, 14 and 3.



- Continue setting up the rest of the transects in this fashion, alternating between heading N to S and S to N and using the random numbers assigned to each transect.
- Sometimes the dimensions of the SKR trapping grids are not perfectly aligned. If your Transect Meter number takes you to or past the next trapping line even though it is less than 15, you should instead figure out the proportional distance between the two trapping lines and start your transect set-up from there. For example, if your number is 13 and that takes you beyond the next trapping grid, you would estimate where $13/15^{th}$ of the distance is and start walking north from there. Record in the notes section of the cover page that this was done (i.e. distance between 3^{rd} and 4^{th} trapping line only 12m so transect started at the 10m point).

Quadrat data

Each place where a flag was put down, a quadrat will be placed on the ground. There is one datasheet for each transect. At the top of the data sheet, put the Grid ID, Observer Initials, Date, Transect #, and the two random numbers used in placing the transect, the Transect Meter and the 1^{st} Quad Meter. On the datasheet, quadrat 1 always refers to the southernmost quadrat and quadrat 3 is always the northernmost. In other words, the labeling of 1 to 3 is done S to N.

A $0.5m^2$ (1m by ½m) quadrat will be placed at each flag with the SW corner of the quadrat touching the flag.

- Within each quadrat surveyors will:
  - Estimate total vegetation cover

- Estimate ground cover for litter, rock (greater than 2cm) and bare ground. These numbers should add up to 100%. Only look at what is covering the ground and ignore any dead or alive standing vegetation that is covering the plot. Litter is defined as dead plant matter that has fallen to the ground. Bare ground includes all sand, gravel and soil that is less than 2cm.
- Measure the thatch layer. To do this, we will use a narrow measuring device or small ruler that is marked in centimeter increments. We will take five measurements in each quadrat. The measurements will be estimated to the nearest millimeter. These will be standardized along the west edge of the quadrat, at intervals marked on the quadrat frame. The highest place where the thatch-o-meter touches litter that is part of a thatch layer should be recorded. Pieces of litter that touch the thatch-o-meter but are suspended above the ground and above the thatch layer will not be counted as part of the thatch layer.
- There will be three vegetation categories: shrub (all woody vegetation – we are unlikely to encounter trees on these plots), tall herb (>10cm), and small herb (<10cm).
- Within each vegetation category, observer will record three dominant species (two for shrub layer), their percent cover and select a category for phenology: either flowering, green but not flowering, seed-set, or desiccated. Observer will also record the overall phenology of each layer and the overall % cover of each layer.
- For all plants layers, Check Rooted Outside for any species that are rooted outside the plot, but have enough cover that you want to include them in the quadrat information. For species that have an individual rooted in the plot and an individual not rooted in the plot, record species twice with separate cover estimates. If there is a major shrub species (>5% cover) that is not included in the top two shrubs, add % cover and phenology information about the species in the notes column.
- Shrubs that have been dead for more than one season and produce a lot of cover should be included in the shrub column, with a note saying that it is dead standing. Identify the dead shrub to species if possible, but if not, just say dead standing shrub and provide a percent cover.
- At the bottom of the notes column, next to *Erodium*, indicate whether there is any *Erodium* present by circling Y or N. This will include information about this species' presence whether or not any of it is still attached.
- Finally, any relevant notes about the site can be entered in the margin.

At the first transect set up on a day of SKR vegetation work, everyone will fill out a Calibration data sheet so that we can quantify the difference between observers. Everyone will collect data for each quadrat one at a time, with observers discussing their results after each quadrat. During this discussion, one person will fill out a regular datasheet with the consensus results.

Unknown species

All plants should be listed to species on the datasheets whenever possible. If a desiccated plant is recognized only to genus, then only the genus needs to be recorded. The following is applicable only to plants with unknown genus and/or plants that are not completely desiccated.

First, these unknown plants will be listed on a trapping grid's cover sheet. Unknown plants will be assigned a number and given a brief description. At the beginning of each day, the first unknown plant will be listed as #1 and unknowns will be listed sequentially throughout the day. As soon as a crew member encounters an unknown plant in their quadrat, they will alert the other crew members who will either identify the plant or agree that the plant in question will be unknown #x.

Second, all unknowns that are not completely desiccated will be collected for later identification. Put the collection in a piece of newspaper and label the edge of the newspaper with Plot ID, date and unknown number.

Appendix B:

Western Riverside County MSHCP
Biological Monitoring Program

Protocol for PIT-tagging Small Mammals
April 2006

Overview:

A necessary component of estimating the density of small mammal populations is the ability to mark animals and uniquely identify individuals upon recapture. Reidentification of individuals also allows assessment of growth rates, movement patterns, and survivorship.

Passive integrated transponders (PIT tags) provide a new method of permanently marking mammals. A PIT tag is a radio frequency device that transmits a unique individual code to a reader where it is displayed in a numeric or alphanumeric form (BIOMARK FAQ 2006). The tag has no internal battery, hence the term "passive". Once implanted, PIT tags can be "read" with a scanner that activates the tags; however, with few exceptions (*e.g.*, Harper and Batzli 1996) specimens must be recaptured and handheld for the scanner to function. The reader powers or excites the tag circuitry by radio frequency induction and receives the code back from the tag. Radio frequency identification does not require line of sight; tags can be read as long as they are within the range of a reader.

PIT tags are injected under the skin (sub-cutaneously) with large-bore hypodermic syringes. Care should be taken to avoid accidental injuries to employees, unnecessary harm to study animals, including Endangered Species, and contamination of PIT tags prior to implantation. Many studies have addressed the potential adverse impacts of PIT-tagging and there is virtually no negative impact on animals provided they have sufficient body size and behavior is not inhibited by the tag (BIOMARK FAQ 2006; Gibbons and Andrews 2004). PIT tags and PIT tag readers are expensive; however, they are more reliable than ear tags in terms of frequency of loss by marked animals (Harper and Batzli 1996; Williams et al. 1997), and do not require permanent loss of tissue as with toe-clipping (Kirkland et al. 1998).

Instructions:

Monitoring Program biologists will use AVID FriendChip Identification System PIT tags and AVID sterile single use disposable syringes for injection. **Before** preparing a small mammal for PIT tag injection, scan the back of the animal with the PIT tag reader to determine if it is already tagged. This is important even in areas where Monitoring Program biologists have not yet tagged animals because other researchers may have been working at the study location. To scan an animal to determine if it is tagged, turn the reader ON, depress and hold down the READ button while waving the wand back and forth about 3-4 inches above the back of the animal. The reader will beep and display the PIT tag's unique identification number if there is a functioning PIT tag inside the animal with a frequency that is legible by our reader. It is possible that an animal could be implanted with a PIT tag that has a frequency unreadable by our reader and we will re-tag these animals with our own tags in this instance. The reader should pick up an implanted tag within a few seconds. To be safe, give the reader at least 10 full seconds, scanning

at various distances, angles and locations on the animal before determining that there is not a functioning PIT tag already inserted. If the reader returns a beep and a number, record the number on the datasheet along with any other pertinent data and release the animal. If the reader does not register a PIT tag, feel around the scruff and upper back of the animal to determine if there is a PIT tag inserted that is not registering. This should be rare, but could happen, and you should be able to feel the tag beneath the skin of the animal. We will tag these animals with our own PIT tags, but use a slightly different injection site to avoid clumping the tags together. If it is determined that the animal will be PIT-tagged, collect other necessary data (length measurements, reproductive condition etc.) **before** performing this procedure.

When preparing for PIT tag injection, remove a single use disposable syringe from the box. The AVID syringes come pre-installed with PIT tags inside and are sterile so care should be taken to avoid contamination of the needle or loss of the PIT tag once the syringe casing is opened. Scan the PIT tag while still inside the protective plastic tubing. Make sure the number on the scanner matches the number on the white sticker(s) inside the plastic tube. Do not remove the stickers from the plastic tube yet, and do not open the plastic tube – the animal should be prepared for surgery before the needle is removed from its sterile packaging. If the numbers don't match, hand-write the number displayed on the reader on your datasheet. If the numbers match, use the provided stickers to record the unique identification number of the PIT tag on the proper place on the data sheet after you've opened the plastic casing.

Although it is possible for a single person to perform PIT tag injections in the field, it is generally faster and safer for both the biologists and small mammals to have one person restrain the animal while the other performs the surgery. Thus, Monitoring Program biologists will work in teams of two during the 2006 field season, and will only perform these procedures alone after gaining a minimum of one year's experience. Disposable sterile gloves can be worn when handling an animal for PIT tag injection if the biologists desire, but because hands should not come in direct contact with the injection site, gloves are not mandatory.

Preparing an animal for surgery involves locating a proper injection site and sanitizing the injection site with a disinfectant. For *Dipodomys spp*., PIT tags should be sub-cutaneously injected near the middle of the back of the animal, so that the PIT tag ends up around the shoulder blades. This area is easy to access with a PIT tag reader, and makes it difficult for the animal to reopen the wound while grooming. The injection site and surrounding area should be cleared of any obvious dirt, vegetative matter, or parasites and wiped with a disinfectant such as Betadine. A clean Q-tip works well for applying Betadine but a clean soft cloth may suffice.

After the injection site has been sterilized, one biologist should restrain the animal by scruffing it and holding it against his/her leg or another hard surface that allows the injector easy access to the back of the animal. The injector should now remove the syringe from the plastic casing by twisting the casing to open it. Do not pull on or depress the plunger until the needle is in the animal and you are ready to inject the PIT tag – if the syringe assembly does not fall easily out of the plastic casing, use the plastic covering over the needle to push the assembly out of the casing. The needle will still be covered but the stickers with unique identification numbers are now available to stick on the datasheet. Insert the needle cover into the small end of the outer sleeve and press firmly. Then remove the exposed needle and syringe, taking care to avoid contamination. Use caution at all times when the needle is exposed. If the tag falls out of the needle onto a non-sterile surface or the needle becomes contaminated for any reason do not use the PIT tag or needle. Put the syringe assembly back into the plastic tubing, mark the tube "contaminated" or place the tube in a marked bag or box. Begin again with a new syringe

assembly, making sure to record the correct PIT tag ID number on the datasheet. We will sterilize and reuse field-contaminated PIT tags and needles in the office so do not discard the contaminated materials.

The object of a successful PIT tag injection is to inject the PIT tag sub-cutaneously near the upper back of the animal with no contamination and a minimum amount of tissue damage to the animal. There should be little to no blood. Kangaroo rats will occasionally jump, kick, squirm, etc. when handled or when the needle is inserted so the biologist holding the animal must maintain a firm grip and the injector must exercise caution not to jab the needle into underlying muscle tissue. Shearing hair off the animal while attempting to insert the needle can also be a problem; there is a delicate balance between getting the needle through the skin layer but not into the underlying muscle tissue. While the holder has the scruff of the animal, there should be a "tent" of available skin to aim for. The injector may have to use an extra hand to pull up loose skin or make the skin taught to provide an ideal injection site. The needle is extremely sharp and should cut into the skin fairly easily. Avoid jabbing motions; try to apply steady pressure until the needle begins to enter the sub-cutaneous space. Insert the needle only until the beveled edge is covered by tissue and slowly depress the syringe plunger until it stops. Withdraw the needle and apply a small amount of surgical glue to close the wound. Lastly, scan the animal to make sure the reader registers the PIT tag and release the animal once you are sure the glue is dry. The used syringe should be disposed of in a portable Sharps container.

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Appendix C:

Habitat Suitability Ranking for Selection of Trapping Grids

Habitat Assocations

The Stephens' kangaroo rat is found almost exclusively in open grasslands or sparse shrublands with cover of less than 50 percent during the summer (*e.g.*, Bleich 1973; Bleich and Schwartz 1974; Grinnell 1933; Lackey 1967; O'Farrell 1990; Thomas 1973). O'Farrell (1990) further clarified this association and argues that the proportion of annual forbs and grasses is important because Stephens' kangaroo rats avoid dense grasses (for example, non-native bromes [*Bromus* spp.]) and are more likely to inhabit areas where the annual forbs disarticulate in the summer and leave more open areas. He also noted a positive relationship between the presence of the annual forb red-stemmed filaree (*Erodium cicutarium*), grazing, and the Stephens' kangaroo rat. O'Farrell and Uptain (1987) noted a decline in the abundance of Stephens' kangaroo rat in the Warner Ranch area when the livestock were changed from mixed Hereford stock to Holstein dairy cattle, thus reducing grazing pressure and allowing for the proliferation of three-awn grasses (*Aristida* sp.). On the other hand, the Stephens' kangaroo rat has been trapped in brittlebush (*Encelia farinosa*) dominated coastal sage scrub with an estimated shrub cover of over 50 percent (USFWS 1997).

Although there are no confirmatory data, it has been assumed that the Stephens' kangaroo rat historically occupied habitat dominated by native perennial grasses and forbs (*e.g.*, Price and Endo 1989).

Soil type also is an important habitat factor for Stephens' kangaroo rat occupation (O'Farrell and Uptain 1989; Price and Endo 1989). As a fossorial (burrowing) animal, the Stephens' kangaroo rat typically is found in sandy and sandy loam soils with a low clay to gravel content, although there are exceptions where they can utilize the burrows of Botta's pocket gopher (*Thomomys bottae*) and California ground squirrel (*Spermophilus beecheyi*). Also, Price and Endo (1989) suggest that sandy soils may be necessary for sand bathing, which keeps oils from building up in their fur. Sand bathing also may serve an important social communication function (Randall 1993). As noted by others (*e.g.*, Brown and Harney 1993), kangaroo rats tend to avoid rocky soils. Stephens' kangaroo rats may be found on rocky soils, but population densities generally are much lower.

Slope is a factor in Stephens' kangaroo rat occupation; the Stephens' kangaroo rat tends to use flatter slopes (*i.e.*, < 30 percent), but may be found on steeper slopes in trace densities (*i.e.*, < 1 individual per hectare). Furthermore, the Stephens' kangaroo rat may use steeper slopes for foraging, but not for burrows (Behrends, pers. obs.). In general, the highest abundances of Stephens' kangaroo rats occur on gentle slopes less than 15 percent.

Because open ground is an important habitat factor, the distribution and quality of Stephens' kangaroo rat habitat also is a function of periodic fires, range use by grazing animals (O'Farrell and Uptain 1987), year-to-year weather variations (Price and Endo 1989), and probably longer

cycles of dry and wet periods. Although precipitation is positively related to primary production of food resources and breeding activities (McClenaghan and Taylor 1993; Price and Kelly 1994), several years of high rainfall can be detrimental. For example, dense matting of annual grasses, such as ripgut grass (*Bromus diandrus*), may exclude this species from certain areas after periods of high rainfall (USFWS 1997). Over the short term, however, Goldingay and Price (1997) did not detect seasonal differences in habitat use by the Stephens' kangaroo rat despite seasonal variation in the microhabitat.

Methods

In order to identify potential trapping grids for the SKR monitoring program, soils (Knecht 1971) and vegetation communities (CNPS 2005) mapped within the study areas were evaluated and ranked for their suitability as SKR habitat. These habitat suitability rankings are relatively subjective, but based on the literature cited above in the habitat description to the extent possible. They are also based on the field experience of the authors (Phil Behrends) based on many years of field experience with the SKR. These rankings are not meant to be definitive of suitable habitat, but rather provide a tool for the relative ranking of areas within the study area for establishing trapping grids that capture the environmental gradient used by the SKR.

Following from the description of SKR habitat above, both soils and vegetation communities were ranked on a scale of 1 to 4 as follows:

1	=	Very Low Suitability
2	=	Low Suitability
3	=	Moderate Suitability
4	=	High Suitability

Soils and vegetation communities ranked as Very Low Suitability almost always do not support the SKR, although there are rare exceptions. Soils and vegetation communities ranked as Low Suitability typically do not support the SKR, but occasionally the species may occur, but usually only in trace densities (< 1 SKR/hectare). Soils and vegetation communities ranked as Moderate Suitability more commonly support the SKR, but occupancy and populations densities may vary from season-to-season or year-to-year in relation to stochastic events (e.g., precipitation cycles, vegetation succession) and/or demographic factors. Soils and vegetation communities ranked as High Suitability typically support the SKR on the most consistent basis and at the highest population densities. Absence of the SKR from these areas only would be expected where local populations have been extirpated due to some other environmental pressure; e.g., a small isolated habitat patch subject to high predation levels.

As described above, the SKR typically uses friable soils on relatively level terrain; i.e., sandy and sandy loam soils with little clay and gravel content on slopes less than 30 percent (although exceptions to both criteria do occur). Table x shows the Habitat Suitability rankings for soils. Clays and Gullied Land were assigned Very Low Suitability. Generally rocky or cobbly soils and/or soils on steeper, eroded slopes (> 25 percent) and Terrace Escarpments (typically 30-70 percent slopes) were assigned Low Suitability. Loamy soils and sandy loam soils on somewhat

steep slopes (e.g., 15-35 percent) were assigned Moderate Suitability. Sandy soils and sandy loams on gentle slopes (< 15 percent) were assigned High Suitability.

Table x show the Habitat Suitability rankings for vegetation communities. The Habitat Suitability ranking is based on a combination of the vegetation community type and the density rating for the particular mapping unit. The "N" under SKR Suitability indicates that the vegetation community typically does not support the SKR, such as riparian and sycamore and coast live oak woodland communities. Although the SKR is considered to be a grassland species, all shrubland communities were assigned "P" for potential habitat because where there are openings or disturbances within shrublands patches, or the community is sparsely distributed (such as after wildfire or extended drought), SKR occupation may occur, often in a dynamic fashion related to successional factors in the community (e.g., in relation to wildfire, grazing or other disturbances of vegetation, and precipitation cycles). For potential habitat, the Habitat Suitability ranking was then related to the following density values assigned to the community by CNPS (2005):

1	=	Greater than 60%
2	=	40-60%
3	=	25-40%
4	=	10-25%
5	=	2-10%

As noted above the SKR typically occupies habitat with less than 50 percent vegetation cover, although it may be found in areas with more than 50 percent cover, especially grasslands during the spring growing season, but also in some shrublands (USFWS 1997). Typically coastal sage scrub communities are more likely to support SKR than chaparral communities because, in the absence of direct disturbance, they tend to be more open. Generally chaparral communities with densities of "1" or "2" were assigned Low Suitability and densities with "3" or higher were assigned Moderate Suitability. Coastal sage scrub-chaparral communities with densities of "1" were assigned Low Suitability and densities of "2-5" were assigned Moderate Suitability. Coastal sage scrub communities with densities of "1" were assigned Low Suitability, densities of "2-3" were assigned Moderate Suitability, and densities of "4-5" were assigned High Suitability. Annual grassland communities were assigned High Suitability regardless of density because of seasonal and year-to-year variation in densities. Refinement of what grasslands are likely or unlikely to be highly suitable habitat for the SKR over the long-term requires more detailed field surveys to verify site conditions because some annual grassland areas remain too densely vegetated over the seasons and years to reliably support the SKR.

It is important to understand that the rankings provided in Tables x and x are only general and are only intended to identify a potential set of trapping grids. It is possible, and even likely, that SKR occur in areas ranked as having Very Low or Low Suitability for the species, such as where SKR use ground squirrel or gopher burrows in clayey soils, on steeper slopes (especially in areas adjacent High Suitability areas), and in areas where the vegetation communities have been mapped as having a dense cover, but at any given time are suitable for the SKR due to changing field conditions due to disturbances such as wildfire, grazing, extended drought and mechanical clearing.

TABLE X
HABITAT SUITABILITY RANKINGS OF SOILS OCCURRING IN STUDY AREA

Soil Code	Soil Series[1]	Habitat Suitability Rank
BfD	Bosanko clay, 8 to 15 percent slopes	1
BuD2	Buren fine sandy loam, 8 to 15 percent slopes, eroded	4
BxC2	Buren loam, deep, 2 to 8 percent slopes, eroded	3
CaC2	Cajalco fine sandy loam, 2 to 8 percent slopes, eroded	4
CaD2	Cajalco fine sandy loam, 8 to 15 percent slopes, eroded	4
CaF2	Cajalco fine sandy loam, 15 to 35 percent slopes, eroded	3
ChC	Cieneba sandy loam, 5 to 8 percent slopes	4
ChD2	Cieneba sandy loam, 8 to 15 percent slopes, eroded	4
CkF2	Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded	2
EcC2	Escondido fine sandy loam, 2 to 8 percent slopes, eroded	4
EcD2	Escondido fine sandy loam, 8 to 15 percent slopes, eroded	4
EcE2	Escondido fine sandy loam, 15 to 25 percent slopes, eroded	3
EfF2	Escondido rocky fine sandy loam, 8 to 50 percent slopes, eroded	2
FaD2	Fallbrook sandy loam, 8 to 15 percent slopes, eroded	4
GzG	Gullied land	1
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	4
HuC2	Honcut loam, 2 to 8 percent slopes, eroded	3
LaC	Las Posas loam, 2 to 8 percent slopes	3
LcD2	Las Posas stony loam, 8 to 15 percent slopes, eroded	2
LoF2	Lodo gravelly loam, 15 to 50 percent slopes, eroded	3
LpF2	Lodo rocky loam, 25 to 50 percent slopes, eroded	2
MmC2	Monserate sandy loam, 5 to 8 percent slopes, eroded	4
MmE3	Monserate sandy loam, 15 to 25 percent slopes, severely eroded	3
PlD	Placentia fine sandy loam, 5 to 15 percent slopes	4
PrD	Porterville cobbly clay, 2 to 15 percent slopes	1
SmE2	San Timoteo loam, 8 to 25 percent slopes, eroded	3
TaF2	Temescal loam, 15 to 50 percent slopes, eroded	2
TbF2	Temescal rocky loam, 15 to 50 percent slopes, eroded	2
TeG	Terrace escarpments	2
VsC	Vista coarse sandy loam, 2 to 8 percent slopes	4
VsD2	Vista coarse sandy loam, 8 to 15 percent slopes, eroded	4
YbC	Yokohl loam, 2 to 8 percent slopes	3
YbD2	Yokohl loam, 8 to 15 percent slopes, eroded	3
YkE2	Yokohl cobbly loam, 2 to 25 percent slopes, eroded	2
YrD2	Ysidora very fine sandy loam, 2 to 15 percent slopes, eroded	4
YsE2	Ysidora gravelly very fine sandy loam, 8 to 25 percent slopes, eroded	3

[1] Knecht, A. A. 1971. Soil Survey of Western Riverside Area, California. U.S. Department of Agriculture, Washington, D.C.

TABLE X
HABITAT RANKINGS OF VEGETATION COMMUNITIES IN STUDY AREA

Vegetation Community Alliance Mapping Unit Name[1]	Habitat Suitability Rank	SKR Suitabilty	Cover Density
Coast Live Oak - Sycamore Riparian	1	N	1
Coast Live Oak - Sycamore Riparian	2	N	2
California Juniper - Coastal Sage Scrub	3	P	4
California Juniper - Coastal Sage Scrub	3	P	5
Willow	1	N	1
Willow	2	N	2
Willow	2	N	3
Willow	2	N	4
Chamise - Coastal Sage Scrub Disturbance	2	P	1
Chamise - Coastal Sage Scrub Disturbance	3	P	2
Chamise - Coastal Sage Scrub Disturbance	3	P	3
Chamise - Coastal Sage Scrub Disturbance	3	P	4
Chamise - Coastal Sage Scrub Disturbance	3	P	5
Laurel Sumac - California Buckwheat - Black Sage - White Sage - California Sagebrush	3	P	4
Mexican Elderberry - Mulefat	2	N	4
Mexican Elderberry - Mulefat	2	N	5
California Sagebrush - California Buckwheat - Annual Grass-Herb	3	P	2
California Sagebrush - California Buckwheat - Annual Grass-Herb	3	P	3
California Sagebrush - California Buckwheat - Annual Grass-Herb	4	P	4
California Sagebrush - California Buckwheat - Annual Grass-Herb	4	P	5
Brittlebush - California Buckwheat	3	P	3
Brittlebush - California Buckwheat	4	P	4
Brittlebush - California Buckwheat	4	P	5
Coast Live Oak	2	N	2
Coast Live Oak / Annual Grass-Herb Association	2	N	3
Coast Live Oak / Annual Grass-Herb Association	2	N	5
California Juniper / Annual Grass-Herb Association	4	P	5
California Juniper - California Buckwheat - California Sagebrush Association	4	P	4
California Juniper - California Buckwheat - California Sagebrush Association	4	P	5
Mixed Tree and Shrub Willow Super Alliance	1	N	1
Red Willow	1	N	1
California Sycamore	1	N	1
California Sycamore	2	N	2
California Sycamore	2	N	3
California Sycamore	2	N	4
Sugar Bush Alliance	4	P	4
Chamise Pure Association	2	P	1
Chamise - California Buckwheat Association	2	P	2
Chamise - Hoaryleaf Ceanothus - Black Sage Association	2	P	1
Chamise - Hoaryleaf Ceanothus - Black Sage Association	2	P	2
Chamise - Hoaryleaf Ceanothus - Black Sage Association	2	P	3

Chamise - Hoaryleaf Ceanothus - Black Sage Association	2	P	3
Chamise - Hoaryleaf Ceanothus - Black Sage Association	3	P	4
Chamise - Hoaryleaf Ceanothus - Sugar Bush Association	2	P	1
Mulefat	2	P	3
Mulefat	2	P	4
California Sagebrush - California Buckwheat	3	P	2
California Sagebrush - California Buckwheat	3	P	3
California Buckwheat	4	P	4
California Buckwheat	4	P	5
Brittlebush Alliance	4	P	4
California Sagebrush - White Sage	3	P	2
Brittlebush - California Sagebrush Association	3	P	2
Brittlebush - California Sagebrush Association	3	P	3
Brittlebush - California Sagebrush Association	4	P	4
Brittlebush - California Sagebrush Association	4	P	5
California Buckwheat - Brittlebush Association	3	P	3
California Buckwheat - Brittlebush Association	4	P	4
California Buckwheat - Brittlebush Association	4	P	5
California Sagebrush - Laurel Sumac Association	3	P	2
California Sagebrush - Laurel Sumac Association	3	P	3
California Sagebrush - Laurel Sumac Association	4	P	4
California Annual Grassland	4	P	1
California Annual Grassland	4	P	2
[1] CNPS. 2005. Vegetation Alliances of Western Riverside County, California.			

The Habitat Suitability rankings for the soils and vegetation communities were then combined to generate an overall ranking score for the vegetation/soils polygon combinations as follows:

Score	**Ranking**
2	Very Low Suitability
3-4	Low Suitability
5-6	Moderate Suitability
7-8	High Suitability

Appendix D:

Western Riverside County MSHCP Biological Monitoring Program Standard Operating Procedures: Small Mammal Trapping

These are the general small mammal trapping standard procedures for the Western Riverside County MSHCP Biological Monitoring small mammal program. Individual projects may have specific procedures and requirements that vary from these. In those cases, project specific guidance will be provided.

Goal: Generally to determine presence/absence, life histories, species community composition, and/or habitat preferences. Each trapping effort or project will have its own goal or goals.

I. Site Selection

Site selection criteria will be project specific, but in general when random placement of trapping grids is desired the following procedures will be followed. The Mammal Lead will use a GIS to conduct queries and produce maps of potential trapping sites based on the current available knowledge for each species. The suitable areas of this map will be divided into 50m x 50m grids from which random points will be used to select trapping grids. The randomly chosen grids will be ground truthed to be sure the selected site conforms to the following site characteristics: vegetation within the grid should include one community type only (grassland, sage scrub, chaparral, etc), and soils specific to the target species when indicated. Grid boundaries should lie at least 70m from the edge of another kind of vegetation community 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
Waste bag

Trap Grid Layout: The standard grid size will vary based on project specifics; currently we are using both 8 x 8 grids with 10m spacing and 7 x 7 grids with 15m spacing.

The pre-selected UTM point will be the southwestern corner unless this will result in a non-homogeneous grid. If this occurs than use the UTM point as any one of the other corners so that the grid is homogeneous. Record this change so the appropriate UTM is listed as the southwestern corner. After the corners are set, check a diagonal distance to ensure that the grid is square, ($a^2 + b^2 = c^2$). Adjust as necessary. From the final corner point use a 100m transect tape to place the north/south and east/west grid lines. Place marked pin-flags appropriately spaced (every 10 or 15m) along each line. The lower left corner of the square when facing north should be labeled A1, A2, A3, through A8 heading northward. The eastward line should be labeled A1, B1, and C1, through H1 (Fig. 2). Note: because the transect tape will begin at the corner point with the A1 flag at "0", each grid line will measure 70m. Individual grids should be at least 100m apart unless you are given other project-specific direction.

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 tapping a container to make a spider fall off the side. 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 sensitive. Please ask if you cannot find the tab.

Once you are sure the sensitivity is correct place the trap on the ground at the station with the opening facing northward (placing all the traps facing the same direction reduces the number of variables). Traps should be placed on level ground so that the entrance of the trap is flush with the ground, and the trap does not teeter. Use your boot to scrape out a smooth, level space. Traps should be placed parallel to the trap line as indicated in the trap placement diagram (attached).

Take about 1 tablespoon of seed 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 its tail could get caught in or severed by the door.

Ant Caution: Ants can kill animals in a trap. If ants are present at a trap station sprinkle the ant powder that is provided to you heavily under and immediately around the trap. 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. If the ants are particularly thick and you are worried, then do not set the trap. Be sure to record that the trap was not set.

III. Checking the 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 (Debbie) or the Monitoring Program Coordinator (Karin). If you are scheduled for an activity you do not feel qualified to conduct, alert Karin or Debbie 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® or bread) per grid
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 for photos of unknown animals
Waste bags for used millet
Ant powder (approved and supplied only)
Backpack
Extra batteries
Mag light flash light

Traps will be checked either once or twice per night. The first time (midnight check) will be approximately 5 hours after sunset, the second check, if done, will be just before dawn. If only one check is to be done, it will always be the midnight check. 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. To ensure that no traps are missed, make note of the status of each trap in the appropriate box on your trap-check quality control sheet. 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 code for traps closed with an animal inside. 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.

If the grid is being closed, pick up all open traps and dispose of the bait in your waste bag. If it is not the last night of trapping and it is not the last check of the night, reset and bait the trap. If it is the last check of the night, dispose of the excess bait in your waste bag and leave the trap perpendicular to the line.

If the door is closed, but the trap seems too light to contain an animal, slowly open the trap door to make sure that something small (mouse or pocket mouse) isn't inside. Gently depress the treadle to check for animals underneath. Harvest mice and pocket mice fit easily under the treadle. Determined *Peromyscus* also fit. If the trap is empty, either fold it and put it into your trap bag, or return it to the trap station as appropriate.

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. With your right hand, through the plastic bag, open and hold the trap door open. Quickly and firmly give the trap a downward shake to make the animal fall 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: If you cannot find a trap at a station make a methodical search for it then move on making note of the missing trap. Once the grid is finished, do another search. You should look until you either find it 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 we also want to know this because it is likely they will return.

If you suspect there is a Rattlesnake in the trap: If there is a snake in the trap, the first thing you will notice is that the trap is solid and too heavy. If you think there is a snake, but are not sure if it is a rattle snake, tap on the trap lightly to see if you hear a rattle. If the snake rattles, or if it rattled when you picked up the trap do the following: Place the trap on the ground, with the door facing you. You are going to pull the pin out of the bottom of the trap. Before you do this, look around you and choose location or direction that is free of obstacles. Pull the pin out of the

bottom left side of the trap. Move away from the trap in your chosen direction as you remove the pin. The trap will collapse and the snake will be free. 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.

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: Before you use a Pesola® scale the first time each night, be sure it is zeroed. 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: While the animal is in the bag, place the bag 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.

Recaptured animals: If the animal is marked, it is a recapture. Marks will vary from project to project, and may even vary from night to night. Marking can be accomplished by PIT tag, trimming fur or using a colored marker. 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: if an animal is found dead in a trap, record the species and the sex and under fate record "dead." If the animal is a Covered Species place the deceased animal in two Ziploc® bags, one inside the other, both zipped closed and bring it 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 for each dead animal or incident while you are in the field. They are located in your trap kits. Place the completed form on the Mammal Program Lead's desk. If the dead animal is a listed species (SKR, SBKR), also put a copy of the Mortality Record on Karin's desk. If it is a Friday night, designate one crew member to call Karin at home on Saturday morning. We are required to notify the Fish and Wildlife Service within 24 hours of finding a listed animal that is dead.

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

Hot or Cold animals: If an animal is too cold (lethargic and unresponsive) place it in a pocket close to your body until it is revived. If you are really worried, you can bring the animal into a heated vehicle. Be careful about placing the animal directly in front of heater vents. They are small and can overheat quickly. Once the animal begins to warm up and move around release it at the station where it was captured. An animal that is overheated will also be lethargic and may have moisture around its mouth. If the animal is hot cool it down 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 can be marked by injection of a pit tag, trimming of fur, or coloring with a sharpie or Ideal Mark, depending on the project. 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 animal in the specified location with the 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: Measurements are taken in the following manner. 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 leangth
- *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

During the last check, collect the traps as you go. 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.

If pin flags are collected, sort them by letter and place rubber bands around sorted groups of pin flags. 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. Once dry, place the folded traps into the plastic buckets with lids for storage.

Appendix E:

Western Riverside County MSHCP Monitoring Program
SKR RCHCA Project Specific Procedures

The information provided here is to specify procedures for the SKR/RCHCA project and is supplemental to our Standard Operating Procedures (SOP) for Small Mammal Trapping. Procedures not covered in this protocol are to be conducted as specified in the SOP.

IV. Site Selection

Grids will be selected randomly from indexed habitat. The index will follow Dudek's rankings. Selected sites will be visited and evaluated to make sure that a grid can be placed on the site and that vegetation is uniform. Grids will be at least 200m apart.

V. Setting out Trap lines

Equipment:
Modified Sherman traps
Millet
List of UTM points
Ant powder/mallets
Transect tape 100m
Flagging/Pin flags
Sharpie pens
Trap carrying bags
Handheld GPS unit/ Compass
Rebar and PVC

Trap Grid Layout: The grid size to be used is a 90m x 90m square. Each station will be 15m from the next and last station. Place pre-marked pin-flags every 15m along each line. The lower left corner of the square when facing north should be labeled A1, A2, A3, through A7 heading northward. The eastward line should be labeled A1, B1, and C1, through G1 (Fig. 2). Individual grids should be at least 200m apart. Corners should be permanently marked using a piece of rebar and covered with a piece of PVC. Reflective tape should be placed on the PVC to help locate them in the dark.

VI. Checking the Traps

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 group
4 Animal handling bags (Ziplock® or bread) per grid
Datasheets (>2 per grid, extras better)
Grid quality control sheets (>1 per grid)
Clipboard 1 per recorder
Several pens
Species field guide/key
Digital camera for photos of unknown animals
Waste bags for used millet
Ant powder (approved and supplied only!)
Backpack
PIT tag kit box
Mortality Record Sheets
Protocol Variation Form

Traps will be checked at or near five hours after sunset and should be closed within 7 hours after sunset. While checking trap lines, note pin-flag number and whether each trap was open, closed and empty, or closed with a capture. To ensure that no traps are missed, make note of the status of each trap in the appropriate box on your trap-check quality control sheet. Mark "O" for open traps, "C" for closed with no capture, "R" for robbed traps and "A" for traps with an animal.

Marking Animals

SKR (DIST) are to be pit tagged and marked under the chin with a sharpie. Animals captured on the last night of trapping do not need to be marked with the sharpie.
Do not attempt the PIT tagging procedure without training and permission. If you have had the training and are not yet comfortable, do not PIT tag SKR until you feel you are ready. You can request help and supervision anytime you are performing this procedure.

DKR (DISI) and other Covered Species are to be hair clipped. Clip the right rear haunch or other area specified for each trapping session.

IV. Filling out the datasheet:

Measuring the animals:

For K-Rats: Take ear length, weight, age, sex and reproductive status.

For all other species, measure and record information necessary for identification.

Scanning animals**:** Scan any captured kangaroo rat with a PIT tag reader while you have it in the bag to weigh it. If it is already tagged, record the tag number on the data sheet. Look at the k-

rat. Is it SKR? Do not assume that it was correctly identified last time it was captured. Record its species, weight, sex and reproductive condition. Weigh the animal, take measurements and release it.
Insert a PIT tag into all untagged Stephens' kangaroo rats and if a kangaroo rat species is not clearly identifiable but may be a Stephens' insert a PIT tag and make note of this. See PIT tag protocol.

Recaptured animals: Record species, sex, and reproductive condition only. Recaptured Covered Species will be hair clipped. Recaptured SKR will have a PIT tag AND a colored marking under its chin or other designated area.

In this project, it is especially important that we do not dump millet on the ground on our grids. In general this is especially important in the summer because it attracts ants. But, because we are going to our grids four times a year for multiple years, the bait we leave becomes supplemental food. And although we all like them to get some extra food for the trauma of being PIT tagged, we don't want to increase survivorship with food. So please be conscientious about disposing of the millet in waste bags.

Appendix F:

Total small mammal captures by grid and study site

Lake Perris

Grid #	Date	Stephens' Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
LP01	1-Nov-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	
LP02	7-Aug-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	
LP03	7-Aug-06	0	0	0	0	0	0	
	8-Aug-06	1	0	3	0	0	0	
	9-Aug-06	2	0	3	1	1	0	
	1-Nov-06	0	0	1	1	0	0	
	2-Nov-06	1	0	1	6	1	0	
	3-Nov-06	2	0	1	5	1	0	
Total Captures		**6**	**0**	**9**	**13**	**3**	**0**	
LP04	7-Aug-06	0	0	0	0	0	0	
	8-Aug-06	0	0	0	0	0	0	
	9-Aug-06	2	0	0	0	0	0	
	6-Nov-06	1	0	0	0	0	0	
	7-Nov-06	1	0	0	0	0	0	
	8-Nov-06	2	0	0	0	0	0	
Total Captures		**6**	**0**	**0**	**0**	**0**	**0**	
LP06	15-Aug-06	0	0	0	1	1	0	
	16-Aug-06	1	0	0	2	3	0	

Grid #	Date	Stephens' Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
LP06	17-Aug-06	5	0	0	2	3	0	
	1-Nov-06	0	0	0	1	0	0	
	2-Nov-06	2	0	0	0	0	1	
	3-Nov-06	2	0	0	0	1	0	
	12-Dec-06	0	0	0	0	1	0	
Total Captures		**10**	**0**	**0**	**6**	**9**	**1**	
LP07	10-Aug-06	0	0	0	0	0	0	
	11-Aug-06	0	0	0	0	0	0	
	12-Aug-06	0	0	0	0	0	0	
	6-Nov-06	0	0	0	0	0	0	
	7-Nov-06	1	0	0	0	0	0	
	8-Nov-06	1	0	0	0	0	0	
Total Captures		**2**	**0**	**0**	**0**	**0**	**0**	
LP08	10-Aug-06	2	0	0	0	1	0	
	11-Aug-06	8	0	0	0	0	0	
	12-Aug-06	11	1	0	1	0	0	
	6-Nov-06	8	0	0	0	0	0	
	7-Nov-06	8	0	0	1	0	0	
	8-Nov-06	10	0	0	0	0	0	
Total Captures		**47**	**1**	**0**	**2**	**1**	**0**	
LP09	16-Aug-06	0	0	2	2	0	0	
	17-Aug-06	1	0	1	0	1	0	
	18-Aug-06	0	0	0	0	1	0	
	1-Nov-06	1	0	0	0	0	0	
	2-Nov-06	1	0	0	0	0	0	
	3-Nov-06	1	0	1	0	0	0	
Total Captures		**4**	**0**	**4**	**2**	**2**	**0**	
LP10	10-Aug-06	0	0	0	0	0	0	

Grid #	Date	Stephens' Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
	11-Aug-06	0	0	0	0	0	0	
LP10	12-Aug-06	0	0	0	0	0	0	
	6-Nov-06	0	0	0	0	0	0	
	7-Nov-06	0	0	0	0	0	0	
	8-Nov-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	
LP11	10-Aug-06	0	0	0	0	0	0	
	11-Aug-06	3	0	0	0	0	0	
	12-Aug-06	6	0	0	1	0	0	
	6-Nov-06	0	0	0	0	0	0	
	7-Nov-06	1	0	0	0	0	0	
	8-Nov-06	1	0	0	1	0	0	
Total Captures		**11**	**0**	**0**	**2**	**0**	**0**	
LP12	15-Aug-06	1	0	0	0	0	0	
	16-Aug-06	11	0	0	5	0	0	
	17-Aug-06	19	0	1	2	0	0	
	1-Nov-06	3	0	0	3	0	0	*Peromyscus eremicus*
	2-Nov-06	10	0	0	1	0	0	*Peromyscus eremicus*
	3-Nov-06	30	0	2	4	0	0	
Total Captures		**74**	**0**	**3**	**15**	**0**	**0**	
LP13	15-Aug-06	0	0	0	0	0	0	
	16-Aug-06	0	0	0	0	0	0	
	17-Aug-06	0	0	0	0	0	0	
	2-Nov-06	0	0	0	0	0	0	
	1-Nov-06	0	0	0	0	0	0	
	3-Nov-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	

Lake Perris Totals	**320**	**2**	**32**	**80**	**30**	**2**	

Lake Skinner

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
LS01	19-Sep-06	0	0	0	0	0	0	
	20-Sep-06	0	0	0	2	0	0	
	21-Sep-06	0	0	0	2	0	0	
	18-Dec-06	0	0	0	0	0	0	
	19-Dec-06	0	0	0	1	0	0	
	20-Dec-06	0	0	0	1	0	0	
Total Captures		**0**	**0**	**0**	**6**	**0**	**0**	
LS02	19-Sep-06	1	0	2	0	0	0	
	20-Sep-06	1	0	3	0	0	0	
	21-Sep-06	1	0	3	0	0	0	
	18-Dec-06	0	0	3	2	0	0	
	19-Dec-06	0	0	0	3	1	0	
	20-Dec-06	2	0	4	3	0	0	
Total Captures		**5**	**0**	**15**	**8**	**1**	**0**	
LS03	19-Sep-06	0	0	0	0	2	0	
	20-Sep-06	0	0	0	1	2	0	
	21-Sep-06	0	0	0	4	2	0	
	18-Dec-06	1	0	0	2	11	1	
	19-Dec-06	2	0	0	0	10	0	
	20-Dec-06	1	0	0	0	0	0	
Total Captures		**4**	**0**	**0**	**7**	**27**	**1**	
LS04	21-Sep-06	2	0	0	0	0	0	
	22-Sep-06	4	0	0	0	0	0	
	23-Sep-06	12	0	0	0	0	0	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
	12-Dec-06	1	0	0	0	0	0	
	14-Dec-06	18	0	0	0	0	0	
LS04	15-Dec-06	35	0	0	0	0	0	
Total Captures		**72**	**0**	**0**	**0**	**0**	**0**	
LS06	14-Sep-06	1	0	0	0	0	0	
	15-Sep-06	0	0	0	0	1	0	
	16-Sep-06	0	0	0	0	1	0	
	12-Dec-06	0	0	0	0	1	0	
	13-Dec-06	5	0	0	0	6	0	
	14-Dec-06	9	0	0	0	8	0	
Total Captures		**15**	**0**	**0**	**0**	**17**	**0**	
LS07	14-Sep-06	0	0	0	0	0	0	*Dipodomys* sp.
	15-Sep-06	0	0	1	0	1	0	
	16-Sep-06	1	0	2	1	0	0	
	12-Dec-06	7	0	0	0	0	0	
	13-Dec-06	8	0	1	0	0	0	
	14-Dec-06	16	0	2	2	4	0	
Total Captures		**32**	**0**	**6**	**3**	**5**	**0**	
LS08	21-Sep-06	2	0	0	0	0	0	
	22-Sep-06	2	0	0	1	0	0	
	23-Sep-06	7	0	0	3	5	0	*Neotoma lepida*
	12-Dec-06	3	0	1	0	10	0	*Neotoma* sp.
	13-Dec-06	6	0	1	0	7	0	
	14-Dec-06	9	0	0	0	8	0	*Dipodomys* sp.
Total Captures		**29**	**0**	**2**	**4**	**30**	**0**	
LS09	20-Sep-06	0	0	0	0	0	0	
	22-Sep-06	5	0	1	0	0	0	*Bufo boreas*
	23-Sep-06	11	0	0	0	1	0	*Neotoma lepida*

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
LS09	12-Dec-06	3	0	0	0	2	0	*Bufo boreas*
	14-Dec-06	17	0	0	0	0	0	*Neotoma lepida*
	15-Dec-06	24	0	0	0	1	0	*Neotoma lepida*
Total Captures		**60**	**0**	**1**	**0**	**4**	**0**	
LS10	20-Sep-06	0	0	0	0	0	0	*Dipodomys* sp.
	22-Sep-06	0	0	0	0	0	0	
	23-Sep-06	3	0	0	0	0	0	
	12-Dec-06	5	0	0	0	0	0	
	13-Dec-06	11	0	0	0	0	0	
	14-Dec-06	9	0	0	0	0	0	
Total Captures		**28**	**0**	**0**	**0**	**0**	**0**	
LS11	20-Sep-06	0	0	0	0	0	0	
	22-Sep-06	0	0	0	0	0	0	
	23-Sep-06	0	0	0	0	0	1	
	19-Dec-06	1	0	0	2	0	0	
	20-Dec-06	0	0	0	1	0	0	
Total Captures		**1**	**0**	**0**	**3**	**0**	**1**	
Lake Skinner Totals		**491**	**0**	**48**	**59**	**168**	**3**	

Silverado

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat (*Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
SO01	31-Aug-06	0	0	0	0	2	0	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
SO01	1-Sep-06	0	0	0	0	10	0	
	2-Sep-06	0	0	0	1	11	0	
	15-Nov-06	1	0	0	1	6	0	
	16-Nov-06	0	0	0	0	30	0	
	17-Nov-06	0	0	0	0	16	0	
Total Captures		**1**	**0**	**0**	**2**	**75**	**0**	
SO02	29-Aug-06	0	0	0	0	0	0	
	30-Aug-06	0	0	0	0	1	0	
	31-Aug-06	0	0	0	0	2	0	
	12-Nov-06	0	0	0	0	0	0	
	15-Nov-06	0	0	0	0	21	0	
	16-Nov-06	0	0	0	3	7	0	
	17-Nov-06	0	0	0	4	19	0	
Total Captures		**0**	**0**	**0**	**7**	**50**	**0**	
SO04	29-Aug-06	0	0	0	0	0	0	
	30-Aug-06	4	0	0	0	0	0	
	31-Aug-06	3	1	0	0	0	0	
	12-Nov-06	7	0	0	0	0	0	
	13-Nov-06	7	0	0	0	0	0	
	14-Nov-06	11	0	0	0	1	0	
Total Captures		**32**	**1**	**0**	**0**	**1**	**0**	
SO05	29-Aug-06	0	0	0	0	0	0	
	30-Aug-06	0	0	0	0	0	0	
	31-Aug-06	0	0	0	0	0	0	
	15-Nov-06	0	0	0	0	0	0	*Mustela frenata*
	16-Nov-06	0	0	0	0	0	0	
	17-Nov-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
SO07	31-Aug-06	1	0	0	0	0	0	
	1-Sep-06	0	0	0	0	0	0	
	2-Sep-06	0	0	0	0	0	0	
	15-Nov-06	0	0	0	0	1	0	
	16-Nov-06	0	0	0	0	0	0	
	17-Nov-06	0	0	0	0	0	0	
Total Captures		**1**	**0**	**0**	**0**	**1**	**0**	
SO101	6-Sep-06	0	0	0	0	0	0	
	7-Sep-06	0	0	0	0	0	0	
	8-Sep-06	0	0	0	0	0	1	
	17-Nov-06	1	0	0	0	0	0	
	17-Nov-06	0	0	0	0	0	1	
	15-Nov-06	0	0	0	0	0	0	
	16-Nov-06	0	0	0	0	1	0	
	17-Nov-06	0	0	0	0	1	0	
	8-Sep-06	0	0	0	0	0	0	*Dipodomys* sp.
Total Captures		**1**	**0**	**0**	**0**	**2**	**2**	
SO102	6-Sep-06	0	0	0	0	0	0	
	7-Sep-06	0	0	0	0	0	0	*Bufo boreas*
	8-Sep-06	0	0	0	0	0	0	
	12-Nov-06	0	0	0	0	0	0	
	13-Nov-06	0	0	0	0	0	0	
	14-Nov-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	
SO103	6-Sep-06	0	0	0	0	0	0	
	7-Sep-06	0	0	0	0	1	1	
	8-Sep-06	0	0	0	1	1	0	
	12-Nov-06	4	0	0	0	0	0	
	13-Nov-06	4	0	0	0	0	0	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
SO103	14-Nov-06	9	0	0	0	1	0	
Total Captures		**17**	**0**	**0**	**1**	**3**	**1**	
SO104	7-Sep-06	0	0	0	0	1	0	
	8-Sep-06	0	0	0	0	0	0	
	12-Nov-06	0	0	0	0	1	0	
	13-Nov-06	0	0	0	0	2	1	
	14-Nov-06	9	0	0	1	2	1	
Total Captures		**9**	**0**	**0**	**1**	**6**	**2**	
SO105	6-Sep-06	0	0	0	0	0	0	
	7-Sep-06	3	0	0	0	0	0	
	8-Sep-06	4	3	0	0	0	0	
	12-Nov-06	15	0	0	0	0	0	
	13-Nov-06	17	0	0	0	0	0	
	14-Nov-06	11	0	0	0	1	0	*Dipodomys* sp.
Total Captures		**50**	**3**	**0**	**0**	**1**	**0**	
Silverado Totals		**172**	**5**	**0**	**22**	**277**	**10**	

Potrero

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
PR01	17-Aug-06	0	0	0	0	0	0	
Total Captures		**0**	**0**	**0**	**0**	**0**	**0**	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
PR01	18-Aug-06	6	0	0	0	0	0	
	19-Aug-06	10	0	0	0	0	0	
	5-Dec-06	0	0	0	0	0	0	
	6-Dec-06	0	0	0	0	0	0	
	7-Dec-06	1	0	0	0	0	0	
Total Captures		**17**	**0**	**0**	**0**	**0**	**0**	
PR02	22-Aug-06	3	0	0	0	0	0	
	23-Aug-06	2	0	0	1	0	0	
	24-Aug-06	8	0	0	0	0	0	
	5-Dec-06	7	0	0	0	0	0	
	6-Dec-06	6	0	0	0	0	0	
	7-Dec-06	2	0	0	0	0	0	
Total Captures		**28**	**0**	**0**	**1**	**0**	**0**	
PR04	24-Aug-06	0	0	0	0	0	0	
	25-Aug-06	5	0	0	1	1	0	
	26-Aug-06	18	0	0	1	0	0	
	18-Dec-06	0	0	0	0	2	0	
	19-Dec-06	3	0	0	0	3	0	
	20-Dec-06	6	0	0	0	3	0	
Total Captures		**32**	**0**	**0**	**2**	**9**	**0**	
PR05	17-Aug-06	2	0	0	0	0	1	
	19-Aug-06	8	0	0	1	0	0	
	5-Dec-06	1	0	0	0	0	0	
	6-Dec-06	1	0	0	0	0	0	
	7-Dec-06	1	0	0	1	0	0	
Total Captures		**13**	**0**	**0**	**2**	**0**	**1**	
PR10	24-Aug-06	2	0	0	0	0	0	
	25-Aug-06	3	0	0	0	0	0	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
PR10	26-Aug-06	6	0	0	1	0	0	
	5-Dec-06	2	0	0	0	0	0	
	6-Dec-06	3	0	0	0	0	0	
	7-Dec-06	9	0	0	1	0	0	
Total Captures		**25**	**0**	**0**	**2**	**0**	**0**	
PR12	22-Aug-06	0	0	0	0	0	0	
	23-Aug-06	2	0	0	0	0	0	
	24-Aug-06	5	0	0	0	0	0	
	5-Dec-06	1	0	0	0	0	0	
	6-Dec-06	0	0	0	0	0	0	
	7-Dec-06	1	0	0	0	0	0	
Total Captures		**9**	**0**	**0**	**0**	**0**	**0**	
PR18	17-Aug-06	14	0	0	0	0	0	
	18-Aug-06	20	0	0	0	0	0	
	19-Aug-06	22	0	0	0	0	0	
	5-Dec-06	1	0	0	0	0	0	
	6-Dec-06	8	0	0	0	0	0	
	7-Dec-06	10	0	0	0	0	0	
Total Captures		**75**	**0**	**0**	**0**	**0**	**0**	
PR19	24-Aug-06	0	0	0	1	0	0	
	25-Aug-06	2	0	0	1	0	0	*Microtus californicus*
	26-Aug-06	5	0	0	3	0	0	
	18-Dec-06	0	0	0	0	0	0	
	19-Dec-06	1	0	0	0	0	0	
	20-Dec-06	2	0	0	0	0	0	
Total Captures		**10**	**0**	**0**	**5**	**0**	**0**	
PR20	12-Sep-06	1	0	1	0	0	0	
	14-Sep-06	4	0	3	1	1	0	

Grid #	Date	Stephen's Kangaroo Rat *(Dipodomys stephensi)*	Los Angeles Pocket Mouse *(Perognathus longimembris brevinasus)*	San Diego Pocket Mouse *(Chaetodipus fallax fallax)*	Deer Mouse *(Peromyscus maniculatus)*	Dulzura Kangaroo Rat *(Dipodomys simulans)*	Western Harvest Mouse *(Reithrodontomys megalotis)*	OTHER
PR20	5-Dec-06	0	0	0	0	0	0	
	6-Dec-06	0	0	0	0	0	0	
	7-Dec-06	0	0	1	0	0	0	
Total Captures		**5**	**0**	**5**	**1**	**1**	**0**	
PR21	12-Sep-06	1	0	0	0	0	0	
	14-Sep-06	7	0	0	2	0	0	
	18-Dec-06	3	0	0	3	1	0	
	19-Dec-06	9	0	0	7	1	0	
	20-Dec-06	10	0	0	8	0	0	
Total Captures		**30**	**0**	**0**	**20**	**2**	**0**	
Potrero Totals		**458**	**0**	**10**	**46**	**22**	**2**	