

APRIL 2003 FINAL REPORT

TRAPPING SURVEY OF MORRO BAY KANGAROO RATS  
(*Dipodomys heermanni morroensis*)

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## INTRODUCTION

The Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*; MBKR) was federally-listed as endangered in 1970 (Federal Register 35 (199):16047). Subsequently, the taxon was state-listed endangered in 1971. Since that time, considerable studies have been conducted to evaluate the changes in population status, distribution, and potential for survival culminating in an approved Recovery Plan (USFWS, 1982). Continued decline in MBKR-occupied habitat prompted the formation of a new Recovery Team to update the 1982 plan in an effort to avoid the projected near-future extinction of the taxon (MBKR Recovery Team, 1995 Draft Revised Recovery Plan).

MBKR historically was known to occupy an area encompassing approximately 4.8 mi<sup>2</sup> in the Morro Bay/Los Osos region (Grinnell, 1922; Figure 1) but the earliest comprehensive estimate of actual occupied habitat was less than 2.5 mi<sup>2</sup> (Stewart and Roest, 1960). A little over a decade later, total MBKR-occupied habitat had declined to 1.75 mi<sup>2</sup> (Congdon and Roest, 1975). Approximately half of the historic range falls within lands now owned by the State of California, either by Parks and Recreation or Department of Fish and Game (Figure 2; Pecho, Hazard, and Los Osos Oaks Preserve). The remaining fragments of past MBKR occupied habitat was identified at three sites (Junior High/Santa Ysabel, Buckskin, and Bayview). All pockets of known occurrence were periodically monitored from 1971 through 1989. There was a progressive decrease in the estimates of MBKR-occupied habitat with an estimated total area of 37 acres in 1989 confined to the Bayview site (MBKR Recovery Team, 1995).

In 1990, a casual walk over portions of the Bayview site revealed sparse but confirmed kangaroo rat sign (O'Farrell, unpublished data). In 1991, the Los Osos Oaks Preserve was examined visually and live-trapped twice with negative results (Gambis, personal communication). In 1995, trapping was performed at Los Osos Oaks Preserve and the Attman property, part of the Junior High/Santa Ysabel site and the remaining properties at the Junior High/Santa Ysabel site were visually surveyed (O'Farrell, 1995). The following year, the Pecho site was visually surveyed (O'Farrell, 1996a), the entire Junior High/Santa Ysabel site and the Buckskin site were surveyed visually and live-trapped (O'Farrell, 1996b), and the first protocol survey conducted on a small property near the Buckskin site (O'Farrell, 1996c). The second protocol survey was conducted the following year (O'Farrell, 1997a). Three parcels within Los Osos but outside the recognized historic occupied habitat were surveyed (O'Farrell, 1997b,c,d). Additionally, a 12-acre site adjacent to the northwest corner of the Bayview site was visually surveyed and live-trapped (O'Farrell, 1997e). In 1998, select sites at the Junior High/Santa

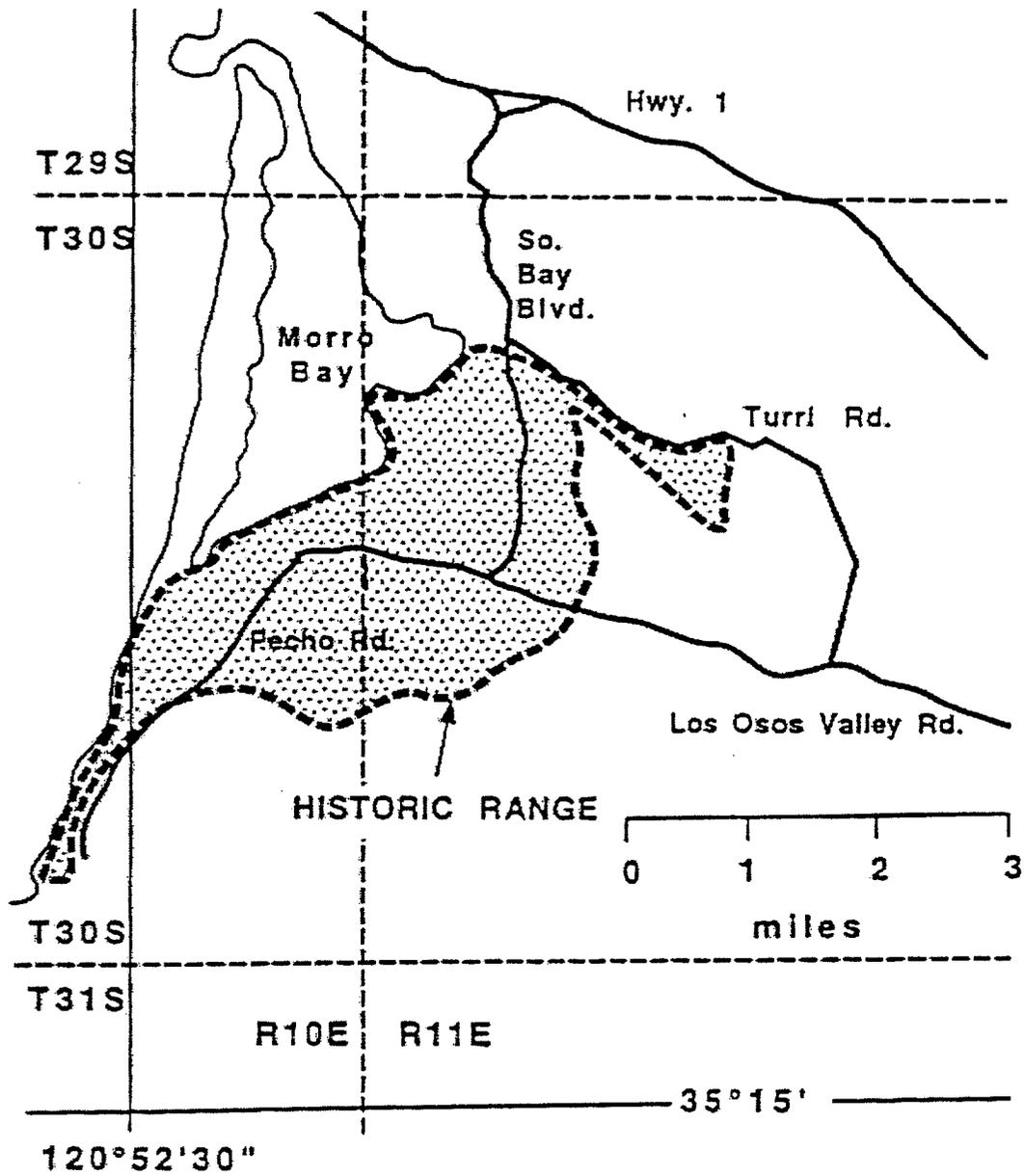


Figure 1. The historic range of the Morro Bay kangaroo rat (prepared by R. Gambs for the Draft Revised MBKR Recovery Plan, 19 June 1995).

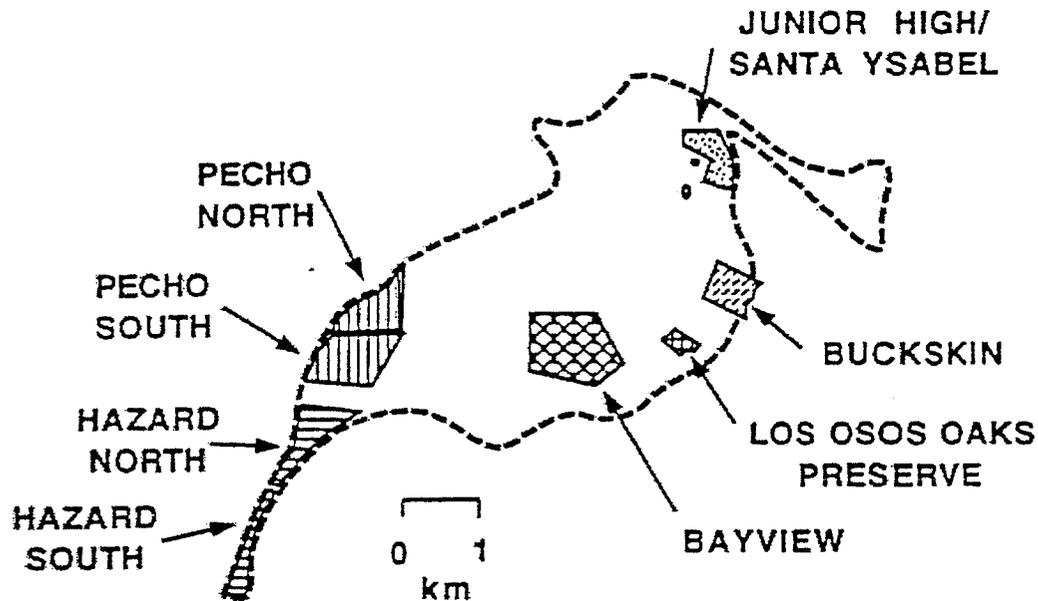


Figure 2. Location of the six disjunct sites within the historic range of the Morro Bay kangaroo rat, which were partly occupied by animals in 1971 (prepared by R. Gambs for the Draft Revised MBKR Recovery Plan, 19 June 1995).

Ysabel and Buckskin sites were visually surveyed again (O'Farrell 1998a, b, c), and two new properties from the north end of Pecho to the bay were visually surveyed (O'Farrell, 1998d). In 2000, the Bayview site and adjacent parcel at the northeast corner were visually surveyed (O'Farrell, 2000). Another visual survey of the Bayview site was conducted in 2001 (O'Farrell, 2001). All surveys since 1990 have yielded negative results.

The purpose of the present study was to perform a third visual survey on the Bayview site and Los Osos Oaks Preserve, select the best areas for trapping, and conduct three separate samplings through the three most optimal months for live trapping. The results of this intensive examination will provide the agencies and Recovery Team sufficient information to judge the status of MBKR.

## MATERIALS AND METHODS

A reconnaissance visual survey (100% coverage) was conducted on the Bayview site on 13 April 2002 by F. Villablanca to assist in placement of trapping grids. Based upon his examination and the known locations of historic captures on the site, we placed trapping configurations at eight discrete locations (Figure 3). Plot 1 was a 3 x 7 station grid with two traps per station. Plot 2 was a 4 x 7 station grid with two traps per station on the outer two lines and a single trap at each of the internal stations. Plot 2a was a small opening in the chaparral, a former historic location, which received six traps. Plot 3 was a 2 x 7 station grid with two traps per station. Plot 4 was a 4 x 16 station grid with one trap per station. Plot 5 was a 2 x 14 station grid with one trap per station. Plot 6 was a 2 x 7 station grid with one trap per station. Plot 7 was a pair of parallel lines of 8 and 9 stations with one trap per station, respectively. Plot 8 was a pair of parallel lines of 4 and 5 stations with one trap per station, respectively. Trap spacing was approximately 10 meters along each line and approximately 10-15 m between lines. Trapping was conducted in blocks of 5 consecutive nights from 15-19 April, 13-17 May, and 9-13 June 2002.

A reconnaissance visual survey (100% coverage) was conducted on the Los Osos Oaks Preserve on 8 June 2002 by F. Villablanca to assist in placement of traps. Based upon his examination, an irregular grid of four lines 5 to 12 stations each, was placed for a total of 40 traps. The placement was dictated by the irregular shape and size of the only relatively open habitat. Trap spacing was approximately 10 m between stations along each line and approximately 10 m between lines. Trapping was conducted 10-12 June 2002. The preserve had already received two visual and one trapping survey previously (fulfilling the accepted survey protocol) with negative results. However, to be conservative, trapping was conducted again in June 2002 coinciding with the most optimal weather conditions encountered during the survey period.

Live trapping was conducted using a mix of Stoddard live traps and their precursor mesh traps, which have been proven to be statistically superior to standard Sherman live traps, particularly for heteromyid rodents (O'Farrell et al., 1994). Traps were opened and baited with a combination of crimped oats, mixed birdseed, and peanut butter in the late afternoon. Traps were checked at sunrise. Each animal captured was identified to species and sex, assessed for reproductive condition and relative age, weighed with a Pesola scale, marked by clipping a patch of hair on the right flank, and released at the point of capture.

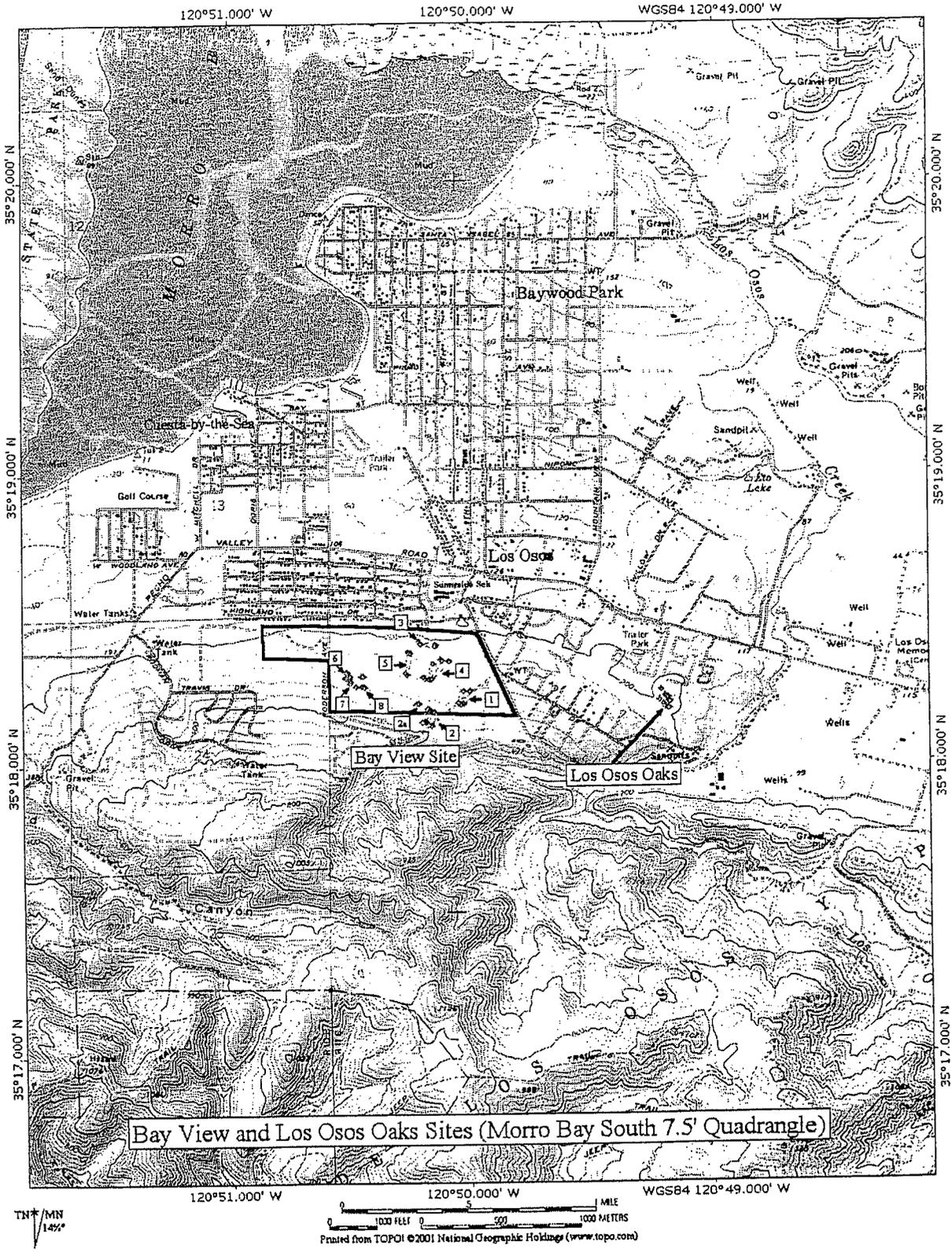


Figure 3. Location of trapping plots on the Bayview site and Los Osos Oaks Preserve.

All fieldwork was conducted by Michael J. O'Farrell, Theda M. O'Farrell, assisted by F. X. Villablanca and students from California Polytechnic University (Austin Guzman, Kevin Melaneply, Erica Lindgren, Amy Krish, Matt Willis and Chelsie Romulo). Trapping was conducted under a Memorandum of Understanding with California Department of Fish and Game and Federal permit TE744707-3.

## RESULTS

Trap response on the Los Osos Oaks Preserve yielded two *Chaetodipus californicus* and one *Sylvilagus auduboni*. Species are consistent with the current plant community sampled (Coastal sage scrub interspersed with manzanita chaparral. Little small mammal sign was noted on the ground surface. Soil conditions were ideal. Tracks of tenebrionid beetles were evident from one afternoon to the next morning. Had kangaroo rats been present, there is no doubt that diagnostic surface sign would have been readily apparent. The amount of open habitat has declined over the past 6 years, also consistent with a lack of kangaroo rat sign.

Trapping results from the Bayview site showed little change in composition over the three months of trapping (Tables 1-3). The number of new animals declined but so did the general number of individuals captured, except for *Chaetodipus*. Temperatures increased through the sampling period, with June being the warmest and driest month. It appeared that movements of *Peromyscus californicus* away from dense shrub cover became restricted as conditions became warmer and drier. A summary of distinct individuals captured through the survey for all plots indicated a suite of species more commonly found in well-developed sage scrub and manzanita chaparral than in open habitat (i.e., early successional coastal sage scrub) preferred by Morro Bay kangaroo rats (Tables 4). Although there was surface cover by grasses and other annual vegetation, there were sufficient open sandy areas in which to evaluate small mammal sign. In general, beetle and other animal sign was readily apparent from one afternoon to the next morning. Absolutely no indication was present that would definitively identify the presence of kangaroo rats.

Table 1. Summary of live-trapping results (number of new individuals; total number of recaptures given in parentheses) on the Bayview Site, Los Osos, San Luis Obispo County, California. Trapping was conducted 15-19 April 2002.

Species	Plot 1	Plot 2	Plot 2a	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
<i>Chaetodipus californicus</i>	6 (1)	2	1	2	1 (2)	3	1	1	-
<i>Neotoma fuscipes</i>	-	-	-	-	-	-	1	1	-
<i>Peromyscus californicus</i>	10 (7)	4 (1)	3 (2)	8 (4)	1 (1)	6 (4)	4 (1)	4	3 (1)
<i>Reithrodontomys megalotis</i>	-	-	-	1	1	3 (1)	-	-	-

Table 2. Summary of live-trapping results (number of new individuals; total number of recaptures given in parentheses) on the Bayview Site, Los Osos, San Luis Obispo County, California. Trapping was conducted 13-17 May 2002.

Species	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
<i>Chaetodipus californicus</i>	1 (4)	3 (2)	-	2 (1)	2 (1)	1	-	-
<i>Neotoma fuscipes</i>	-	-	-	1 (4)	-	1	-	-
<i>Peromyscus californicus</i>	1 (5)	-(2)	2 (3)	1	5 (2)	4 (5)	1 (2)	4 (1)
<i>Reithrodontomys megalotis</i>	-	-	-	3	1	2	-	-

Table 3. Summary of live-trapping results (number of new individuals; total number of recaptures given in parentheses) on the Bayview Site, Los Osos, San Luis Obispo County, California. Trapping was conducted 9-13 June 2002.

Species	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
<i>Chaetodipus californicus</i>	2 (2)	2 (2)	-	-	2 (2)	1	3 (3)	3
<i>Neotoma fuscipes</i>	-	-	-	-(3)	-	1	-	-
<i>Peromyscus californicus</i>	-(2)	2	1 (1)	-(2)	1 (2)	2 (3)	-	1
<i>Reithrodontomys megalotis</i>	-	-	-(1)	-	1 (1)	-	-	-

Table 4. Summary of live-trapping results (number of new individuals) for all three months combined on the Bayview Site, Los Osos, San Luis Obispo County, California.

Species	Plot 1	Plot 2	Plot 2a	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
<i>Chaetodipus californicus</i>	9	7	1	2	3	7	3	4	3
<i>Neotoma fuscipes</i>	-	-	-	-	1	-	3	1	-
<i>Peromyscus californicus</i>	11	6	3	11	2	12	10	5	8
<i>Reithrodontomys megalotis</i>	-	1	-	2	4	5	2	-	-

## DISCUSSION

The historic distribution of MBKR has been summarized by the MBKR Recovery Team (1995). A few individuals were captured a decade ago on the Bayview site. In 1991, I found sparse sign of MBKR in the east central portion of the Bayview site (unpublished personal observation). Although no kangaroo rat sign was observed in the present or surveys past 1991, the vegetation on portions of the Bayview site that contained MBKR sign in past years did not appear appreciably different in the present survey. The east central portion still contained substantial open habitat dominated by apparently suitable native plant species (MBKR Recovery Team, 1995). The Bayview site was the last remaining vestige of occupied habitat. A series of focused surveys over the past seven years throughout the entire historic range, excluding the Bayview site, have failed to produce MBKR. The lack of captures or sign of kangaroo rats in the present survey strongly suggests the taxon is extinct or extant but at an abundance below detection levels. The extended period of fragmentation, low population numbers, and continued habitat degradation due to natural succession and spread of invasive introduced plants provided a prescription for extinction. The unwillingness of the property owners and the regulatory agencies to reach an agreement allowing the removal of remaining individuals to place them in a captive breeding program exacerbated the recovery effort.

## CONCLUSIONS AND RECOMMENDATIONS

Based upon the past examinations of the entire historic range and the findings of the present surveys, following approved protocol methods, there is no other conclusion than there is no viable MBKR population existing within the historic range of the species. There is a remote possibility that a few undetected individuals may persist but would be unable to contribute to a functional population. Conditions on all sites with historic occupation are consistent with habitat that has reached seral conditions no longer suitable for MBKR occupation (Congdon and Roest, 1975). These sites have been developed, are isolated islands surrounded by development, or habitats that apparently are unsuitable for occupation or as movement corridors for MBKR. There is still substantial acreage of the historic range that is under State of California jurisdiction. Measures to rehabilitate existing habitat to accommodate kangaroo rat occupation can be performed.

The closest relative to *D. h. morroensis* is *D. h. arenae* (sensu Grinnell, 1922). *D. h. arenae* is found in the Santa Maria area. This taxon also is under threat of habitat loss and degradation that impact its long-term chances for survival. Preliminary genetic analysis aimed at

determining levels of genetic diversity within populations suggests little difference exists between the two taxa (Matocq and Villablanca, 2000). The Recovery Team has asked for funding to do a subspecies-level genetic analysis and has requested an opinion from U.S. Fish and Wildlife Service concerning potential introgression.

*D. h. arenae* was used as the surrogate for development of a captive breeding program to be applied to MBKR (see annual reports as cited in the draft revised recovery plan). As such, it would be feasible to commence a serious captive breeding program with this taxon. Coupled with a comprehensive effort to rehabilitate existing habitat to conditions commensurate with those supporting high MBKR populations in the 1950s and 1960s, the breeding program could provide a ready base of colonizers. It is well-documented in the literature that kangaroo rats can be keystone species. Kangaroo rats can have significant effects on the presence and abundance of shrubs, grasses and other small mammals (Brown and Heske, 1990), birds (Thompson et al., 1991), and ants (Davidson et al., 1984) all by means of seed bank mediated interactions. Establishing the state lands at Los Osos as a refugium for *D. h. arenae* will not only provide needed protection but return a key small mammal component to the community. Although it is impossible to discount the remote possibility that a few individual MBKR remain hidden within remaining historic locations, a meaningful genetic analysis should provide the basis for evaluating the consequences of potential introgression.

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