

MORRO BAY KANGAROO RAT (*Dipodomys heermanni morroensis*)

**5-Year Review:
Evaluation and Summary**



Photo credit: Moose Peterson

**U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
Ventura, California**

July 2025

5-YEAR REVIEW

Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)

GENERAL INFORMATION:

Species: Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*)

Date listed: October 13, 1970 (under the Endangered Species Preservation Act of 1966)

Federal Register (FR) citation(s): 35 FR 160

Classification: Endangered

Critical Habitat Designation:

We designated critical habitat for the Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*) on September 22, 1977 (42 FR 47841).

State Listing:

The State of California listed the Morro Bay Kangaroo Rat as endangered on June 27, 1971 (14 CCR § 670.5).

BACKGROUND:

Species overview:

The Morro Bay kangaroo rat is a small, nocturnal, burrowing rodent (family Heteromyidae) with elongate hind legs for hopping. Habitat for the species is characterized by sandy soils with low gradient that facilitate the construction of burrows (Service 1999 pp.14-15). These areas are typically associated with early seral coastal dune scrub vegetation where bare ground persists and herbaceous species are intermixed with woody species (Service 1999 pp. 15-19). The range of the species is generally considered to be an area corresponding to the distribution of Baywood fine sand soil series southeast of Morro Bay in San Luis Obispo County, California. The Morro Bay kangaroo rat has not been captured or seen in the wild since 1986, and the last captive individual died in 1993 (Thompson et al., 1995, p. 317).

Most recent status review:

[Service] U.S. Fish and Wildlife Service. 2021. Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, California.

We did not recommend a status change in the 2021 status review.

FR notice citation announcing this status review:

[Service] U.S. Fish and Wildlife Service. 2024. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 59 Pacific Southwest Species. Federal Register 89:83510–83514.

ASSESSMENT:

Information acquired since the last status review:

The U.S. Fish and Wildlife Service's Ventura Fish and Wildlife Office (VFWO) conducted this 5-year review. We announced the review through a Federal Register notice on October 16, 2024 (89 FR 83510). We did not receive any information from the public in response to the Federal Register notice. We also contacted species experts, land managers, and recovery permit holders, performed a literature search, and reviewed information in our files. In the last five years, the search for the Morro Bay kangaroo rat has continued on public lands (see Survey Efforts). We also have new information on a Habitat Conservation Plan within the range of the species (see Habitat Conservation Plans).

Distribution and Abundance

The historical range for the Morro Bay kangaroo rat is based primarily on the 1958 Stewart distributional study and includes a 4.8 square mile area southeast of Morro Bay surrounding the unincorporated community of Los Osos (Figure 1). This area is characterized by stabilized sandy soils with low gradient that facilitate burrow construction, which occur almost entirely on the Baywood fine sands soil series (Service 1999, p. 14-15, 2011, p. 2). Vegetation is characterized by early and midseral succession coastal dune scrub with areas of bare ground covered by a thin crust of lichen. Suitable vegetation is characterized by a mix of soft stemmed shrub species and young woody species. The Morro Bay kangaroo rat uses herbaceous species as food sources, acting as ecosystem engineer in the process (Longland & Dimitri, 2021, pp. 75-76). In more mature coastal scrub, the woody species replace the herbaceous species creating less suitable habitat. Morro Bay kangaroo rats show a preference for habitats with deerweed (*Acmispon glaber*), wedge leaf horkelia (*Horkelia cuneata*), and buckbrush (*Ceanothus cuneatus*) (Gamb & Holland, 1988 p. 121; Service 1999 p.15).

Habitat loss led to a rapid population decline from the late 1950s through mid-1980s. During this time, live trapping and visual surveys were done throughout the sites in Figure 2 (Service 1999, p. 9-11). Despite many searches that covered most of the known geographic range, the Morro Bay kangaroo rat has not been captured or seen in the wild since 1986. Villablanca (2021, p. 268) hypothesized that the population could have been displaced to the peripheries of its range, outside of what we consider the historical range. Before Stewart's study, Joseph Grinnell also described an area potentially broader than what we consider the historical range. Grinnell described an "area of four miles square of sandy ground around Morro Bay up to 250 feet above sea level" (Grinnell, 1922 p. 59). If this referred to an area 4 miles by 4 miles, it would be larger than the 4.8 square mile range from Stewart. Based on this, in 2021, we recommended that the search for the species be expanded to include the peripheral area of suitable habitat that had not been searched (Service 2021, p. 3). This included the Morro Bay sandspit, which was identified as potential habitat following a 2021 habitat assessment.



Figure 1. Distribution of sandy soils and the historical range of Morro Bay kangaroo rat (orange dotted line) in San Luis Obispo County, California. The yellow on Baywood Fine Sand indicates urban development as of 2007. Xs indicate where Morro Bay kangaroo rats were captured in Stewart’s 1958 distributional study. The Morro Bay sandspit is located between the Pacific Ocean and Morro Bay, labeled “Dune Sand”. This figure is from Kofron and Villablanca (2016).

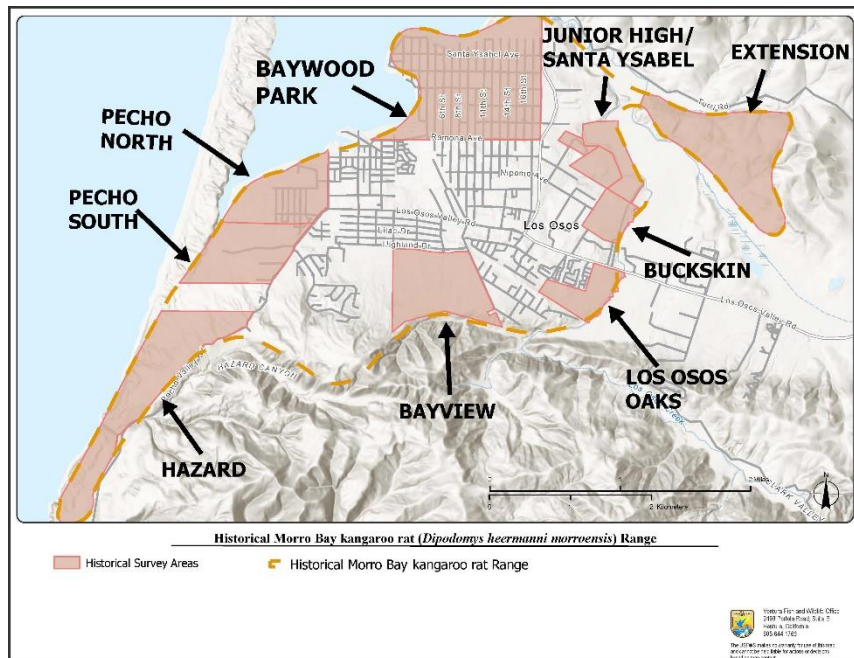


Figure 2. Historical survey areas for the Morro Bay kangaroo rat. The frequency of surveys at these sites vary. Many haven’t been surveyed for over a decade (Buckskin and Los Osos Oaks), but some are actively surveyed (Pecho South and Bayview) (CNDDDB 2025). Figure adapted from Service 1999.

Survey Efforts:

Since researchers have been unable to access many private properties, it was recommended that surveys continue on public lands. Surveys since the last 5-year review have included live trapping and wildlife cameras. The 2021 5-year review recommended that the search be expanded to the Morro Bay sandspit, and between 2021-2022 researchers from California Polytechnic State University San Luis Obispo conducted an extensive survey. This included a visual survey for signs of the species (tail drags, burrows, etc.) in the most suitable habitat. Baited camera traps were deployed in all seasons where signs were observed. The visual search yielded few observations of possible signs, and the camera traps yielded no positive results. Modeling showed a near zero probability of not detecting the Morro Bay kangaroo rat if it was present. Therefore, the study concluded that the Morro Bay kangaroo rat is not present on the Morro Bay sandspit (Hopkins et al., 2023, pp. 13-15). Most recently, CDFW is conducting extensive baited camera trap surveys in the Pecho and Bayview units of Morro Dunes Ecological Reserve. Ongoing surveys beginning in August of 2023 have yielded no positive results yet (B. Swanson, personal communication, January 15, 2025).

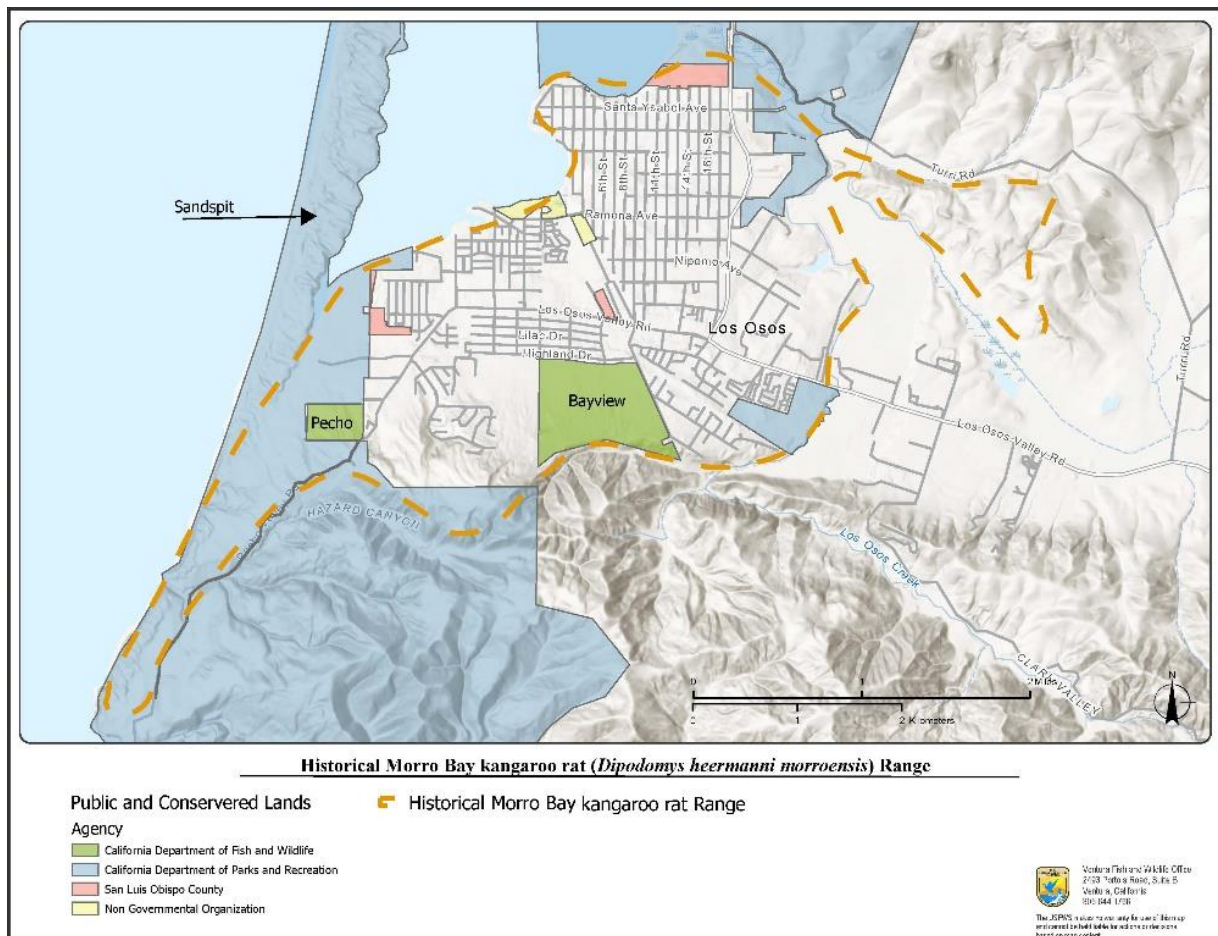


Figure 3. Public lands in the vicinity of Morro Bay and within the Morro Bay kangaroo rat historical range. The areas not highlighted within the range are privately owned.

The international standard for determination of extinction is that a species should be considered extinct when there is no reasonable doubt that the last individual has died. Alternately, a species can be presumed extinct when exhaustive time-appropriate surveys throughout its historical range have failed to identify an individual (International Union for Conservation of Nature, 2012, p. 14). While surveys have continued on public lands, several private properties within the historical range are inaccessible (Service 2011 pp. 10-14; Service 2021 pp. 2-3). Kofron and Villablanca (2016, p. 237) recognized that the Morro Bay kangaroo rat could be extinct but speculated that it may be persisting at extremely low density in isolated colonies on private properties.

Threats:

The two primary causes of decline of the Morro Bay kangaroo rat can be summarized as declining quantity and quality of habitat (Service 1982, p. 25). First, development in the community of Los Osos, including commercial, residential, and agricultural, has resulted in direct loss of habitat. Second, in the absence of fire, most former optimal habitats have matured to later successional stages of vegetation. Later successional stages of vegetation are denser, have substantially fewer annual food plants, negatively impact the locomotion of kangaroo rats, and change the diversity of the small mammal community with a likely increase in competition (Kofron & Villablanca, 2016, p. 244). Additionally, encroachment of perennial veldt grass (*Ehrharta calycina*) is modifying the sparse ground cover habitat feature (Service 2011, p.16). As a result, only pockets of early successional coastal dune scrub habitat remain, with optimal habitat comprising an estimated 1% of the historical geographic range (Kofron & Villablanca, 2016, p. 243). Additional ongoing threats of predation by cats, stochastic events, invasive plant species, and effects of climate change are identified (Service 2011, p. 19). The threat analysis in the 2021 5-year review remains current (Service 2021, p. 3).

Habitat Conservation Plans

There is a new Habitat Conservation Plan (HCP) that includes Morro Bay kangaroo rat as a covered species. In 2024, the Los Osos HCP was signed in an effort to set parameters for development and habitat mitigation in Los Osos. The HCP addresses the two primary threats to the Morro Bay kangaroo rat, development and succession, as well as additional threats like invasive plants. While most historical habitat has already been developed, a few large undeveloped parcels could be developed and redevelopment remains a threat. The impact of development may be partially offset by improving the quality of remaining habitat, thus potentially addressing the threat of plant community succession and invasive species. Mitigation efforts in Los Osos resulting from the HCP will be organized through a preserve system with the goal of protecting, restoring, and actively managing habitat in perpetuity. An adaptive management plan will be developed to guide habitat improvement through prescribed burns and active management of early successional coastal dune scrub (County of San Luis Obispo, 2024, p. 5-43). While the Los Osos HCP provides valuable habitat restoration and survey opportunities, development of key private land, especially large undeveloped parcels, continues to pose a threat to the species.

Evaluation of Recovery Criteria:

The 1999 draft revised recovery plan identifies downlisting criteria to be an effective population size of 500 individuals, corresponding to a census size of 2,000 individuals and the acreage necessary to maintain that number of individuals (500 acres when assuming a density of 4 individuals per acre). More land will be required if habitat is not managed to maintain 4 individuals per acre (Service 1999, pp. iii, 34).

There are currently over 500 acres within the historical range under protection (County of San Luis Obispo, 2024, p. 5-58). The Los Osos HCP preserve system could protect up to 107 additional acres through conservation easements. It is possible that there is enough protected land of sufficient quality to support a population. However, the Morro Bay kangaroo rat was last observed in 1986 (Thompson et al. 1995), therefore the abundance criterion has not been met.

Conclusion:

After reviewing the best available scientific information, we conclude that the Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*) remains an endangered species. Threats from development and habitat succession remain. Predation, habitat fragmentation, stochastic events, invasive plant species, competition with other burrowing rodents, and effects of climate change persist. Ongoing surveys within and outside of its historical range have failed to observe any individuals.

RECOMMENDATIONS FOR FUTURE ACTIONS:

1. Investigate the application and accuracy of emerging survey techniques such as eDNA to detect terrestrial cryptic species, such as in Mynhardt et al. (2024, p. 35).
2. Continue search efforts for Morro Bay kangaroo rats throughout the geographic range, including five private properties (descriptions reference survey areas in Figure 2):
 - a. Main Buckskin property
 - b. The property immediately northwest of the Buckskin property
 - c. One property south of Junior High/Santa Ysabel
 - d. One property in Baywood Park
 - e. The southeastern part of one property in Extension
3. Conduct habitat assessments on the full range of Baywood fine sands in the Morro Bay area. If suitable habitat is found, the area should be surveyed utilizing best practices.
4. Finalize and begin implementing the adaptive management plan for the Los Osos HCP preserve system. Continue to manage habitat for early successional coastal dune scrub.

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Approved _____

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