5-Year Review

Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)

July 2021

GENERAL INFORMATION

Species: *Dipodomys heermanni morroensis*
FR citation: 35 FR 16047
Date listed: October 13, 1970 (under the Endangered Species Preservation Act of 1966)
Classification: Endangered

BACKGROUND

Most recent status review:
U.S. Fish and Wildlife Service. 2011. Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office. Ventura, California.

FR Notice citation announcing this status review:
U.S. Fish and Wildlife Service. 2020. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews of 66 Species in California and Nevada. Federal Register 85:4692–4694.

ASSESSMENT

Information acquired since the last status review:
This 5-year review was conducted by the U.S. Fish and Wildlife Service (Service) Ventura Fish and Wildlife Office. Data for this review were solicited from interested parties through a Federal Register notice announcing this review on January 27, 2020. Additionally, we conducted a literature search and a review of information in our files. In general, little work has been done on the Morro Bay kangaroo rat since the last 5-year review (Service 2011), except as reported by Kofron and Villablanca (2016) and Villablanca et al. (2021). Benedict et al. (2019) completed a recent genetics study that included the Morro Bay kangaroo rat.

The Morro Bay kangaroo rat is a small, nocturnal, burrowing rodent (family Heteromyidae) with elongate hind legs for hopping. The species occurs on old, stabilized sand dunes (windblown sand deposited late to middle Pleistocene; Wiegers 2009) in the vicinity of Los Osos in San Luis Obispo County, California. The range of the species is generally restricted to an area of approximately 12.4 square kilometers (km) (4.8 square miles (mi)) corresponding to the distribution of Baywood fine sand south and southeast of Morro Bay.

The Morro Bay kangaroo rat was federally listed as endangered in 1970 (35 FR 16047, p. 16047). It was designated as fully protected pursuant to the California Fish and Game Code in 1970 (California Fish and Game Commission 1970). Field research from the late 1950s to mid-1980s (reviewed in Kofron and Villablanca 2016) documented a rapid population decline. 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. The last captive individual died in 1993 (Thompson et al. 1995, p. 317).

Taxonomy:
Several genetics studies have been conducted to evaluate the distinctiveness of the Morro Bay kangaroo rat and other subspecies of *Dipodomys heermanni* that occur within San Luis Obispo County, and the Morro Bay kangaroo rat has been regarded as a genetically distinct, monophyletic taxon (Matocq and Villablanca 2001; Villablanca 2007). Recently, Benedict et al. (2019, p. 72) concluded that none of the nine subspecies of *D. heermanni* are valid, which included the Morro Bay kangaroo rat (*D. heermanni morroensis*). Because methods employed in Benedict et al. (2019) do not satisfy recommended best practices for questioning genetic distinctness of listed taxa (McCormack and Maley 2015, p. 384), we continue to rely on previous studies that demonstrated monophyly of the listed entity.

Distribution and Abundance:
Because the Morro Bay kangaroo rat has not been observed in the wild since 1986 and because there are no longer any in captivity, the 2011 5-year review considered it as possibly extinct. Kofron and Villablanca (2016, p. 237) also recognized that the Morro Bay kangaroo rat could be extinct and speculated that the subspecies may be persisting at extremely low density in isolated colonies. Therefore, it was recommended that surveys continue on the public lands where the greatest concentrations of potential signs were observed in 2011, specifically at Pecho South (Morro Dunes Ecological Reserve West, and Montaña de Oro State Park) and Junior High/Santa Ysabel (Morro Bay State Park).

In 2016, wildlife scent-detection dog and baited camera trap surveys were conducted in four historically-occupied areas: Pecho South, Junior High/Santa Ysabel, Bayview (Morro Dunes Ecological Reserve East) where the last capture of a Morro Bay kangaroo rat occurred in 1986, and in vicinity of the parking lot in north Hazard (Montaña de Oro State Park). These locations were chosen because they had potential signs of Morro Bay kangaroo rat presence in 2011 and 2013 (Villablanca et al. 2021, p. 267). The dog alerted at two sites in Pecho South and showed special interest at two sites in vicinity of the parking lot in north Hazard. The four sites were in open, low-growing coastal sage scrub with elements of Morro manzanita (*Arctostaphylos morroensis*) in Montaña de Oro State Park and comprised typical habitat for the Morro Bay kangaroo rat (Villablanca et al. 2021, p. 267). The surveys produced no evidence (photographic images) of Morro Bay kangaroo rats, despite using a trained wildlife scent-detection dog and baited camera traps at alert sites. However, a degree of uncertainty remains because the scent-detection dog committed no false-positive errors during final testing, and the dog was excited and persistent in searching at each alert site.

Villablanca et al. (2021) concluded that their results, combined with all other existing data, do not allow a determination as to whether the Morro Bay kangaroo rat is extinct or extant. For a

definitive determination of extinction, the international standard is that a species should be considered extinct only when there is no reasonable doubt that the last individual has died (International Union for the Conservation of Nature 2012, p. 14), and this standard has not been met. In addition, the Morro Bay sand spit (total area 4.35 km^2) is a peripheral area comprised mostly of Baywood fine sand, and is potentially part of the geographic range with suitable habitat that has never been searched. Therefore, considering all available information, Villablanca et al. (2021) concluded that the Morro Bay kangaroo rat must be considered as possibly extant.

Threats:
There are two primary causes of decline of the Morro Bay kangaroo rat, which were identified in the 1982 Recovery Plan (Service 1982, p. 25) and remain ongoing. First, development in the vicinity of Los Osos, including homes, shopping centers and parking lots, has resulted in direct loss of habitat. The Morro Bay kangaroo rat inhabits predominantly early and midseral stages of coastal dune scrub on sandy soil. Only pockets of this habitat remain in the known geographic range, with optimal habitat (early seral stages of coastal dune scrub) comprising an estimated 1% of the historical geographic range (Kofron and Villablanca 2016, p. 243). Second, in the absence of fire, most former optimal habitats for the Morro Bay kangaroo rat 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 and Villablanca 2016, p. 244). The 2011 5-year review also identified predation by cats, habitat fragmentation, stochastic events, invasive plant species, competition with other burrowing rodents, and effects of climate change. These threats are also considered to be on-going.

RECOVERY CRITERIA

A recovery plan was completed in 1982 (Service 1982) and a draft revised recovery plan in 1999 (Service 1999). The latter document (Service 1999, p. 34) states the following: "…Morro Bay kangaroo rats may be reclassified as threatened when an effective genetic population size (N_e) of 500 has been achieved (translating to an actual census size of about 2,000 individuals), and then sustained with a mean at that level for 10 consecutive years, with adequate geographic distribution."

Because a Morro Bay kangaroo rat was last captured in 1986 and the last captive individual died in 1993 (Thompson et al. 1995), the draft revised recovery plan has not been finalized and this criterion has not been met.

CONCLUSION

After reviewing the best available scientific information, we conclude that evaluation of threats affecting the species under the factors in 4(a)(1) of the Act in our 2011 5-year review remains accurate and that the Morro Bay kangaroo rat still meets the definition of an endangered species, and we recommend no status change at this time.

RECOMMENDATIONS FOR FUTURE ACTIONS

1. Continue search efforts for Morro Bay kangaroo rat:
   - at the Morro Bay sand spit with camera traps, which has never been searched;
   - at Pecho South and Bayview while attempting to cover a greater sample area with a wildlife scent-detection dog followed by camera trapping, and further south in Hazard;
   - and at four private properties: main Buckskin property and the property immediately northwest, one property south of Junior High/Santa Ysabel, and one property in Baywood Park.
2. Re-evaluate the validity or non-validity of Morro Bay kangaroo rat as a subspecies of *D. heermanni* with special emphasis on the genetics.

APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

Approved STEPHEN HENRY Digitally signed by STEPHEN HENRY Date: 2021.07.08 13:54:05 -07'00'

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