San Bernardino Kangaroo Rat
(*Dipodomys merriami parvus*)

5-Year Review:
Summary and Evaluation

Photo courtesy of Art Davenport (*Davenport Biological Services*)

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California

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5-YEAR REVIEW

San Bernardino Kangaroo Rat
(*Dipodomys merriami parvus*)

GENERAL INFORMATION

Subspecies: San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*), a mammal subspecies
Date listed: September 24, 1998
Federal Register citation: Service 1998b (63 FR 51005)
Classification: Endangered
Recovery Priority Number: 6C
Critical habitat: Service 2008

Methodology Used to Complete the Review

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened species and endangered species to determine whether its status has changed, and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the San Bernardino kangaroo rat as part of a Species Status Assessment (SSA) to inform this 5-year review.

The SSA report (Service 2023a, entire) represents our evaluation of the best available scientific information, including resource needs, factors affecting viability of the species, and current and future condition of the species. We developed three future scenarios that include a range of environmental and management conditions to discuss the viability of the species in the future. Independent peer reviewers and partner representatives reviewed the SSA report before we used it as the scientific basis to support our 5-year review analysis.

Federal Register Notice announcing this status review: On August 17, 2023, we published a Federal Register notice announcing initiation of the 5-year review of this species, and the opening of a 60-day comment period to receive information (Service 2023b, entire). No comments relative to the San Bernardino kangaroo rat were received.

REVIEW ANALYSIS

Species Overview and Habitat

The San Bernardino kangaroo rat (*Dipodomys merriami parvus*) is 1 of 19 recognized subspecies of Merriam's kangaroo rat (*D. merriami*) which is a widespread species distributed throughout arid regions of the western United States and northwestern Mexico (Hall 1981, p. 586; Williams, *et al*. 1993, p. 62). Historically, this subspecies occupied alluvial floodplains and adjacent upland habitats within the San Bernardino, Menifee, and San Jacinto valleys and the typical vegetation type associated with this subspecies is Riversidean alluvial fan sage scrub (Service 1998b, p. 51005).

The San Bernardino kangaroo rat is a small, burrowing rodent, capable of dispersing up to 0.3 miles (0.4 kilometers) in search of mating opportunities during the breeding season (Braden 2001, pp. 1–3). The range of this animal had been reduced by up to 96 percent by the time the species was emergency listed (Service 1998a, p. 3835).

Since listing, new information has been obtained showing the subspecies can colonize a greater diversity of habitats than originally thought (Braden and McKernan 2000, p. 17). Because the distribution of San Bernardino kangaroo rats appears to be driven by soil type rather than any other habitat conditions, the hydrologic regime in the alluvial fans is of great importance to their recovery. Particularly in areas where the channel is deeply entrenched, maintaining habitat connectivity between upland terrace habitat and the channel to facilitate movement of animals between upland and instream habitat is critical to support animals in both locations (Service 1998b, p. 51008).

Updated Information and Current Subspecies Status

Biology and Habitat

Since the latest status review in 2020, a habitat use model developed by the San Diego Zoo Wildlife Alliance was created, consisting of models developed at the microhabitat and landscape scale to determine the extent of suitable habitat for the San Bernardino kangaroo rat (Chock *et al*. 2020, entire). We utilized the landscape model throughout the range to determine potential suitable habitat. The final variables used in the landscape model of suitable habitat consisted of slope and elevation, annual precipitation, January minimum temperature, August maximum temperature, percent clay, fluvent soils, Normalized Difference Vegetation Index (NDVI), alluvial scrub cover, and human development (Chock *et al*. 2020, p. 4). The new model indicates that the San Bernardino kangaroo rats are generally more abundant in areas with low shrub cover (less than 20 percent), low annual grass cover (less than 30 percent), low cover of woody debris (6–13 percent), and areas with greater than 50 percent bare ground with exposed sand and a gravel component greater than 25 percent (Chock *et al*. 2020, p. 9). The model highlights unoccupied upland areas that are highly degraded as potentially suitable. While not suitable in its current condition, future intensive restoration work could potentially make these areas suitable for the subspecies in the future.

Recent burrow casting has documented 1 to 5 burrow entrances (mean of 3.1) and 3 to 13 chambers (mean of 5.3) per burrow, with a deepest tunnel depth of 16.5 inches (42 centimeters) and a longest main tunnel length of 29.5 feet (9 meters), with 60 percent of tunnels located directly under shrubs (Shier *et al*. 2024, entire). Based on this research, the burrow system of San Bernardino kangaroo rat is more extensive than previously described.

Distribution and Genetics

Currently the San Bernardino kangaroo rat occupies the last remaining habitat patches that contain the necessary elements to support the subspecies (Figure 1). The subspecies continues to occupy three watersheds (i.e., Lytle Cajon Creeks, Santa Ana River, and San Jacinto River) and the effective population sizes are relatively small in each of these watersheds (Shier *et al*. 2022,

p. 51). Effective population sizes are small across the range, with inbreeding likely occurring (Shier *et al*. 2022, p. 5). The effects of inbreeding could have negative impacts in the future, especially in the smallest and most genetically distinct population (San Jacinto population). In the future, deleterious effects from small populations may contribute to lost representation through reduced genetic diversity or the complete loss of a population.

Threats

In the SSA Report, we evaluated threats impacting San Bernardino kangaroo rats and their habitat. This included habitat loss (development, agricultural activities, and mining activities) (Factor A), habitat degradation (groundwater recharge, and flood control activities, off highway vehicles (OHV) use, nonnative grasses) (Factor A), climate change effects (Factors A & E), and predation (Factor C) (Table 1). The level of threats remains similar to the last status review completed in 2020 (Service 2020, entire). If current trends continue, the threats that limit habitat availability (especially upland refugia) may result in further declines.

Under the pressure of these threats, condition categories were developed in the SSA to describe current population resiliency. High resiliency indicates that all population needs are clearly met. Medium resiliency means some population needs may be minimally present and low resiliency means that one or more population needs were not met. Resiliency for the Lytle and Cajon Creeks population is low to moderate. Habitat in the Lytle and Cajon Creeks population is partially degraded, but not limited in its extent; and some areas of lowland and upland habitat are connected to facilitate dispersal. Both populations are likely large enough to recolonize the floodplain after a large flooding event and have sufficient upland acreage to support long-term survival. The Santa Ana River is considered moderately resilient. The habitat in these population is less degraded and occupied habitat is more connected to facilitate dispersal. In contrast, the San Jacinto population is considered to have a low resiliency. This population has little refuge habitat remaining, which could impact the long-term survival of San Bernardino kangaroo rats. Habitat in this population is more degraded and there is little dispersal between upland and floodplain habitat. In the future, deleterious effects from small effective populations may contribute to further losses in representation as genetic diversity or loss of a population. It is therefore important to retain occupancy throughout the current range to maintain both representation and redundancy.

Conservation

Recent funding of over 1 million dollars has been allocated to purchase 32 acres (13 hectares) of kangaroo rat habitat in the city of Rialto. Since kangaroo habitat is limited, these recovery actions are important to ameliorate the impacts of habitat loss and degradation.

Table 1. Summary of Current Threats to the San Bernardino Kangaroo Rat and its Habitat.

Threat	Specific Threats	**Need Affected** (habitat or demographic)	Intensity	Scope of Threat	Immediacy	Magnitude
Habitat Loss	Urban development; facility development for flood control; aggregate mining; groundwater recharge; road-crossings and freeway overpasses; pipeline emplacement.	Habitat	Population	Rangewide	Current	High
Habitat Degradation	Operations and maintenance of flood control; aggregate mining; agriculture; nonnative grasses; human encroachment activities including OHV-use, transient encampments, illegal trash-dumping.	Habitat	Population	Rangewide	Current	High
Disruption to Hydrologic Processes	Dams, road crossings, instream berms to protect mining pits, unauthorized berms (e.g., constructed to facilitate OHV use).	Habitat	Population	Rangewide	Current	High
Flooding[1]	Natural Flooding.	Habitat/Demographic	Population	Rangewide	Current	Moderate
Drought[1]	Prolonged drought.	Habitat	Population	Rangewide	Future	Moderate
Predation[2]	Predation from domestic and feral cats.	Demographic	Individual	Rangewide	Future	Low/None

[1] Impacts from flooding and drought are the specific threats created from the effects of climate change.
[2] Discussed as a possible threat.
Intensity: Scale of impact (population or individual level). Scope: Threat localized or rangewide. Immediacy: Timeframe of threat (present or in the future).
Magnitude: Overall level of threat.

Recovery Criteria

Recovery Plan:

U.S. Fish and Wildlife Service. 2023c. Draft Recovery Plan for San Bernardino kangaroo rat. U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. iv + 8 pp.

None of the criteria have been met as the draft Recovery Plan was recently completed in 2023. Future status assessments will evaluate completion of recovery criteria.

CONCLUSION

San Bernardino kangaroo rats are currently distributed among three isolated populations. These core areas make up the majority of the modeled habitat thought to be suitable for the subspecies within the historical range. There is some evidence of inbreeding that could have negative impacts in the future, especially in the smallest and most genetically distinct population (San Jacinto population).

Threats identified for San Bernardino kangaroo rats include habitat reduction and fragmentation by development, flood control structures and operations, agriculture, groundwater recharge, OHV activities, predation, and climate change in the San Bernardino and San Jacinto valleys. After reviewing the best available scientific information, we conclude that the San Bernardino kangaroo rat remains an endangered subspecies. Based on the evaluation of threats affecting the subspecies under the factors in 4(a)(1) of the Act and analysis presented in the 2023 SSA (Service 2023a), we believe that the San Bernardo kangaroo rat remains an endangered species.

Species recovery will require the maintenance of occupancy throughout the current range to maintain both representation and redundancy.

RECOMMENDATIONS FOR FUTURE ACTIONS

The recommended actions listed below are to be initiated over the next 5 years. Successful implementation of these actions will reduce threats to the San Bernardino kangaroo rat and provide information to better understand the biological and physical factors limiting the population growth and distribution. We recognize that conservation of this taxon will require cooperation and coordination with partners to minimize impacts from current threats and aid with future restoration efforts.

1. Conduct research to inform management actions and successfully implement habitat restoration techniques restore habitat where appropriate throughout the range of the subspecies.

2. Create and implement a protocol for range wide surveys and monitoring.

3. Restore and protect other potentially suitable habitat including upland refugia habitat throughout the range of the subspecies.

4. Increase population abundance at extant occurrences and expand distribution in the wild using reestablishment and augmentation as recovery tools.

5. Use management tools to improve connectivity and maintain/restore populations.

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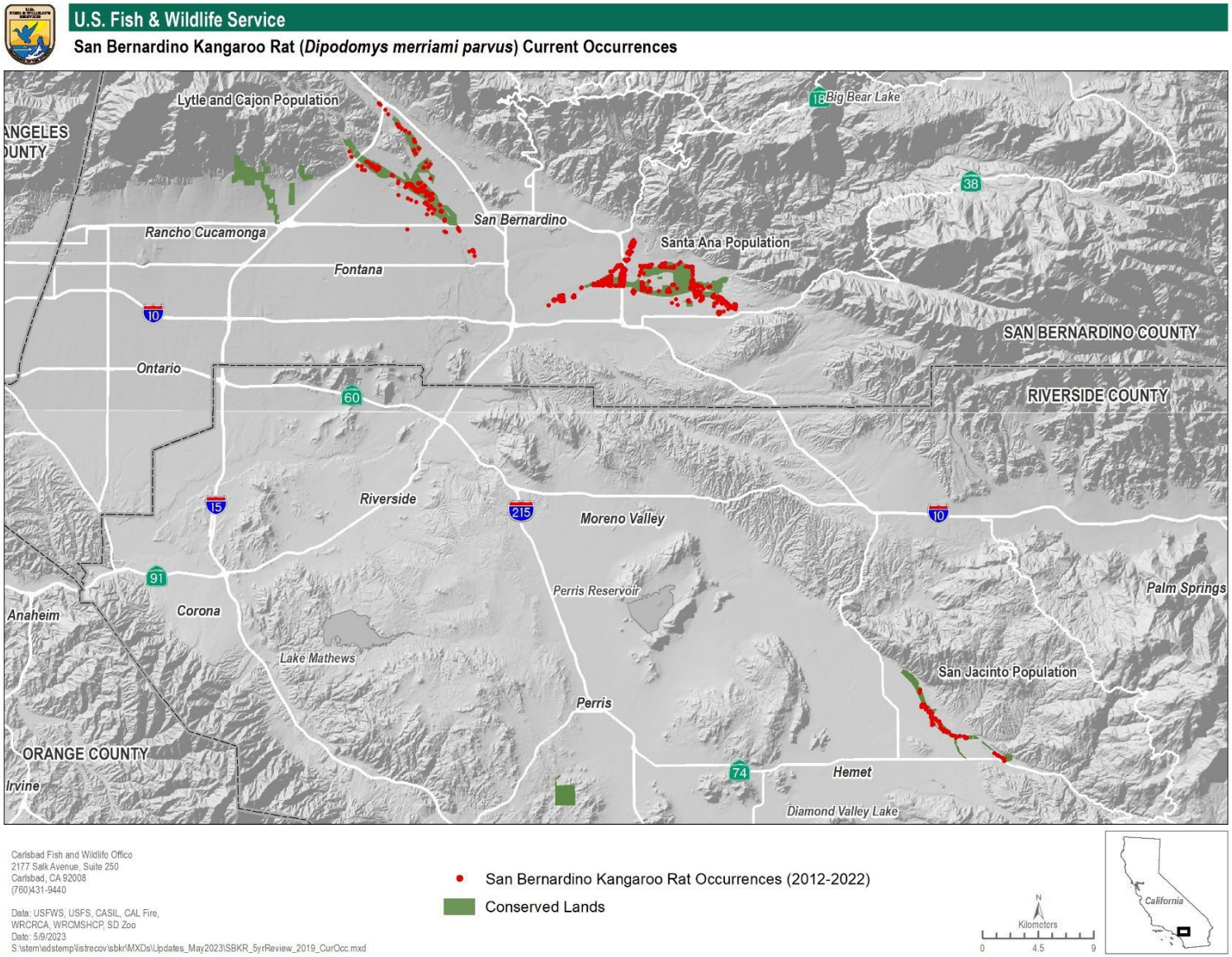

Figure 1. Current distribution for the San Bernardino kangaroo rat (includes all known occupancy data from 2012 to 2022) in San Bernardino and Riverside Counties.

FIELD OFFICE APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

☒ Approved

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