10. SAN BERNARDINO KANGAROO RAT

Today's Item **Information ☐** **Action ☒**

Consider whether listing San Bernardino kangaroo rat (*Dipodomys merriami parvus*) as threatened or endangered under the California Endangered Species Act (CESA) may be warranted

Summary of Previous/Future Actions

• Received petition	Mar 15, 2019
• FGC transmitted petition to DFW	Mar 22, 2019
• Published notice of receipt of petition	Apr 12, 2019
• Public receipt of petition	Apr 17, 2019; Santa Monica
• Received DFW's 90-day evaluation report	Jun 12-13, 2019; Redding
• **Today determine if petitioned action may be be warranted**	**Aug 7-8, 2019; Sacramento**

Background

In Mar 2019, FGC received a petition (Exhibit 1) from the Endangered Habitats League (petitioner) to list San Bernardino kangaroo rat as endangered under CESA. The petition was formally received by the public at the Apr 2019 FGC meeting.

California Fish and Game Code Section 2073.5 requires that DFW evaluate the petition and submit to FGC a written evaluation with a recommendation, which was received at FGC's Jun 12, 2019 meeting (Exhibit 3). The report delineates each of the categories of information required for a petition, evaluates the sufficiency of the available scientific information for each of the required components, and incorporates additional relevant information that DFW possessed or received during the review period. Based upon the information contained in the petition and other relevant information, DFW has determined that there is sufficient scientific information available to indicate that the petitioned action may be warranted (Exhibit 2).

Today's agenda item follows the public release and review period of the evaluation report prior to FGC action, as required in Fish and Game Code Section 2074. If FGC determines listing may be warranted pursuant to Section 2074.2 of the Fish and Game Code, a one-year status review will commence before a final decision on listing is made.

CESA and FGC's regulations require that the petition contain specific scientific information related to the status of the species. CESA, and case law interpreting it, make clear that FGC must accept a petition when the petition contains sufficient information to lead a reasonable person to conclude that there is a substantial possibility the requested listing could occur; the requested listing is tied to the species' status, that is, whether the species' continued existence is in serious danger or is threatened by a number of factors, and in no way relates to economic consequences that might result from listing.

Significant Public Comments

1. Six organizations and nine members of the public commented in support of listing, including Friends of Harbors, Beaches and Parks; Natural Resources Defense Council (Exhibit 9); San Diego Zoo Institute for Conservation Research (Exhibit 7); The Urban Wildlands Group; Audubon California (Exhibit 8); and Defenders of Wildlife (Exhibit 10). The comments cite population declines, threat from future development, threat from federal management, man-made habitat changes that jeopardize each of the remaining populations, challenges of conservation efforts, risk of light pollution from further development, risk from potential development along Lytle Creek, and the view that CESA listing is the only way to save the species from extinction.
2. The petitioner provided additional information intended to substantiate the view that federal regulatory mechanisms are not adequate an an alternative to CESA for providing protections to the species. The information includes copies of a briefing document and emails from the developer and U.S. Fish and Wildlife Service obtained through the Freedom of Information Act related to consideration of San Bernardino kangaroo rat in the Lytle Creek Ranch Project (Exhibit 4).
3. Three biologists provided comment letters, transmitted by the petitioner via email, with biological rationale for recommending advancement of the San Bernardino kangaroo rat to candidate status (Exhibit 5).
4. A law firm provided a comment letter, transmitted by the petitioner via email, discussing the legal standards for advancement to candidate status, and recommending such on that basis (Exhibit 6).
5. Eighteen form letters support listing (see example Exhibit 11).

Recommendation

FGC staff: Determine that listing may be warranted.

DFW: Accept and consider the petition for further evaluation.

Exhibits

1. CESA petition, received on Mar 15, 2019
2. DFW memo, received May 20, 2019
3. DFW 90-day evaluation report, dated May 30, 2019
4. Email and attachments from Dan Silver, Endangered Habitats League, received Jul 23, 2019
5. Letters (and curriculum vitaes) from Steve Montgomery, Dr. Wayne Spencer, and Gerald Braden, with transmittal email from Dan Silver, Endangered Habitats League, received Jul 23, 2019
6. Letter from Chatten-Brown, Carstens & Minteer LLP, with transmittal email from Dan Silver, Endangered Habitats League, received Jul 23, 2019
7. Letter from San Diego Zoo Institute for Conservation Research with 10 signatures, with transmittal email from Debra M. Shier, Ph.D, received Jul 24, 2019

8. Email from Juan Altamirano, Audubon California, received Jul 25, 2019
9. Email from Damon Nagami, Natural Resources Defense Council, received July 22, 2019
10. Letter from Kim Delfino, Defenders of Wildlife, received July 25, 2019
11. Sample form letter sent in support of listing
12. Letter from David Ivester, Briscoe Ivester & Bazel LLP, with transmittal email from Margaret Howlett, received May 30, 2019

Motion/Direction

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the Fish and Game Code, finds that the petition to list San Bernardino kangaroo rat as endangered species **does** provide sufficient information to indicate that the petitioned action **may be** warranted based on the information in the record before the Commission, and directs staff to issue a notice reflecting this finding and that San Bernardino kangaroo rat is a candidate for threatened or endangered species status.

OR

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the Fish and Game Code, finds that the petition to list San Bernardino kangaroo rat as an endangered species **does not** provide sufficient information to indicate that the petitioned action may be warranted based on the information in the record before the Commission.

FGC - 670.1 (3/94)

A PETITION TO THE STATE OF CALIFORNIA
FISH AND GAME COMMISSION

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED:

Common Name: San Bernardino Kangaroo Rat

Scientific Name: (*Dipodomys merriami parvus*)

II. RECOMMENDED ACTION:

(Check appropriate categories)

a. List X b. Change Status ☐

As Endangered X from _____

As Threatened ☐ to _____

Or Delist ☐

III. AUTHORS OF PETITION:

Name: Michael White, PhD; Gerald Braden; Dan Silver, MD

Address: c/o Endangered Habitats League, Attn: Dan Silver

8424 Santa Monica Blvd, Suite A 592, Los Angeles, CA 90069-4267

Phone Number: (213) 804-2750

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signatures: _____

Date: March 14, 2019

PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION SUPPORTING INFORMATION FOR

San Bernardino Kangaroo Rat	***(Dipodomys merriami parvus*)**
Common Name	**Scientific Name**

EXECUTIVE SUMMARY

Based on a scientific review of its distribution and status, this petition requests that the San Bernardino kangaroo rat (*Dipodomys merriami parvus* [SBKR]) be listed as Endangered by the California Fish and Wildlife Commission. SBKR is a heteromyid rodent that historically occurred in alluvial fan scrub habitats associated with active floodplains across over 325,000 acres of the San Bernardino and San Jacinto/Perris valleys. Habitat quality and SBKR densities (varying from 1-30 individuals/acre) are higher in floodplains with active fluvial processes and sandy or gravelly soils and substrates, generally supporting open-structured alluvial fan scrub vegetation, that are connected to nearby upland and/or less frequently inundated terraces that serve as flood refugia. Due to extensive urban, commercial, and agricultural development of these areas, SBKR is currently restricted to about 5% of this historical range, and much of this remaining habitat is highly fragmented and degraded by indirect effects. Critically, extensive channelization and water management activities have irreversibly degraded the natural fluvial processes that historically maintained SBKR habitat. Climate change is expected to exacerbate adverse impacts to SBKR.

In response to the dramatic loss of habitat experienced by SBKR, it was listed as Endangered by the U.S. Fish and Wildlife Service (Service) in 1998. Since its listing, however, its status has continued to decline. The Service considers seven populations extant in 1998 to be extirpated, and SBKR is now confined to three discontinuous blocks of habitat: Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River. Although the Service designated 33,295 acres of Critical Habitat in 2002, it considers only 16,300 acres of that to be currently functioning for SBKR (but not necessarily occupied by SBKR). Since 1998 we estimate that over 11,000 acres of potential SBKR habitat (regardless of its quality or occupation) has been lost even when regulated under the Endangered Species Act. Since the 1998 federal listing, federal permitting allowed the fundamental hydrologic basis for persistence of the largest SBKR population to be lost, and mitigation measures performed under federal consultations have been ineffective.

SBKR historical habitat occurs in naturally functioning alluvial fan systems, which are highly dynamic, constantly shifting networks of braided channels. Habitat quality is frequently reworked through scouring and alluvium deposition during fluvial events, and subsequent vegetation establishment and succession on floodplain terraces. SBKR population persistence relies on the availability of higher elevation floodplain terraces to escape lethal flooding events. Individuals from these higher elevation areas can repopulate reworked habitats once suitable.

Much of the remaining SBKR habitat has been adversely modified by channelization, flood control, and water management activities such that the natural hydrologic regimes of the alluvial fan systems, that historically maintained SBKR habitat, are now gone and/or much of the higher elevation refugia available to the species are physically disconnected from remaining SBKR

populations. For example, the prospect for long-term persistence of SBKR and its habitat in the Santa Ana River area is poor because of the construction of Seven Oaks Dam (SOD), and nonnative plant invasion and vegetation type conversion limit habitat quality and persistence in the Plunge Creek area. Likewise, probability of persistence is poor in the upper reaches of City Creek and in Mill Creek habitats as a result of flood control operations and suburban development. Habitat along Lytle Creek now largely exists within levee-modified or channelized floodplains which are subject to high stream velocity and scouring events relative to historical conditions, exposing SBKR populations to potentially catastrophic flood events with little available refugia. The cumulative impacts of habitat loss and land-use changes jeopardize the continued existence of the species under existing conditions, yet new development proposals further threaten important blocks of SBKR habitat that still have functioning fluvial processes.

The primary threat to SBKR is the direct impact of past and present modification and destruction of its habitat. A new range-wide genetic assessment of SBKR confirms these negative trends in habitat and population loses for conservation and recovery of the species. SBKR in the Lytle/Cajon creeks, Santa Ana River, and San Jacinto River/Bautista Creek blocks of habitat have low effective population sizes. The genetic structure of the three populations is unique, reflecting their relatively recent isolation from each other due to loss of connectivity. The conservation genetics research by the San Diego Zoo Institute for Conservation Research confirm the isolation, low genetic diversity, and small effective population sizes and recommend "preventing further impacts to SBKR populations and increasing numbers."

Since the federal listing, mitigation efforts for past impacts to SBKR have not successfully compensated for the loss of suitable, as well as occupied, SBKR habitat. Yet, at this time, major additional loss of SBKR habitat is proposed and is being reviewed by the Service. For example, the City of Rialto approved the Lytle Creek Ranch development in 2010 and the project is undergoing an Endangered Species Act section 7 consultation. According to the Service, ~1,920 acres of the proposed Lytle Creek Ranch project falls within SBKR Critical Habitat and ~1,191 acres of that (62%) would be adversely impacted by the project. Mitigation measures proposed by the project applicant include the same unproven measures that have not adequately mitigated the loss of SBKR habitat in the past. Furthermore, the project would eliminate the vital terrace refugia habitat that remains along Lytle Creek. Given the negative consequences to SBKR from the loss of hydrologic functions on the Santa Ana River due to the operation of the SOD, the loss of additional functional, SBKR-occupied habitat on Lytle Creek would likely be catastrophic to the long-term persistence of SBKR.

An objective look at SBKR status, trends, and conservation needs based on these negative trends is essential. Innovative and creative conservation actions are needed, based upon an assessment of what has not worked in the past and what has promise in the future. While the federal listing is not providing these functions, the State of California is well suited to do so. Furthermore, the tools currently available to the State—Streambed Alteration Agreements and the CEQA comment process—are either inherently limited in scope (the former) or have proven ineffective (the latter). For example, recommendations offered by the California Department of Fish and Wildlife during the Lytle Creek Ranch CEQA process were ignored by the lead agency.

State listing will also remedy a serious limitation in the federal system that has contributed to SBKR decline. Due to proximity of SBKR habitat to river systems, federal permitting for SBKR impacts typically occurs via section 7 consultations (with resulting Biological Opinions) requested by the Army Corps of Engineers in association with impacts to Waters of the United States, rather than through Habitat Conservation Plans under section 10 of the ESA.

Unlike a Habitat Conservation Plan, there is no general requirement in a section 7 consultation to minimize and mitigate the impacts of the take of an endangered species to the maximum extent practicable. Indeed, unless the extreme case of jeopardy to the very existence of a federally endangered species is reached, *no mitigation whatsoever is required* (per the Endangered Species Consultation Handbook, "It is not appropriate to require mitigation for the impacts of incidental take."). Rather, section 7 seeks to minimize take as long as such measures are "reasonable and prudent" and "minor" in extent. Under these circumstances, it is not surprising that mitigation for impacts to SBKR under the federal listing has failed to compensate for the substantial loss of habitat that has occurred.

To the contrary, under the California Endangered Species Act (CESA), project applicants would not be able to circumvent providing effective mitigation. Under CESA, take must be minimized and "fully mitigated." Elevating the regulatory status of SBKR in California to Endangered will provide the Department of Fish and Wildlife a heightened level of review and regulatory authority to arrest the decline of SBKR. Only with sufficient mitigation on all projects can the negative trends in SBKR population begin to be reversed. U.S. Army Corps regulations are no substitute, as its focus is on wetlands and Waters of the U.S. rather on the surrounding uplands that are vital to SBKR.

Finally, there is strong and ample evidence of the politicization of federal regulatory agencies under the current Executive Administration and the ascent of an anti-science and anti-regulatory agenda. Scientific panels have been disbanded and there is open hostility to objective science, such as in the realm of climate change. State listing is a necessary backstop to the disregard of law and science by federal environmental agencies under the current Administration.

For these reasons, described more fully below, listing by the Commission is imperative given the failures of the federal listing as an alternative regulatory mechanism and the gravity of impending threats.

1. POPULATION TRENDS

The San Bernardino kangaroo rat (*Dipodomys merriami parvus*), or SBKR, is a heteromyid rodent that historically occurred in alluvial fan scrub associated with active floodplains of the San Bernardino and San Jacinto/Perris valleys (McKernan 1997). Because of extensive urban, commercial, and agricultural development, <5% of SBKR's historical habitat was occupied by 2008 (USFWS 2009). Much of this remaining habitat is highly fragmented and degraded, and more than half is considered non-functional with low long-term habitat value (USFWS 2018).

The density of SBKR, generally 1-30 individuals/acre (McKernan 1997), is controlled by local habitat conditions, which change and shift spatially and temporally in response to flooding and fluvial processes. Areas with natural fluvial processes support higher SBKR abundances than areas where these processes have been modified or eliminated (McKernan 1997, USFWS 2009). Channel-floodplain connectivity and fluvial processes have been significantly modified in the region, and SBKR populations are now present at lower densities where habitat quality has declined. As the understanding of trends in abundance is poor, the dramatic loss and fragmentation of the species' habitat, rather than a population abundance trend per se, is the best descriptor of SBKR's status and need for California Endangered Species Act (CESA) protection.

2. RANGE AND DISTRIBUTION

Historical range/abundance

The San Bernardino kangaroo rat historically occurred in alluvial fan habitats in two broad geographic areas: (1) floodplain terraces at the bases of the San Gabriel and San Bernardino mountains in the northern portion of the San Bernardino Valley, and (2) floodplain terraces in the San Jacinto, Perris, and Menifee valleys at the base of the San Jacinto Mountains (Figure 1, McKernan 1997). McKernan (1997) estimated a historical range of more than 325,000 acres of alluvial floodplains, but by the 1930s only about 28,000 acres of its habitat remained. In the northern portion of its range, habitat extended from the base of the Cajon Pass (Cajon and Lytle creeks), west to San Antonio and Cucamonga creeks, south along the Santa Ana River floodplain to the Jurupa Mountains and Reche Canyon, and east to terraces along Mill Creek and the upper Santa Ana River. In the southern portion of its range, habitat extended from the upper San Jacinto River and Bautista Creek, north along the San Jacinto River to the northern Moreno Valley, and southwest to the Menifee and Paloma valleys. By the time serious investigations of SBKR status were initiated, over 90% of its habitat had already been eliminated.

Range at time of Federal ESA listing (1998) and Critical Habitat designation (2002)

McKernan (1997) prompted the U.S. Fish and Wildlife Service (Service) to emergency-list the SBKR as Endangered. In the final rule for the listing, the Service estimated that SBKR was restricted to a mosaic of 13,193 acres of its historical potential habitat but occupied only 9,797 acres (USFWS 1998) primarily in three locations: Santa Ana River (3,861 acres), Lytle Creek and Cajon Wash (5,161 acres), and San Jacinto River (775 acres) (Table 1). In the emergency listing, the Service (1998) also estimated smaller amounts of habitat at City Creek (20 acres), Reche Canyon (5 acres), Etiwanda alluvial fan (5 acres), and South Bloomington (2 acres).

Figure 1. Historical range of San Bernardino kangaroo rat, all known trap locations, and trap locations from 2008-2018 (from USFWS 2018).

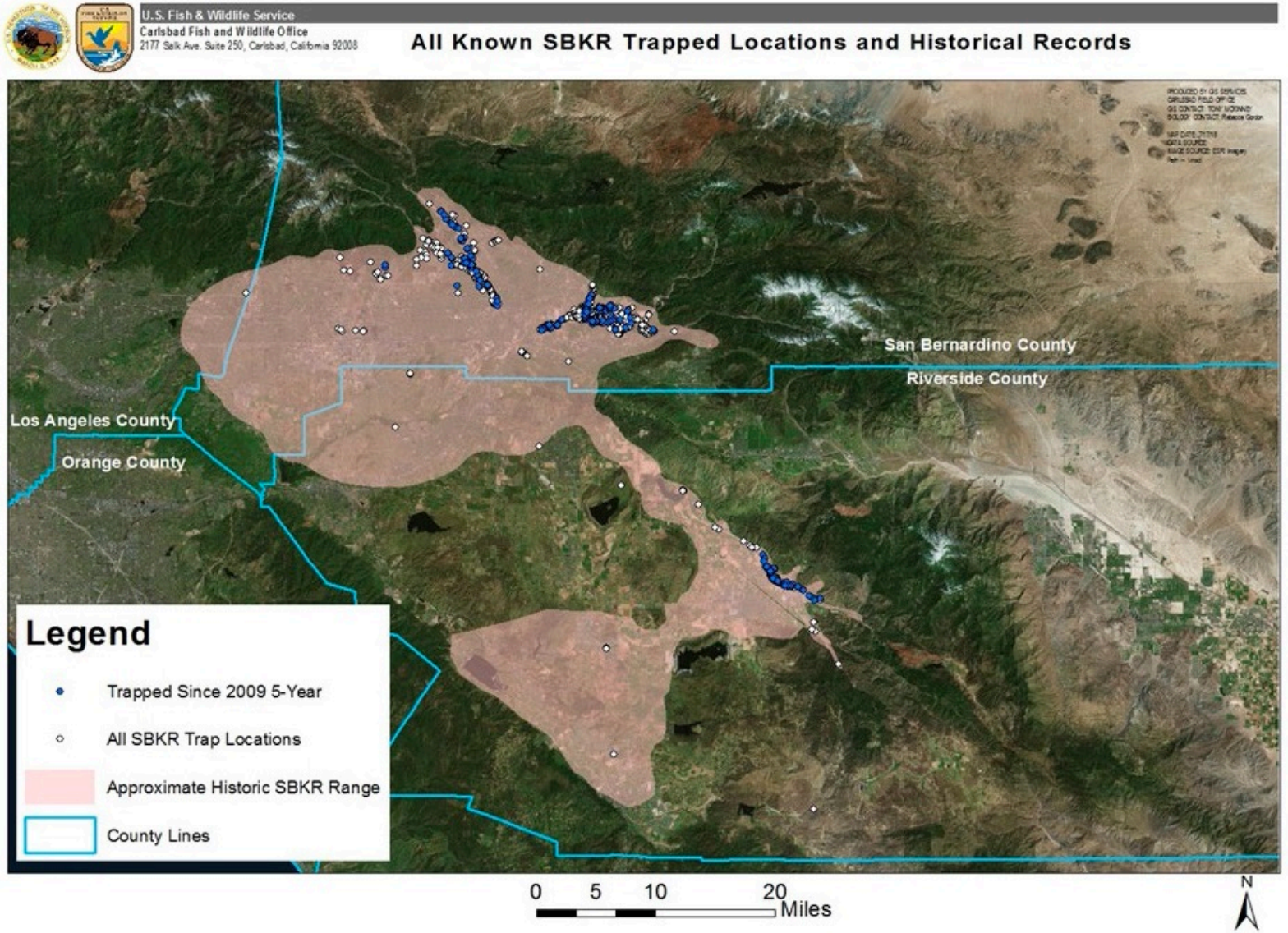


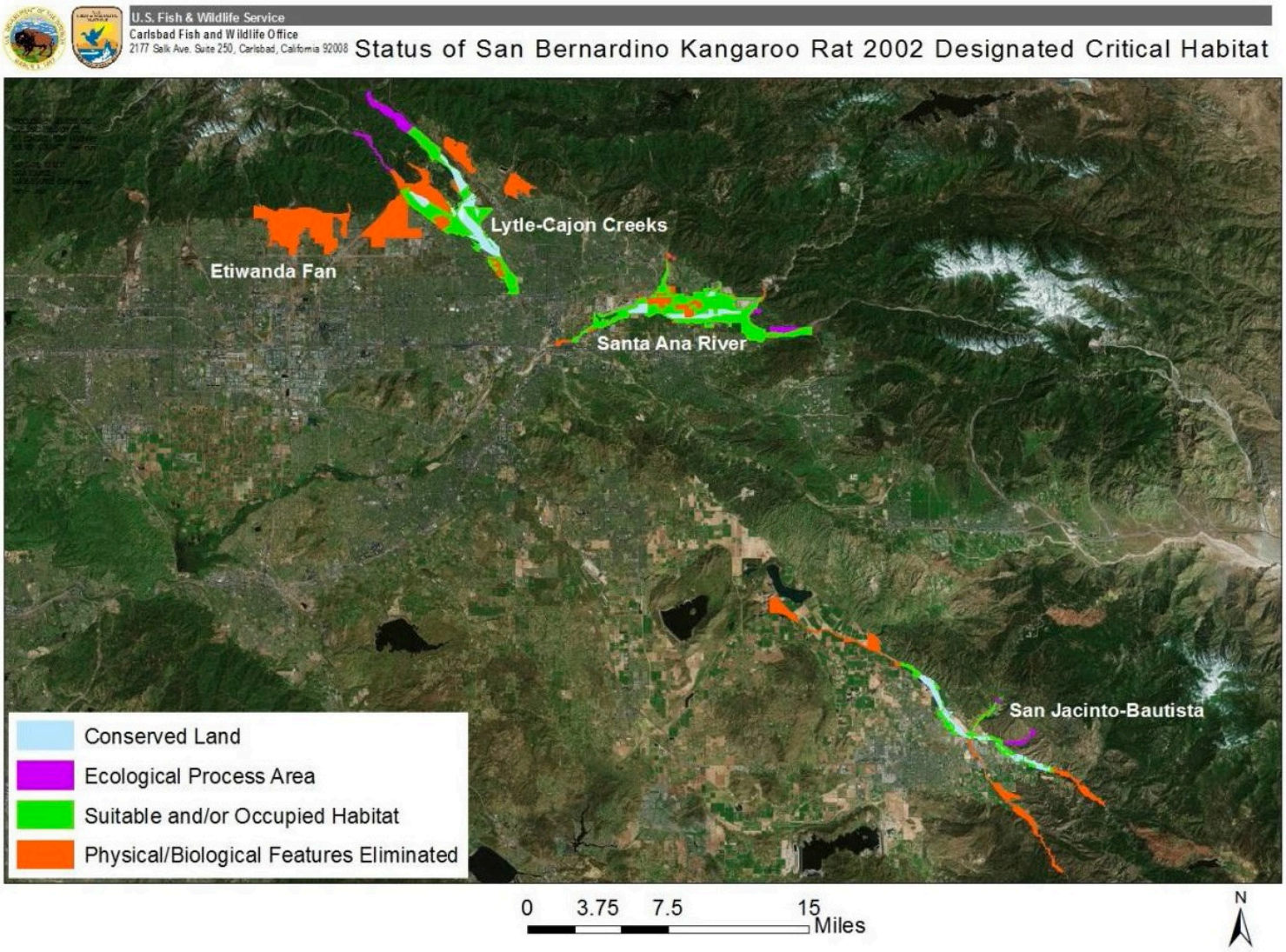
Table 1. U.S. Fish and Wildlife Service's estimates of area of SBKR habitat (acres) at time of federal listing (1998), area of Designated Critical Habitat (2002), and functioning habitat remaining in 2018.

Unit	Potential Habitat Estimated at Listing (1998[1])	Designated Critical Habitat (2002[2])	Estimated Functioning Habitat (2018[3])
Etiwanda Alluvial Fan	Extant	4,820	Extirpated[3]
Lytle Creek/Cajon Wash	6,967	13,970	6,471
Santa Ana River	5,224	8,935	7,426
San Jacinto River	1,002	5,565	2,403
Bautista Creek	Part of San Jacinto R.	Part of San Jacinto R.	Extirpated[3]
Cable Creek	Part of Lytle/Cajon	Part of Lytle/Cajon	Extirpated[3]
Devil's Canyon	Part of Lytle/Cajon	Part of Lytle/Cajon	Extirpated[3]
City Creek	Extant	Part of Santa Ana R.	Extirpated[3†]
Reche Canyon	Extant	Not designated	Extirpated[4]
South Bloomington	Extant	Not designated	Extirpated[4]
Estimated Totals	**13,193[5]**	**33,295 (10,969[6])**	**16,300[7]**

[1] USFWS 1998
[2] USFWS 2002a
[3] USFWS 2018
[4] Extirpated by 2008 (USFWS 2009)
[5] A total of 3,396 acres of the 13,193 acres of the potential habitat was considered to "have too much cover or is otherwise degraded" to support SBKR.
[6] A total of 33,295 acres have been designated as Critical Habitat for SBKR (USFWS 2002a), but the Service (USFWS 2009) considered 10,969 acres of this to be "much of the remaining occupied habitat" at the time.
[7] Habitat considered "currently functioning" may not necessarily be occupied by SBKR.
[†] Refers to City Creek reach upstream of Highland Ave.

Prior to designation of Critical Habitat (USFWS 2002a), development, agriculture, stream channelization, management of flow and associated edge effects destroyed or degraded large portions of historical habitat in western San Bernardino Valley and Moreno, Perris, and Menifee valleys. In the final Critical Habitat rule (USFWS 2002a), the Service estimated the species' range (not all occupied) was at least 32,480 acres within the 33,295 acres of Critical Habitat, but some areas supported low abundance populations with a low likelihood of long-term sustainability in 2002 (e.g., Etiwanda fan; Cable Canyon; Devil Creek; northeast Fontana). Remaining habitat occurred in four larger disjunct blocks (Figure 2, Table 1): Etiwanda Fan (including Deer/Day/Etiwanda creeks), Lytle Creek/Cajon Wash, Santa Ana River/City Creek/Plunge Creek/Mill Creek, and San Jacinto River/Bautista Creek; and two small disjunct tracts: Cable Creek and Devil Creek (tributaries of Cajon Wash). This represents <5% of historical habitat that once occurred in large tracts of naturally functioning, interconnected patches. Over 90% of this remaining habitat occurred in two disjunct blocks: Lytle Creek/Cajon Wash and Santa Ana River, which were fragmented internally by development, mining, highways, and water management infrastructure.

Figure 2. Critical Habitat for San Bernardino kangaroo rate (USFWS 2002a, 2018) and the status of SBKR habitat within those units.



Range/abundance at 5-year review (USFWS 2009)

As part of the 5-year assessment of the SBKR (USFWS 2009), the Service considered that two of the remaining known locations likely were extirpated since the ESA listing in 1998 (i.e., South Bloomington and Reche Canyon). Within the Etiwanda alluvial fan, SBKR was confined to the San Bernardino County Flood Control District's Etiwanda Debris Basin Lower Spreading Grounds and associated facilities.

The 5-year assessment described the distribution of SBKR as of 2008 (USFWS 2009) in the three remaining significant habitat blocks, but did not report acreages of suitable or occupied habitat. The acreage estimates of suitable habitat and SBKR distribution have evolved over the 10 years following the emergency listing; we now know that by 2008 SBKR occupied a greatly reduced and significantly fragmented portion of its former range, occurred in very low numbers in some portions of its designated Critical Habitat (e.g., Etiwanda Alluvial Fan, Cable Creek), and it has been extirpated from areas it once occupied, following its listing as an Endangered Species and designation of Critical Habitat by the Service.

Santa Ana River

In 2008, SBKR occurred along the upper reach of the Santa Ana River from its confluence with Mill Creek to just below Tippecanoe Avenue. This habitat was a mosaic of (1) developed and disturbed areas that do not support SBKR, (2) undeveloped but disturbed habitats that support SBKR in limited numbers, and (3) higher quality habitats that support SBKR in higher numbers. However, vegetation succession from lack of flooding has degraded many of these once higher quality habitats. SBKR also still occurred in alluvial fan habitats in the lower portions of Mill, Plunge, and City creeks where they flow into the Santa Ana River, although habitat on Plunge Creek was fragmented and largely isolated from other high-quality habitats occupied by SBKR.

Lytle Creek, Cajon Wash, and Cable Creek

In 2008, SBKR still occurred in discrete, fragmented locations along approximately 3 miles of Lytle Creek from upstream of the Interstate 15 crossing of the creek to the confluence of Cajon Wash. Lytle Creek was deeply incised, and channelization and levees had modified the habitat significantly. The largest block of habitat along Lytle Creek occurred just upstream of the aggregate mining operations, where the creek meandered within its deeply incised channel, creating alluvial terraces with high quality habitat. However, these alluvial terraces were subject to high velocity floods, little high elevation refugia habitat in the channel was available, and adjacent upland areas occupied by SBKR have been isolated from the creek by development.

In 2008 SBKR occupied an approximately 8-mile reach of Cajon Wash from approximately 4.5 miles upstream of the Interstate 15 crossing of the creek to its confluence with Lytle Creek. Cajon Wash experienced normal fluvial process necessary to maintain suitable SBKR habitat.

In 2008 SBKR occupied habitat along Cable Creek, which was historically part of the Cajon Wash floodplain. However, SBKR habitat along Cable Creek was isolated from Cajon Wash by

development and Interstate 215. Habitat quality along Cable Creek was variable and adversely affected by disturbances such as off-highway vehicles and trash dumping.

San Jacinto River and Bautista Creek

In 2008 SBKR occurred in the approximately upper 13 miles of the San Jacinto River, but all habitat downstream of this had been eliminated (USFWS 2009). Lower Indian and Poppet creeks, while not considered historical habitat by McKernan (1997) or discussed in the 2009 5-year Assessment (USFWS 2009), were included in Critical Habitat. Bautista Creek, a tributary of the San Jacinto River, was historically part of a large habitat block contiguous with the San Jacinto (McKernan 1997). However, the Bautista Creek habitat is now isolated from the San Jacinto River by an over 4-mile developed and channelized creek reach that did not support habitat in 2008. While not well-surveyed, the Service considered the upper 4 miles of Bautista Creek to be a self-sustaining population distinct from the San Jacinto River population (USFWS 2009).

Current range/abundance (2018)

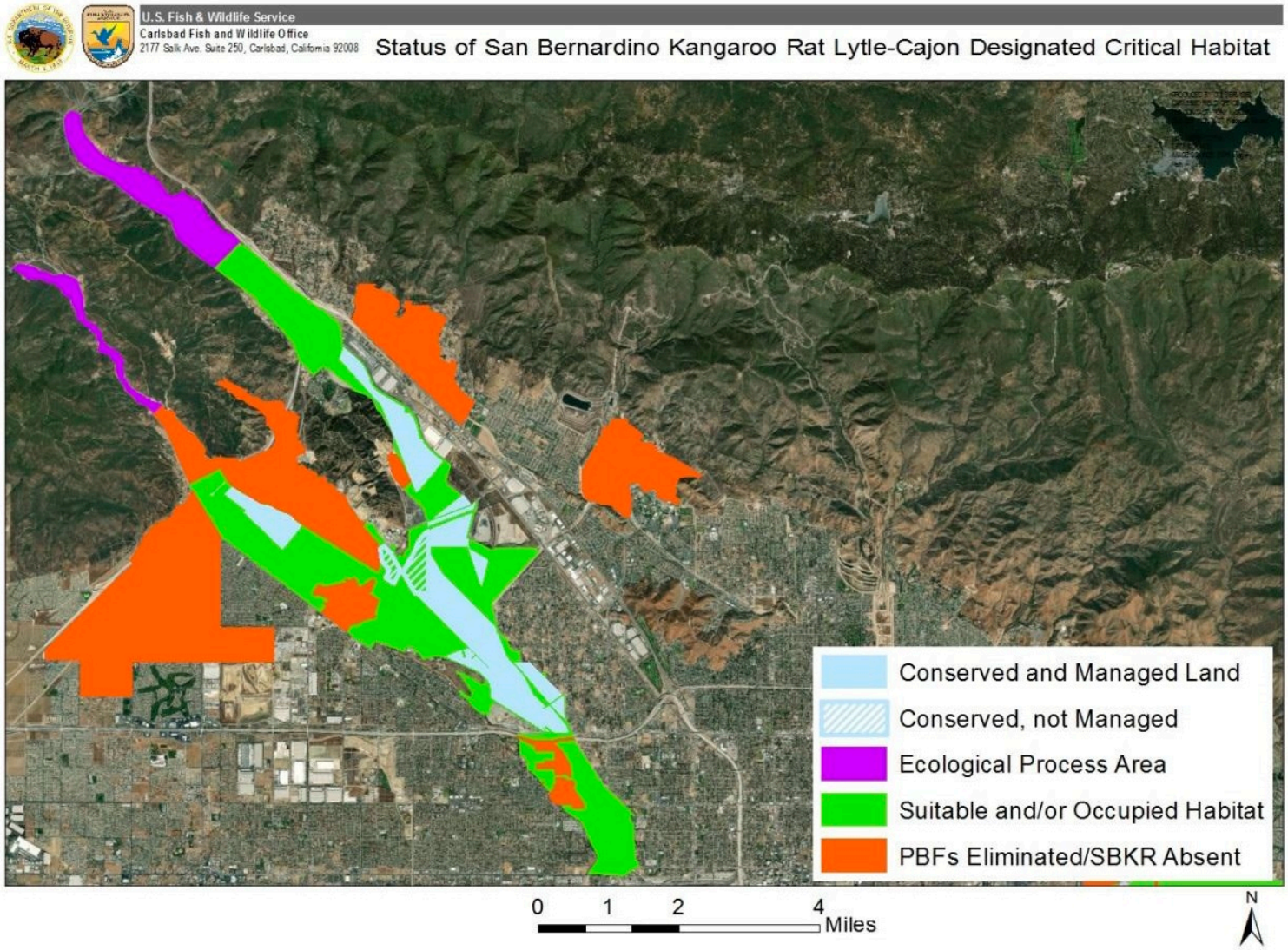
This section uses the best scientific information available to describe current distribution, including museum records, recent unpublished survey and research reports (e.g., Shier et al. 2018), other publicly available location data, and recent Service unpublished information on its distribution and status (USFWS 2018). Over 85% of remaining functional SBKR habitat is associated with Lytle Creek and Cajon Wash and the Santa Ana River, with the only other significant populations along the San Jacinto River (Figure 2, Table 1). It is likely that the SBKR has been extirpated (or occur in such small numbers as to be effectively extirpated) from the Etiwanda Fan and Bautista Creek since 2008 (Shier et al. 2018, USFWS 2018).

Lytle Creek/Cajon Wash

The habitat block along Lytle Creek/Cajon Wash is one of the two largest remaining (Santa Ana River being the other). In Cajon Wash, SBKR occur from 1.5 miles above Interstate 15 downstream to the Lytle Creek confluence. In Lytle Creek SBKR occur from 0.6 mile above the Interstate 15 crossing downstream to Route 66. Recent, extensive trapping in suitable habitat within this block found many sites had low or no SBKR (Shier et al. 2018). The most SBKR were trapped within the Lytle Creek Conservation Bank and Cajon Wash Conservation Bank, and few or no animals were trapped at five other sites (Institution, Glen Helen, Highway 210, Muscovy, and Cemex). Land use changes in this area have fragmented the remaining habitat (Figure 3). Connectivity between upstream and downstream patches along Lytle Creek has been virtually eliminated by the CEMEX mining operation and Lytle Creek North development.

The small SBKR population in Cable Creek, discovered in the late 2000s, has been isolated by development from the historic Cajon/Lytle drainages and is unlikely to persist without intensive management to maintain appropriate habitat conditions (attempts at active SBKR habitat management are discussed further below). The Service considers that the physical and biological features necessary to support SBKR at Cable Creek have been eliminated (Figure 3, USFWS 2018).

Figure 3. SBKR status habitat within the Lytle Creek/Cajon Wash Critical Habitat unit (from USFWS 2018).



In 2018 the Service identified 6,471 acres of suitable, occupied, and/or conserved SBKR habitat, and approximately 6,530 acres where physical and biological features necessary for SBKR have been eliminated from within this Critical Habitat unit (Figure 3, USFWS 2018). The Service currently estimates only 46% of Critical Habitat in this the largest (13,970 acres) of the Critical Habitat units is suitable, occupied or conserved for SBKR, and this remaining habitat is threatened by additional development (discussed further below).

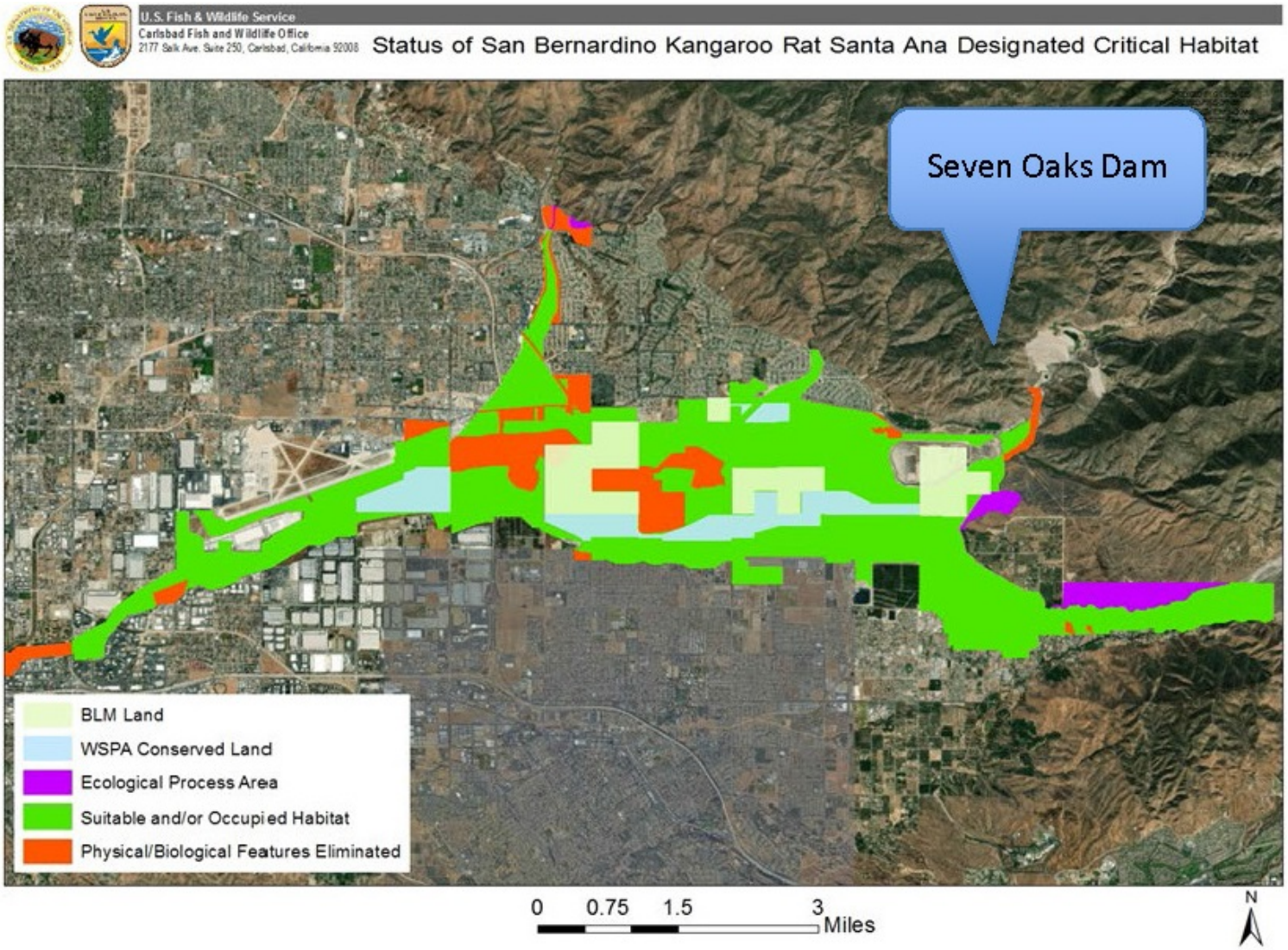
Santa Ana River

SBKR distribution within this second largest Critical Habitat unit includes the lower portions of Mill Creek, Plunge Creek, and City Creek near their confluences with the Santa Ana River, and the mainstem Santa Ana River from the mouth of the canyon down to Tippecanoe Avenue. The mainstem Santa Ana River habitat has been fragmented by road, mining, and development. The Mill Creek population above Greenspot Road is also small, isolated, and adversely affected by creek channelization, water conservation basins, and flood control. City Creek upstream of Highland Avenue no longer supports necessary physical and biological features for SBKR (Figure 4, USFWS 2018).

Construction of the SOD and flood control operations of the reservoir have dramatically altered the hydrology of the Santa Ana River and eliminated the hydrological and ecological processes that have historically maintained habitat for SBKR. While the Biological Opinion for Seven Oaks anticipated periodic water releases to mimic historic flood flows and rejuvenate habitat (USFWS 2002b), such releases have not occurred and have not yet been planned by dam operators. In addition, the design of the dam physically limits the amount of water that can be released to a small fraction of the river's larger historical peak flows (ICF 2019). As a result of dam construction, large proportions of existing and proposed conservation areas along the Santa Ana River are no longer hydrologically active and will require long-term active management actions (as yet unproven) to maintain suitable habitat for SBKR (USFWS 2018). Recent hydrological studies of the Santa Ana River system (ICF 2018) conclude that the current tributary flow regimes, even if augmented by theoretically maximum dam releases, will not, given the deeply incised channel and reduced discharge relative to historical conditions, reconnect the channel with the historical floodplain. The lack of flooding in the disconnected floodplain will lead to succession by mature floodplain vegetation and invasion by nonnative plants inhospitable to SBKR.

In 2018 the Service identified 7,426 acres of suitable, occupied, and/or conserved SBKR habitat, and approximately 1,240 acres where physical and biological features necessary for SBKR have been eliminated from within the 8,935-acre Critical Habitat Unit (Figure 4, USFWS 2018). This includes ~773 acres in the WSPA (Figure 4). Therefore, the USFWS currently estimates 83% of Critical Habitat in this Critical Habitat unit is suitable, occupied or conserved for SBKR, but some of the conserved habitat is not occupied (USFWS 2018).

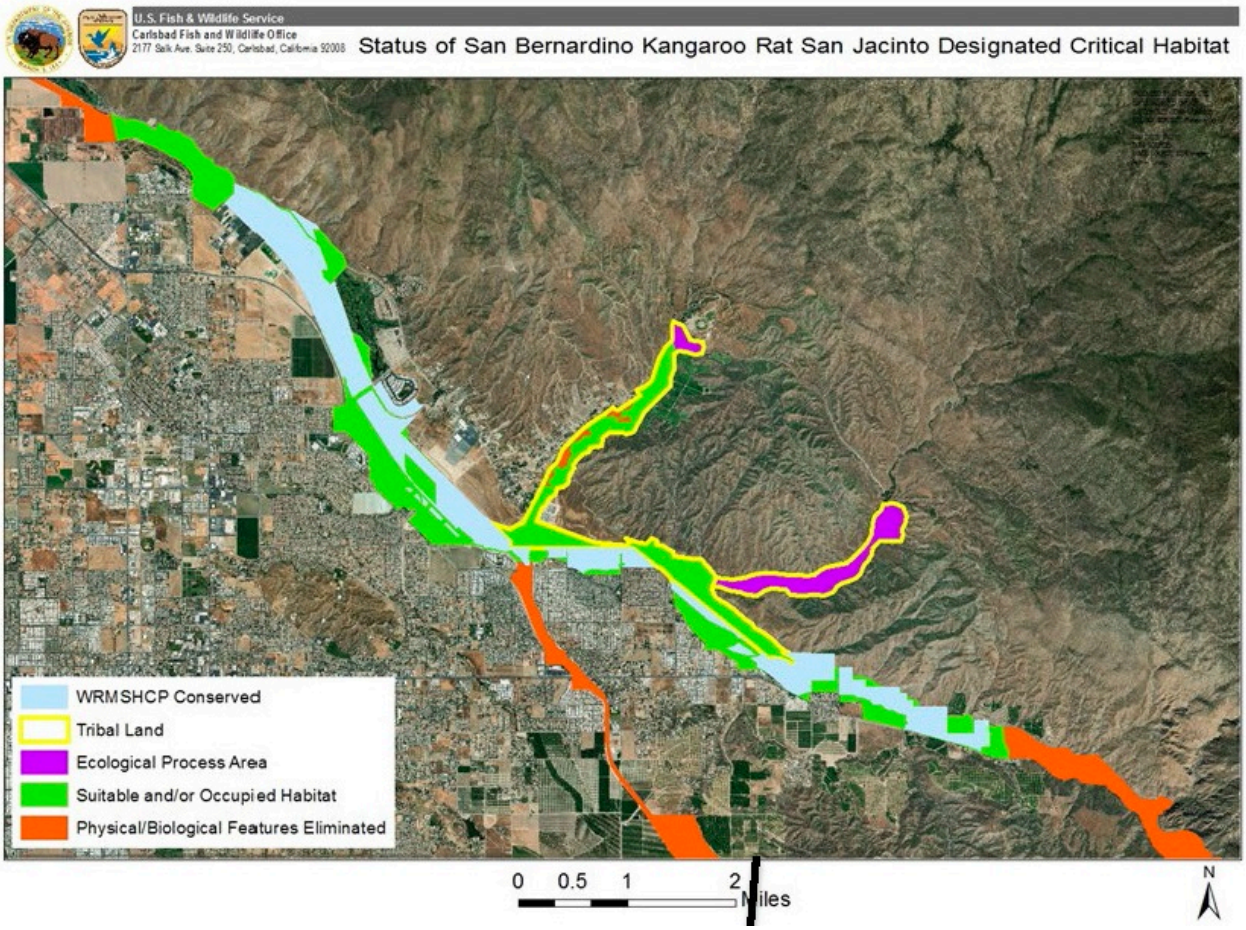
Figure 4. SBKR status habitat within the Santa Ana River Critical Habitat unit (from USFWS 2018).



San Jacinto River and Bautista Creek

The Service currently considers only the upper 6 miles of the San Jacinto River to be occupied based on trapping surveys conducted since 2009, and only 43% (2,403 acres) of the 5,565 acres of Critical Habitat in this unit to be functioning (USFWS 2018), while the necessary physical and biological features for SBKR have been eliminated on 2,913 acres of the unit (Figure 5). This remaining habitat is fragmented by roads and stream channelization. The Service considers the Bautista Creek population, which has been physically isolated from the confluence of the San Jacinto River by a 4-mile long concrete channel, to be extirpated (Figure 5). Monitoring for SBKR in 2015 found only 451 acres of occupied habitat in the MSHCP preserve, 32% of the "suitable" habitat that was sampled by the Biological Monitoring Program, and far short of the MSHCP conservation objective for this species (Biological Monitoring Program 2016). Shier and colleagues (2018) trapped no SBKR at one of their Valle Vista sites, and SBKR were absent from the occupied Hemet site when it was re-trapped in 2017.

Figure 5. SBKR habitat status within portions of the San Jacinto River/Bautista Creek Critical Habitat unit (from USFWS 2018). The status of the upper portions of the unit not shown in the map is Physical/Biological Features Eliminated.



Etiwanda Alluvial Fan

Only a few SBKR remained extant within the Etiwanda Alluvial Fan Critical Habitat unit when it was designated (USFWS 2002a). Shier and colleagues (2018) trapped but did not capture SBKR at Wilson and Edison. Service records indicate that the remaining SBKR on the Etiwanda Fan occur on the periphery of San Bernardino County Flood Control basins which inadvertently provide a narrow margin of suitable, marginally occupied habitat. The few remaining animals and limited habitat have little viability, as the population is small, isolated, and subject to flood control activities; the Service now considers that physical and biological features necessary for SBKR in the Etiwanda Fan Critical Habitat unit have been eliminated (Figure 2, USFWS 2018).

Land cover change 1998-2018

We estimated the loss of potentially suitable SBKR habitat in the decade between the emergency listing habitat of SBKR in 1998 and 2018. We used aerial photographs from NASA and Google Earth, focusing on lands inside and outside designated Critical Habitat for the species. The objective of this analysis is to identify the relative geographic distribution of remaining SBKR habitat and estimate the amount of land cover change experienced by the remaining populations since the time of the federal listing. To assess the nature, magnitude, and rate of SBKR habitat loss, we used aerial photographs, SBKR survey reports submitted to the Service, Biological Opinions issued by the Service, project Environmental Impact Reports, and decades of field work and SBKR trapping by the author (GB) and Biological Consultant (PB) to map the remaining "potential" SBKR habitat at the time of its listing as Endangered by the Service in (1998) and then again in 2018 (Table 2).

Because the condition, quality and actual occupancy of SBKR across its current range changes over time and is not comprehensively known at any given point in time, for years 1998 and 2018 we mapped all "potential" SBKR habitat, including alluvial fan scrub vegetation and adjoining ruderal and disturbed habitats that in our experience have the potential to support SBKR. The mapping within SBKR Critical Habitat was carried out regardless of documented occupancy. Outside of Critical Habitat, potential habitat was mapped in adjoining areas where historical records of SBKR were found. This exercise yielded a likely maximum estimate of potential SBKR habitat, and it is certain that not all of it is suitable, functional, or occupied. Most importantly, this mapping exercise identified areas that are not considered potential habitat for SBKR because of human-induced land cover changes (for example, conversion to residential development). Therefore, this exercise documents the magnitude and rate of the *irreversible* loss of potential SBKR habitat since listing by the Service in 1998.

By late 1998 SBKR occupied habitat was in seven populations largely restricted to four geographic areas (USFWS 1998): Etiwanda Alluvial Fan (Figure 6), Lytle Creek/Cajon Wash (including Cable and Devils creeks, Figure 7), Santa Ana River (Figure 8), and San Jacinto River/Bautista Creek (Figure 9a, b). These four areas ultimately served as the basis of the Service's designation of Critical Habitat for SBKR (USFWS 2002a). In 1998, we estimate approximately 36,464 acres of potential habitat existed, with a little more than 3,200 acres of unsuitable areas within the boundaries of designated Critical Habitat (Table 2).

By 2018, under federal Endangered Species Act regulation, each of the four areas had lost significant acreages of habitat (Table 2). Nearly 11,000 acres of potential habitat was converted to areas unsuitable for SBKR during this 20-year period, an increase of 337%. This represents a rate of 539 acres of habitat lost per year since federal listing of the species. In addition, there was a particularly large loss of potential habitat in Lytle Creek and Cajon Wash (5,613 acres), which, with the Santa Ana River, is one of the two remaining significant populations. While the acreages in Table 2 significantly overestimate the actual area occupied by SBKR (e.g., San Jacinto River is estimated to support only a total of 451 acres [Biological Monitoring Program 2016] and the Service considers the Etiwanda Alluvial Fan population extirpated [USFWS 2018]), these estimates provide an objective picture of the rates of land cover change in the only remaining areas that still supported SBKR in 1998. Given that significant portions of remaining potential habitat have lost the physical and biological features necessary to support SBKR (USFWS 2018), the current status and trajectory of SBKR is truly dire. Further, as demonstrated by these steep and ongoing rates of loss of suitable habitat, this negative trajectory is *not* being effectively addressed through the federal listing.

Table 2. Acreages of potential, suitable and unsuitable SBKR habitat in 1998 and 2018. Units are shown in Figures 6-9.

Unit	1998 Unsuitable	1998 Suitable	2018 Unsuitable	2018 Suitable	% Loss Suitable 1998-2018	% Increase Unsuitable 1998-2018
Inside Critical Habitat						
Etiwanda Alluvial Fan	248	5,645	2,402	3,491	24%	435%
Lytle Creek/Cajon Wash	1,285	15,891	6,898	10,278	19%	187%
Santa Ana River	1,004	8,829	2,661	7,172	10%	75%
San Jacinto River/Bautista Creek	664	6,099	2,036	4,727	4%	221%
Outside Critical Habitat						
Etiwanda Alluvial Fan	0	1,075	1,075	0	100%	-
Lytle Creek/Cajon Wash	0	3,205	3,205	0	100%	-
Santa Ana River	0	897	897	0	100%	-
San Jacinto River/Bautista Creek	0	1,198	1,198	0	100%	-
Estimated Totals	**3,201**	**36,464**	**13,997**	**25,668**	**30%**	**337%**

Figure 6. A comparison of the distribution of remaining "potentially suitable" San Bernardino kangaroo rat habitat within and adjacent to the Etiwanda Fan Critical Habitat unit (designated in 2002) and areas considered unsuitable for SBKR in 1998 (top) and 2018 (bottom).

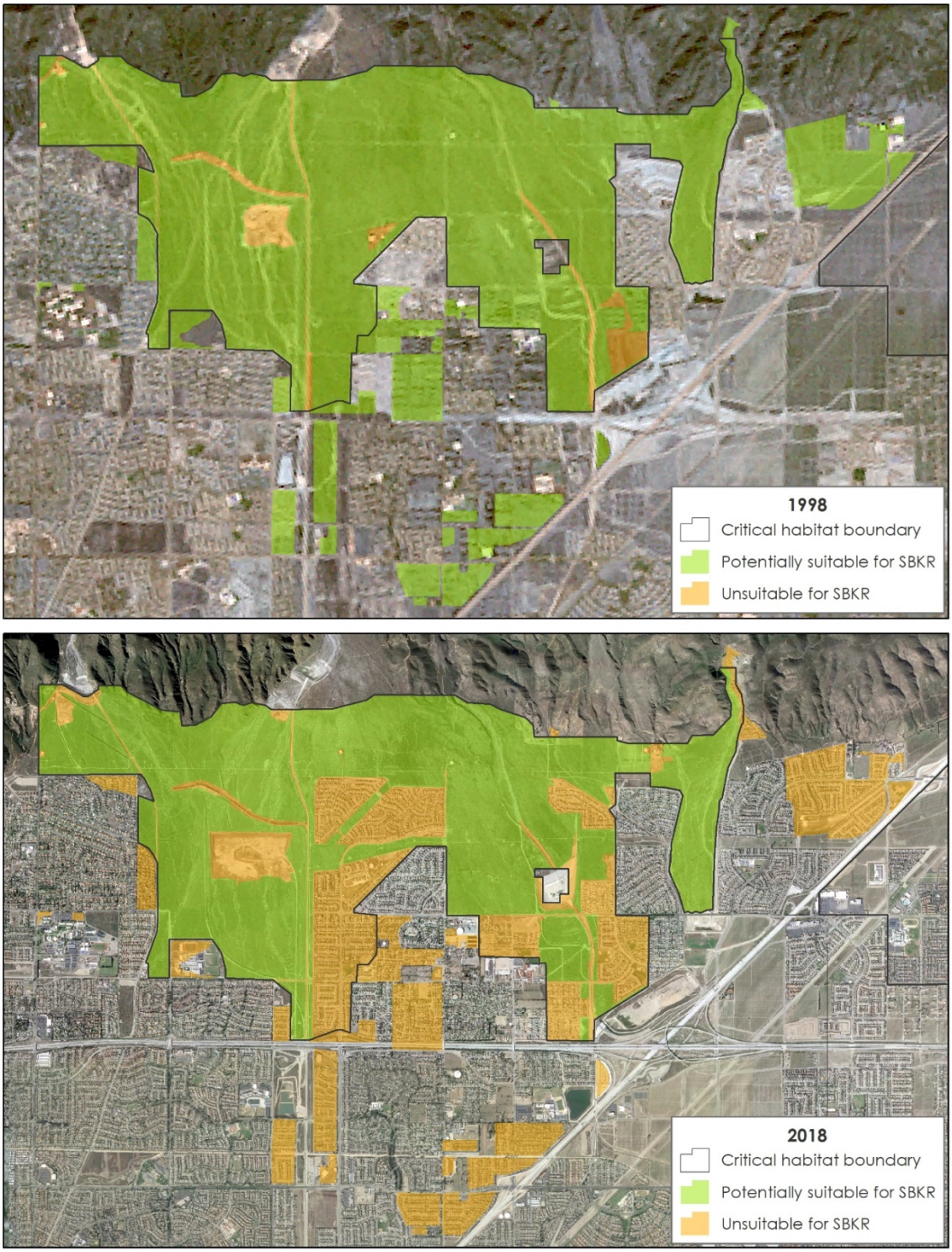


Figure 7. A comparison of the distribution of remaining “potentially suitable” San Bernardino kangaroo rat habitat within and adjacent to the Lytle Creek/Cajon Wash Critical Habitat unit (designated in 2002) and areas considered unsuitable for SBKR in 1998 (left) and 2018 (right).

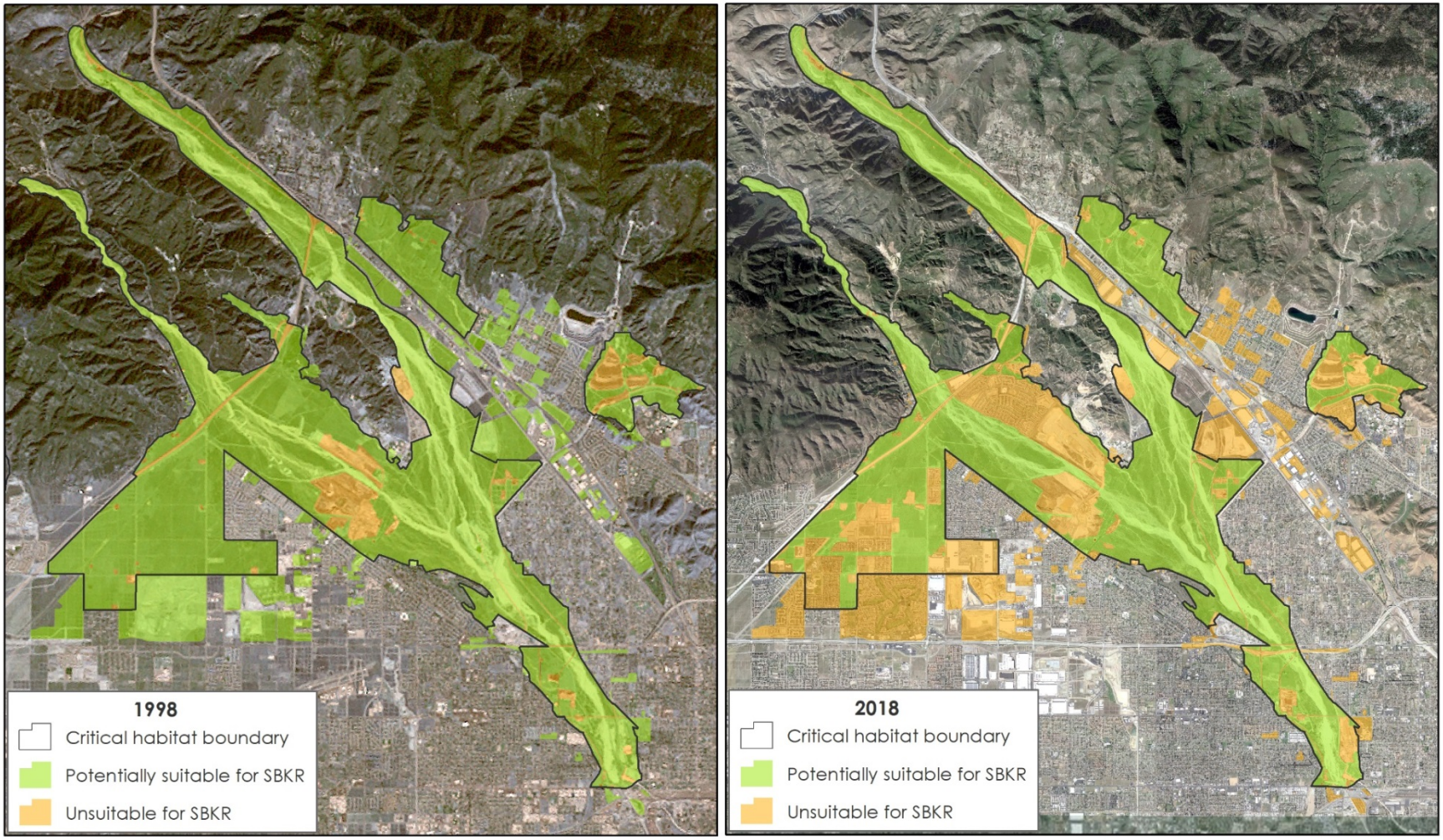


Figure 8. A comparison of the distribution of remaining “potentially suitable” San Bernardino kangaroo rat habitat within and adjacent to the Santa Ana River Critical Habitat unit (designated in 2002) and areas considered unsuitable for SBKR in 1998 (top) and 2018 (bottom).

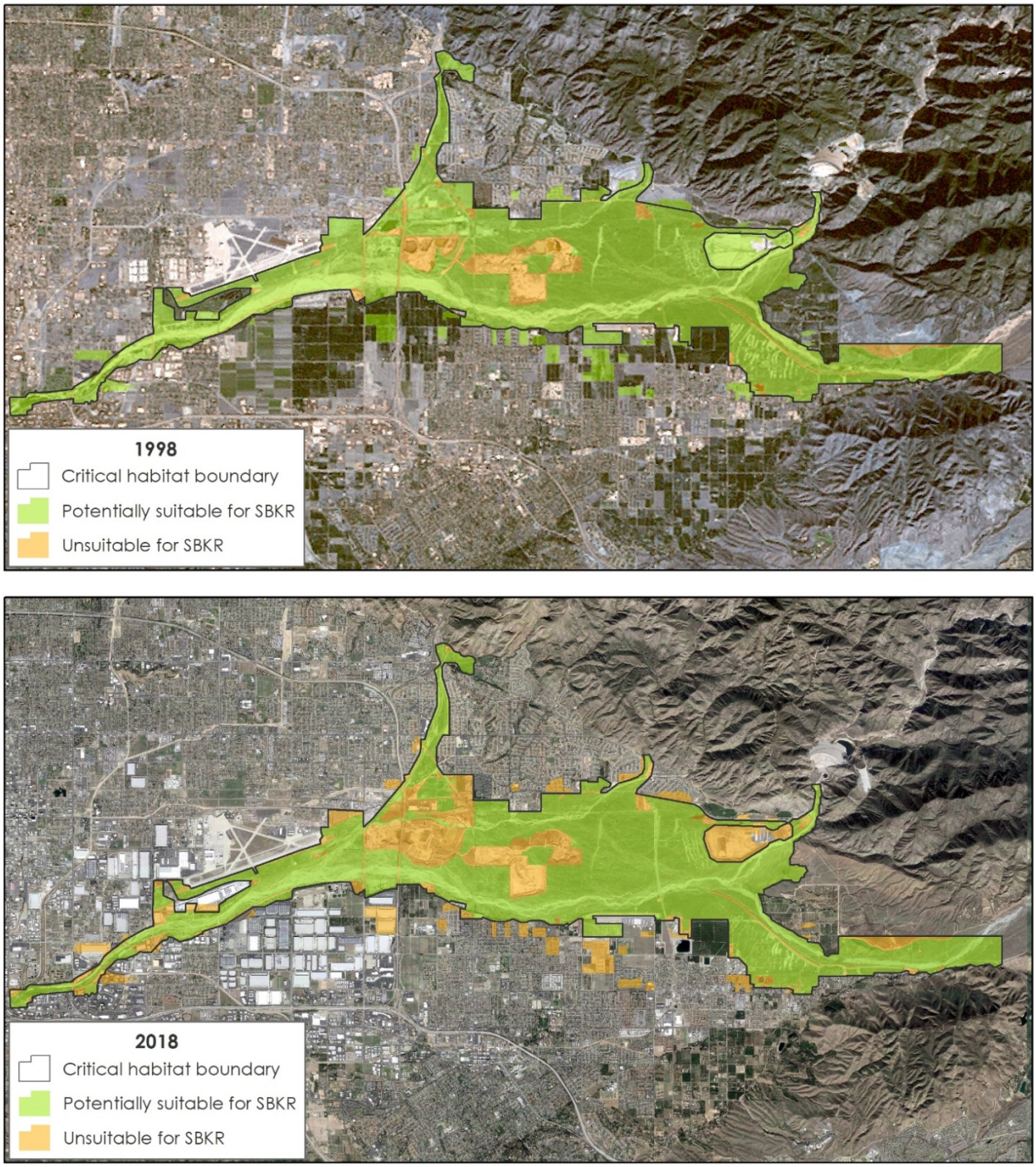


Figure 9a. Comparison of the distribution of remaining “potentially suitable” SBKR habitat within and adjacent to the northern portion of the San Jacinto River/Bautista Creek Critical Habitat unit (designated in 2002) and areas considered unsuitable for SBKR in 1998 (top) and 2018 (bottom).

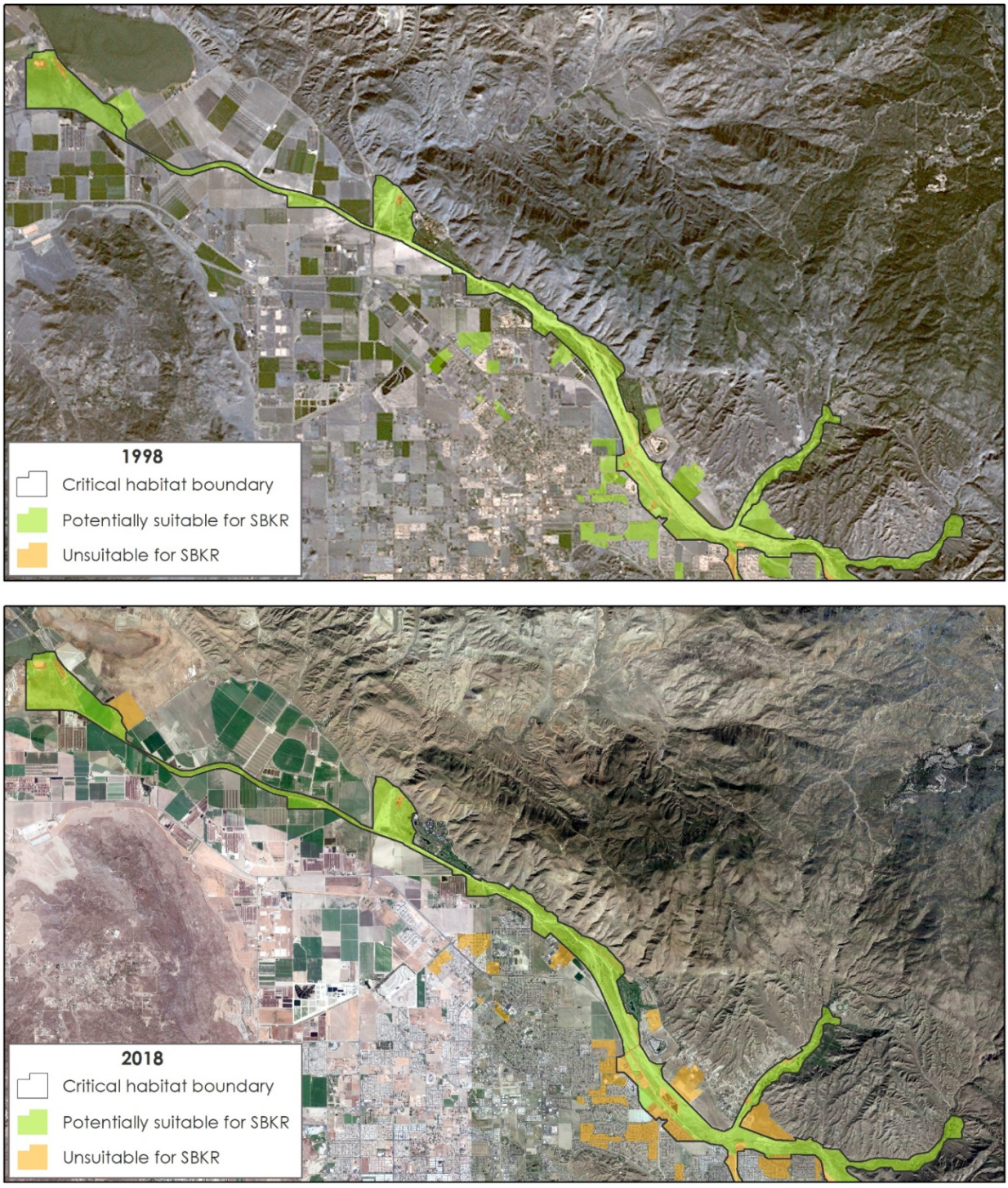
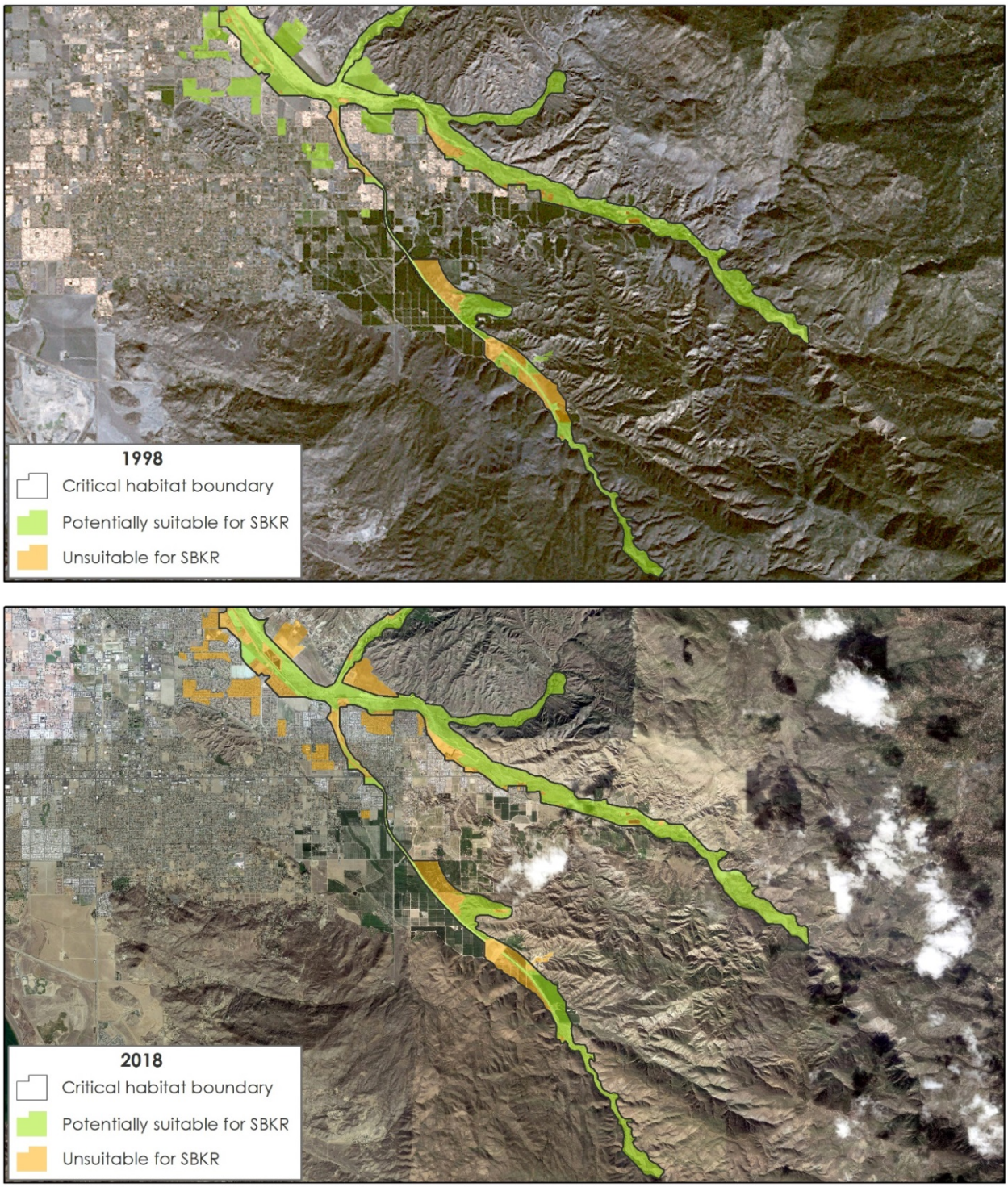


Figure 9b. Comparison of the distribution of remaining “potentially suitable” SBKR habitat within and adjacent to the southern portion of the San Jacinto River/Bautista Creek Critical Habitat unit (designated in 2002) and areas considered unsuitable for SBKR in 1998 (top) and 2018 (bottom).



3. ABUNDANCE

SBKR historically occurred in alluvial fan scrub habitats associated with the active floodplains of the San Bernardino and San Jacinto/Perris valleys (McKernan 1997). As discussed above, due to the urban, commercial, and agricultural development of these areas, less than 5% of SBKR's historic range was still occupied by 2008 (USFWS 2009). However, much of this remaining habitat has low value because it is highly fragmented, degraded, and lacks necessary ecological functions to support SBKR. As discussed further in Section 5, local habitat conditions control population abundance, which generally ranges from 1 to 30 individuals/acre (McKernan 1997, Root 2008, Root 2010). Habitats in areas with natural fluvial processes support greater abundance than areas where these processes have been modified or eliminated (McKernan 1997, USFWS 2009, USFWS 2018). Population abundance trends are poorly understood across SBKR's range. Therefore, the dramatic loss and fragmentation of the species' habitat, rather than a population abundance trend per se, is the best descriptor of SBKR's status and need for additional CESA protection.

4. LIFE HISTORY (SPECIES DESCRIPTION, BIOLOGY, AND ECOLOGY)

Description

SBKR (*Dipodomys merriami parvus*) is one of three recognized subspecies of Merriam's kangaroo rat within California (Lidicker 1960) that occur in alluvial fan scrub habitats in northern San Bernardino and Riverside counties. The San Bernardino kangaroo rat is morphologically distinct from the other two *D. merriami* subspecies in California (*D. m. merriami* and *D. m. collinus*). It has yellowish-brown colored pelage with dark brown tail stripes, foot pads, and tail hairs. It has an average body length of 95 millimeters (3.7 inches) and a total length (tail included) of 230-235 millimeters (9-9.3 inches). Its hind feet are <36 millimeters (1.4 inches) in length. On average, the San Bernardino kangaroo rat is smaller and darker than the other two California *D. merriami* subspecies.

Taxonomy and current population genetics

Kangaroo rats belong to the genus *Dipodomys* within the Heteromyidae family of rodents. Merriam's kangaroo rat (*D. merriami*) occurs throughout arid regions of the western United States and northwestern Mexico, with 19 described subspecies across this range (Hall 1981, Williams *et al.* 1993). Only three of the 19 subspecies occur in California: *Dipodomys merriami merriami*, *D. m. collinus*, and *D. m. parvus*. SBKR was initially described as a full species (*D. parvus*) but is currently considered a subspecies of *D. merriami* (Hall 1981, Williams *et al.* 1993).

SBKR is geographically isolated from the other two *D. merriami* subspecies. At the northern end of its range, near Cajon Pass, the SBKR is separated from *D. merriami merriami* (in the Mojave Desert) by 5-8 miles of currently unsuitable habitat. At the southern end of its range, it is geographically separated from *D. m. collinus*, which it may have intergraded with in the distant

past (Lidicker 1960). Morphological divergence suggests potential genetic differentiation as well, and it has been suggested that the SBKR may be a separate species (Lidicker 1960).

Dispersal and home range

While no data exist on home ranges for SBKR specifically, home range size for Merriam's kangaroo rat averages 0.33 hectare (0.82 acre) for males and 0.31 hectare (0.77 acre) for females (Behrends *et al.* 1986). Edges of the home ranges of neighboring kangaroo rats sometimes overlap. However, adults often defend core areas near their burrows. Overlap between male-male and male-female kangaroo rat home ranges is often extensive, while female-female overlap is generally much less (Jones 1993). Zeng and Brown (1987) found that 75% of adult male and 59% of adult female *D. merriami* dispersed between 197 feet (60 meters) and 787 feet (240 meters) from their initial capture sites (in the Chihuahua Desert).

Reproduction and growth

SBKR reproductive timing is variable and likely depends on annual precipitation and associated plant growth. Pregnant and lactating females have been found between January and November, and reproductively active males have been observed from January through August (McKernan 1997). Green vegetation following rainfall is consumed prior to reproductive activity. Merriam's kangaroo rat may forgo breeding during years of poor plant growth in response to drought conditions (Tremor et al. 2017). Females can have more than one litter per year, with an average litter size of two to three young (Eisenberg 1993).

Foraging ecology and diet

Merriam's kangaroo rats are nocturnal and primarily granivorous. They store seeds temporarily in external fur-lined cheek pouches before stashing the seeds in either shallow pit caches or a larder within their burrows, which they utilize during periods of food scarcity (Jenkins et al. 1995, Reichman and Price 1993). Individuals within the same population may exhibit different food-hoarding preferences (Murray et al. 2006). Although seeds are a central component of their diets, they also forage for green vegetation and insects. These additional food supplies provide essential sources of water for kangaroo rats, which can live indefinitely without direct consumption of water (Reichman and Price 1993). Foraging rates are lower during full moon compared to new moon conditions (Kotler 1984, Wang and Shier 2017).

Natural mortality and population regulation

Merriam's kangaroo rats (*D. merriami*) live for 3.7- 5 months on average, but single individuals can live for >3 years (French *et al.* 1967). Kangaroo rat populations fluctuate dramatically in response to food availability (Goldingay et al. 1997). *Dipodomys* species, unlike other Heteromyids, do not have the ability to enter a state of torpor, or inactivity, which would help prevent dramatic populations declines during times of drought or low resource abundance (Brown and Harney 1993). Major flood events also negatively affect local population abundance, and kangaroo rat mortality is often high following these episodic events (USFWS 2002a). Predation by coyotes (*Canis latrans*), grey foxes (*Urocyon cinereoargenteus*), badgers (*Taxidea*

taxus), long-tailed weasels (*Mustela frenata*), bobcats (*Lynx rufus*), snakes (*Crotalus* spp. and *Pituophis* spp.), and raptors (e.g., great horned owls [*Bubo virginianus*]) also acts as a natural population regulator (French et al. 1967, Daly et al. 1990, Shier unpublished).

5. HABITAT NECESSARY FOR SURVIVAL

Necessary habitat characteristics for the SBKR include: sandy or gravelly soils and substrates, generally supporting open-structured alluvial fan scrub vegetation, in floodplains with active fluvial processes and nearby upland and/or less frequently inundated terraces (USFWS 2002a). These habitat characteristics are described further below.

The SBKR's habitat occurs within naturally functioning alluvial fan systems, which are highly dynamic, constantly shifting networks of braided channels. The active channels can range from a few decimeters to several meters deep. Alluvium and soils in the floodplain typically have sand, sandy loam, or gravel textures (McKernan 1997). Habitat quality is frequently reworked in these systems through scouring, sediment relocation, and alluvium deposition during fluvial events. There are three successional phases of alluvial fan scrub habitat, the distribution of which is determined by three characteristics: elevation, distance from main channel, and time since previous flooding. The three successional phases are pioneer, intermediate, and mature (Hanes et al. 1989). The pioneer phase has been subject to recent flooding and often occurs close to the main channel. The intermediate phase is generally between the active channels and terraces and experiences periodic flooding over longer temporal intervals. The climax, or mature, phase is rarely affected by flooding and has dense vegetation cover (Smith 1980). The SBKR prefers more open vegetation structures (between 7 and 22% shrub cover), which is typically in the early and intermediate seral stages (McKernan 1997). The intermediate terraces have been observed to host the highest densities of kangaroo rats (Smith 1980).

A geomorphic analysis of the upper Santa Ana River alluvial fan carried out in 1999 (Mussetter Engineering 1999, MEC Analytical 2000) examined SBKR habitat in relation to flood history. Data on soil characteristics (weathering on the surface of boulders, gravel, cobble, boulder, and sand grain size; surface texture; presence and size of lichens, cryptogramic crusts on soil surfaces, sediment depths, and successional phases of the vegetation) were used to map the locations of channels, overbank, and interfluvial areas associated with major floods, notably the 1862/1869, 1938, and post-1938 floods.

The main classes of flood influence were areas influenced by the 1938 flood and more recent floods; areas overtopped by the 1938 flood; and areas that last experienced substantial flooding during the 1862/1869 floods. The 1862/1869 floods, with estimated peak glows of 120,000 cubic feet/sec (cfs) (the largest on record, representing a 200-year pre-SOD flood event) flooded most or all of the fan of the Santa Ana River and hydraulically re-worked most of the fan. The 1938 flood, with an estimated peak flow of about 45,000 cfs (representing a 50-year storm pre-SOD) flooded large areas of the fan with the exception of the area between the percolation basins and Plunge Creek. This area was last flooded or over-topped by the 1862/1869 floods but not affected by the 1938 flood and now supports senescent alluvial fan sage scrub habitat. Data indicate that geomorphically significant events that re-set alluvial fan sage scrub plant succession

have occurred twice in the last 140 years in the pre-SOD history (1862/1869 and 1938), suggesting a recurrence interval of 60-70 years.

The absence of fluvial processes for 60-70 years leads to senescent alluvial fan sage scrub via plant community succession, and senescent alluvial fan sage scrub habitat is not used by SBKR. Senescent alluvial fan sage scrub dominates the Etiwanda fan Critical Habitat unit, is the dominant native plant community in the western part of the Lytle Creek-Cajon Wash unit and occurs in the Santa Ana River between the percolation basins and Plunge Creek. SBKR are most abundant in the early pioneer phase alluvial fan sage scrub habitat, which occupies a small part of the Santa Ana River Critical Habitat unit. Most of the alluvial fan sage scrub in the Santa Ana River Critical Habitat unit is intermediate phased AFSS dominated by juniper trees/shrubs. SBKR historical occurrences are distributed widely in this habitat type, but in lower numbers than in early successional stage alluvial fan sage scrub. Moreover, in the absence of fluvial processes, juniper-dominated intermediate phased alluvial fan sage scrub probably developed 20 years after the latest major flood event, and successional changes after 60 or 70 years can be expected to lead to the senescent phase alluvial fan sage scrub.

Flood events can destroy burrows and force the movement of individuals occupying flooded habitats or they drown. Local population survival is therefore dependent on connectivity to nearby refugia, often on intermediate to higher elevation floodplain terraces, where individuals can escape floods and later colonize early successional habitats (USFWS 2002a).

There is a body of evidence demonstrating the adverse effects of habitat fragmentation and edge effects (e.g., night lighting) on small mammals such as SBKR (e.g., Wilcox and Murphy 1985, Beier 2006). Rodents change their foraging behavior during full moons presumably to reduce their risk to visual predators (Daly et al. 1992, Wang and Shier 2017), and artificial lights can elicit the same responses (Kotler 1984, Wang and Shier 2017). SBKR are significantly less likely to deplete a foraging patch under continuous lighting than under motion detection lights or natural moon conditions. The effect of artificial lighting on SBKR foraging decisions was significant up to 82 feet (25 meters) from the light source (Wang and Shier 2017). Thus, edge effects affect SBKR foraging decisions, and so large unfragmented blocks of suitable habitat not subject to edge effects likely provide the highest habitat quality for SBKR.

6. FACTORS AFFECTING ABILITY TO SURVIVE AND REPRODUCE

The primary threat to SBKR is the direct impact of past and present modification and destruction of its habitat. McKernan (1997) first documented the extensive loss and fragmentation of this species' historical habitat. This work by McKernan and others in the late 1990s led the Service to emergency-list SBKR as Endangered in 1998. By that time, SBKR habitat had been reduced from two large contiguous blocks of habitat in the San Bernardino and San Jacinto/Perris valleys, respectively, into four small, internally fragmented blocks of habitat (Etiwanda Fan, Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River/Bautista Creek), with >90% of the remaining habitat found in only two of these blocks (Santa Ana River, Lytle Creek/Cajon Wash). These four remaining blocks of habitat were the focus of the Service when designating Critical Habitat (USFWS 2002).

However, habitat in these areas has continued to be lost, fragmented, and degraded by land use changes. We estimate that on average over 500 acres of SBKR habitat have been lost each year, with over 11,000 total acres of habitat having been lost since federal listing in 1998. Just as important as the direct loss of habitat, however, significant ecological and hydrological processes that historically maintained SBKR habitat have also been lost due to channelization, flood control operations and water management, and loss of upland refugia. The result is an increasing reliance on experimental, unproven, and as yet unsuccessful, management measures to recover these declining populations.

Habitat loss is the primary driver of species extinction (e.g., Fahrig 2003, Wilcove et al. 2008), and over 95% of the SBKR's historical habitat has been eliminated, including the complete loss of significant portions of its original range (McKernan 1998). This in and of itself potentially jeopardizes the continued existence of the SBKR. Structural impacts to SBKR habitat as a result of habitat conversion to developed uses (e.g., residential, commercial, and flood control), and other land use changes, have led to the loss and degradation of connectivity between remaining habitat patches, which has also been eliminated or greatly reduced. Habitat fragmentation can have negative effects on animal populations (Fahrig 2003, Prugh et al. 2008), particularly when remaining habitat patches have low habitat quality, which can increase extinction rates in individual patches and reduce the long-term viability of a species (Lindenmayer and Luck 2005, Prugh et al. 2008, Rhoades et al. 2008). Because much of the remaining suitable habitat is now located in highly active and flood-prone channels and near stream locations with limited connectivity to suitable habitat on higher, less frequently flooded terraces, elevated local extinction rates of SBKR are expected. In addition, Prugh and colleagues (2008) emphasize the importance of the intervening "matrix" lands (land between suitable habitat patches) to population persistence; i.e., when matrix lands have low or no habitat suitability, the adverse effects of habitat loss and fragmentation on population viability increase. Most of the undeveloped matrix lands around higher quality patches of SBKR habitat lack appropriate fluvial processes and vegetation succession, support nonnative grass, and have elevated night lighting and other edge effects. Without immediate intervention to reverse the extensive losses and modifications to its habitat, the long-term viability and persistence of SBKR is questionable.

A range-wide genetic assessment of SBKR confirms these negative trends in habitat and population loses for conservation and recovery of the species. SBKR in the Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River/Bautista Creek blocks of habitat have low effective population sizes (N_e, Shier et al. 2018). Effective population sizes in Lytle Creek/Cajon Wash (85.8), Santa Ana River (30.4), and San Jacinto River (14.7) are an order of magnitude below the target for maintaining genetic diversity in the species (N_e>500), and the Santa Ana River and San Jacinto River fall below targets to prevent inbreeding depression (N_e>50). Shier and colleagues (2018) documented significant levels of inbreeding of SBKR within these three blocks of habitat and no natural interbreeding among them (their work did detect the translocation of SBKR between the Santa Ana River and Cajon Wash populations). The genetic structure of the three populations is unique, reflecting their relatively recent isolation from each other due to loss of connectivity. Genetic diversity in the San Jacinto block was particularly low and suggestive of a population bottleneck in the past.

SBKR populations use fluvially dynamic alluvial floodplains that support a shifting but interconnected mosaic of flood terraces, varying in elevation with different aged and structured stands of alluvial fan scrub habitat. However, flood control and water management, rail lines, roads and culverts, commercial and urban development, agricultural conversion, and nonnative plant species have modified or eliminated floodplain connectivity and these processes. The prospect for long-term persistence of SBKR and its habitat in the Santa Ana River area is poor because of the operation of the SOD, and nonnative plant invasion and type conversion. Likewise, SBKR appear to have been extirpated in the upper reaches of City Creek (upstream of Highland Avenue). Habitat along Lytle Creek now exists within levee-modified or channelized floodplains which are subject to high stream velocity and scouring events relative to historical conditions, exposing SBKR populations to potentially catastrophic flooding events with little available refugia that remains available for SBKR to move to elevations above the flood zone. Habitat that is currently occupied will become unsuitable for SBKR over time. The cumulative impacts of habitat loss and land use changes jeopardize the continued existence of the species under existing conditions. New development proposals along Lytle Creek and the loss of natural hydrological processes on the Santa Ana River further threaten the last remaining irreplaceable blocks of SBKR habitat with functioning fluvial processes and will further degrade connectivity to important refugia habitats.

Much of the remaining population is subject to indirect impacts from “edge effects” (Harris 1988) associated with human land uses, such as increased nighttime illumination, weed invasions, disturbances from off-highway vehicles, dumping, etc. (USFWS 1998). The effects of lights on nocturnally active animals such as SBKR are of particular concern. Rodents change their foraging behavior during full moons presumably to reduce their risk of predation (Daly et al. 1992, Wang and Shier 2017) and artificial lights can elicit the same responses (Kotler 1984, Wang and Shier 2017). Illumination associated with human land uses, particularly roads, is an order of magnitude above those that cause behavioral responses or increase risk of predation (Beier 2006). Wang and Shier (2017) found that artificial lighting significantly influenced the probability that SBKR would deplete a resource patch. Although their acute hearing may mitigate some increased predation risk under high levels of natural illumination such as full moons (Kotler 1984, Brown et al. 1988), artificial light levels generated by roads and developments in the vicinity of occupied habitat are high enough to cause significant adverse effects. Numerous roadways, including interstate freeways, and commercial and residential development generate artificial lights that adversely affect adjacent SBKR habitat. When habitat coincides with or is nearby to flood control channels, rodenticide bait targeting ground squirrels can pose a danger to SBKR.

Climate change will likely exacerbate the adverse effects to SBKR of human landscape modifications in the future. Hall and colleagues (2012) projected >4ºF warming in the region by mid-century. Projections of rainfall changes are less certain, but climate model results (Cal Adapt 2018) for example, show 2040-2060 average annual rainfall in the Lytle Creek watershed varying ±2-4 inches from its 1961-1990 average of 29.5 inches, depending on the leanings of the specific climate model (e.g., warmer/drier or cooler/wetter). Furthermore, modeling provides evidence of a greater amount of fall and summer rainfall, instead of the historical winter/spring rainfall pattern (Cayan et al. 2008), changing stream hydrology (e.g., seasonal timing of flows, flood magnitude and return intervals). Climate changes can affect the distribution of plants and

animals (e.g., Crimmins et al. 2011, Kuepper et al. 2005). For example, Hayhoe and colleagues (2004) found that shrub cover in California declines under all climate model scenarios. Vegetation communities could shift their position in the landscape to more suitable climates (e.g., Crimmins et al. 2011), but many opportunities for habitats to shift have been precluded in this landscape by permanent loss of SBKR habitat. Much of the highest quality SBKR habitat is now located between levees within flood control channels and is disconnected from higher elevation refugia. Increased rainfall and additional storm runoff from impervious surface cover associated with human land uses (e.g., pavement and buildings) will cause elevated discharges and peak flows that are likely to destroy SBKR habitat and extirpate SBKR populations unless connectivity to refugia can be provided. This is particularly true for larger catastrophic events that occur infrequently, but now have much more significant consequences to the continued existence of SBKR than they did historically.

7. DEGREE AND IMMEDIACY OF THREAT

As documented above, human land use modifications have greatly reduced the extent, quality, and functionality of SBKR historical habitat. By the 1930s, the historical range of SBKR had been reduced by >90%, and by the time it was listed by the Service as Endangered in 1998, the species was eliminated from >95% of its range (McKernan 1998). Listing SBKR as federally Endangered in 1998 and designating Critical Habitat in 2002 has done little to stop the loss, fragmentation, and degradation of habitat and associated populations. Since the listing, populations in Reche Canyon, South Bloomington, Devil's Canyon, Cable Creek, Bautista Creek, and Etiwanda Fan have been effectively extirpated (USFWS 2018), and the remaining three population centers of Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River in total have lost significant potential habitat (5,613 acres; 1,657 acres; and 1,372acres respectively), including critical refugia in upland and higher elevation flood terraces. Shier and colleagues (2018) confirm the isolation, low genetic diversity, and small effective population sizes and recommend "preventing further impacts to SBKR populations and increasing numbers." Dam operations or other hydrologic modifications have largely eliminated the ecological processes necessary for the long-term persistence of SBKR at the largest (Santa Ana River) population and along the San Jacinto River. Active management has yet to be effective in maintaining, let alone increasing, these populations. Thus, the existing status of SBKR is precarious, and there is no clear conservation strategy for the species.

Moreover, additional planned or proposed projects will directly or indirectly impact remaining occupied habitat, including some of the best remaining habitat for the species, ensuring further adverse consequences to SBKR populations. These additional threats to the species are discussed further below.

Lytle Creek/Cajon Wash

Two important projects have significantly affected SBKR in the Lytle Creek/Cajon Wash Critical Habitat unit. A Biological Opinion was issued for the Lytle Creek North Master Planning Community in 2003. The project included 5,120 feet of revetment along the northeast bank of Lytle Creek and construction of 2,466 residential units and infrastructure. The Service estimated that 296 acres of suitable habitat would be lost. As mitigation, 160 acres of floodplain

and wash, including a 56.8-acre “island” of habitat (a proposed refugium), and 5.7 acres of upland terrace were conserved with the objective of protecting as much of the population as would be lost to the project (that is, a net loss of 50%). The 56.8-acre refugium was projected to be high enough to remain above the flood elevation of a 100-year storm event, while the remaining 150.2 acres would be subject to inundation during a 100-year flood. The project analysis anticipated that a significant number of SBKR in the lower elevation floodway and adjacent wash habitat of the conservation area would be lost during high-flow events but would be recolonized from adjacent habitats above flood elevations.

However, a 2005 flood event, estimated at an 8.5-year flood return interval (USFWS 2017), washed part of the island away, and subsequent studies of this reach (Chang 2016, cbec 2018) predicted continued erosion of the island and failure of its southern bank from high flow velocities. Proposals by the project applicant to further armor the island if additional erosion occurs are of unknown efficacy and may have unintended negative consequences to occupied SBKR habitat. Furthermore, using the best available flood data and state-of-the-art sediment transport modeling, the cbec (2018) study shows that the great majority of the island would actually be inundated during a 100-year event, negating its purported value as refugium.

Mitigation also included vegetation thinning and herbicide application on 40 acres on the island, with performance standards for SBKR population numbers established by the Biological Opinion (Lytle Creek supporting documents, various dates). However, this mitigation has failed, and in the 15 years of its existence, the conservation area has not demonstrated it can support a sustainable population. Central to the mitigation performance standards was achieving a population of 72 individuals on the island for 3 consecutive years. Despite the many years of management at the site, this criterion has not been met. All surveys performed using a standard Service protocol found a declining population after 2010.

In conclusion, after the Biological Opinion issued by the Service, and after many years of active conservation management, there was a net loss of SBKR habitat as a result of the Lytle Creek North project. The in-channel refugium in exchange for lost habitat outside the floodplain has failed to date.

The City of Rialto approved the Lytle Creek Ranch development in 2010, which is undergoing an Endangered Species Act section 7 consultation with the Service. The project proposes ~8,407 homes on a 2,447-acre site, which includes high quality SBKR habitat supporting a relatively large population and upland terrace habitats that currently function as refugia during floods.

According to the Service (May 24, 2013), ~1,920 acres of the proposed Lytle Creek Ranch project falls within SBKR Critical Habitat and about 1,191 acres of that (62%) would be adversely modified by the project. According to the applicant, 489 of 700 acres of occupied habitat would be conserved, with additional habitat restored to total 529 acres. Thus, even under the applicant’s mitigation proposal, 171 acres of occupied habitat in one of the last two remaining population centers would be lost, and the proposed conservation measures would rely on unproven restoration practices. Moreover, the Service considers the applicant’s survey methods faulty and assumes that more occupied acres would be impacted than reported by the applicant. Importantly, the habitat proposed for conservation is located largely between the

proposed project revetment and existing levees bounding the north side of the creek. The remaining upland terraces that provide important habitat and a refugium would be developed. As a result, with the exception of the mitigation island described above, all SBKR would remain in the lower elevation and more frequently scoured active channel where they would be vulnerable to medium and large flow flood events. The applicant is proposing to create 40 acres of SBKR habitat off-site and to restore 35 acres onsite, thereby exchanging areas with functioning hydrogeomorphic processes for areas that would need to be artificially maintained and managed.

The proposed mitigation expands conservation activities to the downstream portion of the mitigation island described above for the Lytle Creek North project. Yet the inundation of the island by large flood events leaves the entire Lytle Creek population without refugia and subject to loss. Thus, even in light of the lack of success of previous mitigation attempts on the island, and its inundation during large flood events, the island is still being proposed to compensate for the loss of functioning habitat and refugia on the terraces adjacent to the active channel.

Within this last hydrologically intact reach of remaining SBKR habitat on Lytle Creek, the project proposes to build ~7 miles of revetments, which will constrict the channel and create higher velocity flows with increased scour and erosion. The upland terraces outside the floodplain would be developed, and remaining individuals on the project site would be forced into the highly active flood channel. The increased scour from the project would create bare ground unsuitable for SBKR for long periods of time. Studies by cbec (2018) also showed loss over time of the fine, sandy sediments essential to SBKR from the modified hydrology. This effect extended to the downstream conservation banks. If the Lytle Creek Ranch project is built, there will be no functional flood refugia on this reach of Lytle Creek, which brings into question the long-term viability of this area for SBKR. This would be a highly significant loss of habitat in one of the two remaining population centers for the species.

The Service and Endangered Habitats League have independently offered modified project designs to more effectively mitigate the effects of the proposed development and retain viable refugia. (USFWS 2018, FORMA 2015). Despite an economic analysis showing viability for a modified project (Developers Research 2016), no such redesign has been undertaken by the project proponent. The outcome of federal permitting by the U.S. Army Corps of Engineers (Army Corps) and Service is unknown at the time of petition submittal. According to Service correspondence though, the project applicant has “elevated” its concerns to Service headquarters in Washington DC, potentially politicizing this agency decision-making. (USFWS 2018)

The CEMEX mining company is also processing a take permit for SBKR via an Army Corps section 7 consultation to reestablish aggregate mining in the Lytle Creek channel. (USACE 2015). In 2005, high flows caused a levee breach. Subsequent to the breach, a large mining pit within the channel has been filling. A more natural flow regime has also resulted, with less scour in the channel and vegetation regrowth. The current consultation calls for levee reconstruction.

The outcome of the consultation, the configuration of new levees, and ultimate creek hydrology are unknown at present. However, levee repair will of necessity reverse to some degree the beneficial effects of the 2005 breach on channel hydrology. If, as is likely, the pit or portions thereof continue to fill, however, the current detention basin function of the pit will diminish,

increasing inundation of the island during high flow events (cbec 2018). This fact further heightens the dire consequence of losing terrace refugia as proposed by the Lytle Creek Ranch development.

Santa Ana River

A Biological Opinion was issued for the construction and operation of the SOD on the upper Santa Ana River (USFWS 2002b). The CEQA and NEPA documents for construction and operation of SOD had anticipated that operation of SOD would eliminate natural fluvial processes and associated flooding of habitats on the fan of the Santa Ana River where SBKR occur. The Biological Opinion anticipated that water releases from SOD would be designed and implemented to mimic natural flooding of fan habitats rejuvenating scrub habitats on the fan that support SBKR. Flooding of these habitats would re-set affected parts of the fan to early successional changes preferred by SBKR. However, these releases have not been implemented by the U.S. Army Corps of Engineers (ACOE) and the sponsoring Flood Control Districts, nor are they being planned. The project proponents were also required to fund a large endowment (~$6,000,000) for long-term management and enhancement of the Woollystar Preserve Area to improve habitat quality for SBKR and other species (USFWS 2002b). Long-term management has generally consisted of weed removal to improve habitat quality, which has not been successful (Montgomery 2011). There is currently litigation pending against the ACOE to reinitiate a section 7 consultation with the Service and to compel releases and implement other mitigation measures in the original Biological Opinion for the project.

Not only were project impacts to SBKR not adequately mitigated through the Biological Opinion, USFWS permitting allowed the fundamental hydrological processes maintaining SBKR habitat along the Santa Ana River to be lost, and the largest of the remaining functioning SBKR habitat blocks to be permanently altered. This situation is especially dire in light of the negative trajectory of SBKR in the other large habitat block at Lytle Creek/Cajon Wash, and makes protection of SBKR habitat in Lytle Creek/Cajon Wash imperative.

To investigate the potential efficacy of water releases from SOD, San Bernardino Valley Municipal Water District and San Bernardino Valley Water Conservation District have studied flood scenarios, with discouraging results (ICF 2018). Even with theoretically maximal releases from the dam, coupled with 100-year floods on Mill Creek and other tributaries, there are no significant overbank flows out of the incised channel, meaning that there would be no rejuvenation of the floodplain to reset vegetation succession. There are also major operational and institutional obstacles to obtaining water releases for habitat of *any* magnitude from the dam.

Other Habitat Conservation Plans (e.g., the Wash Plan and Upper Santa Ana River HCP) would affect development authorizations and conservation of SBKR. For example, the Public Review Draft Wash Plan Habitat Conservation Plan (HCP, ICF 2018) would allow 680 acres of impact in exchange for ultimately conserving 1,622.5 acres of habitat for the species. About half of the conserved acreage is currently considered medium or high suitability habitat.

San Jacinto River/Bautista Creek

The status and trajectory of SBKR in the San Jacinto River and Bautista Creek block of habitat are also negative. The Service now considers SBKR extirpated from Bautista Creek, and trapping studies suggest relatively low rates of occupancy of suitable habitat elsewhere (Biological Monitoring Program 2016). SBKR is covered by the Western Riverside MSHCP, but conservation efforts are well below goals for the species (4,400 acres of conserved habitat, 75% of which is to be occupied). Given the Service's assessment of the remaining suitable habitat in this block (2,403 acres, USFWS 2018), it appears the MSHCP conservation goal for SBKR is not feasible without a massive habitat creation effort. SBKR habitat creation has not yet been successfully implemented. In addition, recent efforts to translocate SBKR, required by a Biological Opinion to mitigate loss of habitat resulting from a recharge basin in the San Jacinto riverbed, have failed. Additional projects (e.g., San Jacinto River Levee Project Stage 4 project, KPC Promenade (City of San Jacinto), Eastern Municipal Water District San Jacinto River floodplain recharge basins) are being planned or are under consideration that would adversely affect additional SBKR habitat.

8. IMPACT OF EXISTING MANAGEMENT EFFORTS

SBKR conservation to date has been under the purview of the Service under sections 7 and 10 of the Federal Endangered Species Act (ESA). Based on an extensive review of the majority of Biological Opinions issued under section 7 of the ESA (40) and five HCPs issued under section 10 of the ESA since SBKR was listed, conservation of SBKR can be reduced to three basic strategies: (1) relocation, (2) habitat restoration, and (3) purchase of mitigation credits from mitigation banks (almost exclusively the Lytle Creek and Cajon Wash banks). There are significant problems with all three strategies.

Relocation of SBKR has taken two forms: movement of SBKR from a project area to adjacent habitat, and large-scale relocation of SBKR from one geographic area to another. In only one instance was either form of relocation at least partially successful, and that was a translocation of individuals to a site already occupied by SBKR. The former strategy involved the movement of SBKR caught within a fenced project area to areas outside a fenced project area. The strategy has rarely considered the impact of the relocation to existing SBKR populations outside the fencing, nor has it necessarily required the habitat outside the fenced area be suitable for SBKR. There has been no substantive effort to determine the fate of the relocated SBKR in any of these projects. This mitigation strategy has been the most common requirement in the Biological Opinions and has accomplished nothing substantive or quantifiable with regard to ensuring SBKR survival and persistence.

Habitat restoration has been a common element in the Biological Opinions and HCPs. Habitat restoration has not yet resulted in persistently occupied SBKR habitat. Moreover, there is no requirement in any of the Biological Opinions or HCPs that SBKR occupation be confirmed before occupied SBKR habitat is taken. This mitigation strategy of habitat restoration has not been effective in compensating for loss of habitat.

Purchase of lands in available mitigation banks, mostly in the Lytle-Cajon confluence and Cajon Creek, but also in a small bank near Mill Creek, is also a common requirement in Biological Opinions. However, like all mitigation banks, the purchase of credits in the Lyle and Cajon mitigation banks still results in a *net* loss of SBKR habitat, and permanent impacts to SBKR populations in project impact locations. When using a bank to mitigate project impacts to SBKR habitat, the project applicant is exchanging the protection of existing habitat within the bank for the loss of habitat outside of the bank. For example, mitigation at a 1:1 ratio would result in a 50% net loss of habitat (purchase of 1-acre of credits in the bank for each acre of habitat lost). Additionally, the Judson/Brown Preserve is small, hydrologically disconnected, and management for SBKR habitat poses a conflict with California gnatcatcher management objectives.

Despite the above inherent limitations, the Lytle and Cajon banks – and their financial success – are rare encouraging notes for species conservation. In the majority of the Cajon Creek bank, rejuvenating fluvial processes increase habitat suitability and likelihood of SBKR persistence over the long-term. SBKR trapping started there in 2017 and shows presence/absence of SBKR rather than population size. For the Lytle bank, about half is outside the active floodplain, meaning that those lands will need long-term intensive management. Surveys for SBKR in the Lytle bank within the last 10 years are limited. Both banks have management plans in place, but implementation of management actions is in early stages, with uncertain prospects for long-term efficacy. It must be stressed that the Lytle Creek (182-acre) and Cajon Wash (1,300-acre) banks in isolation are far too small in size and population, and too vulnerable to stochastic events, to sustain the species genetically.

When the HCPs are specifically evaluated, none includes a population viability analysis or a minimum population viability analysis for SBKR. Instead, they call for habitat restoration, which as described above, has not been successful, with no clear or credible monitoring strategy or abundance/occupation targets.

Ultimately, the Service's current approach to conserving SBKR has been inconsistent and has relied on unproven mitigation tactics. Of the three prevalent management strategies by USFWS in its permitting decisions, two (relocation and restoration) have not been effective to date, and the third (mitigation banking) has both inherent limitations and significant on-the-ground uncertainties regarding long term benefits to the species. The overall result has been a substantial and ongoing loss of SBKR and SBKR habitat since the species' listing. The existing federal listing, while theoretically an alternative regulatory mechanism to state listing, has in reality proven ineffective.

In the sections below, we describe some of the mitigation and management activities that have occurred in the three remaining SBKR population centers.

Santa Ana River

As described above, a Biological Opinion was issued for the Santa Ana River Mainstem Project and SOD (USFWS 2002b). Operation of the SOD eliminated natural fluvial processes and removed major flood flows in the mainstem portion of the Santa Ana River block of SBKR habitat. The anticipated water releases identified in the Biological Opinion to mimic natural

scouring and vegetation succession patterns have not been implemented. Management of the Woollystar Preserve Area (WSPA) has generally consisted of weed removal, which has not been successful (Montgomery 2011). In addition to this unsuccessful management, subsequent studies of potential water releases from the dam (as described above) have disclosed that fixed engineering constraints render the Biological Opinion's water release strategy largely moot.

The majority, but not all, of the remaining potential SBKR habitat on the Santa Ana River falls either within the WSPA or the Santa Ana River Wash Plan Habitat Conservation Plan (Wash Plan HCP) being developed by the San Bernardino Valley Water Conservation District (ICF 2018) or is land owned by the San Bernardino Flood Control District (SBCFCD). The SBCFCD lands are managed to maintain flood capacity rather than for SBKR persistence or benefit. Channel maintenance has, at times, occurred under an emergency process without consideration of SBKR or mitigation of impacts to the species. Flood district lands are not secure. The SBCFCD has sold upland SBKR refugia along City Creek in the Highlands area, as well as upland habitat in Etiwanda Fan near Rancho Cucamonga, for development purposes.

The Wash Plan HCP, which also incorporates some BLM properties, is expected to be completed in late 2019. As proposed by the draft Wash Plan HCP, 570.9 acres of permanent impacts and 109.1 acres of temporary impacts to SBKR would be offset by conservation of 1,622.5 acres of conserved and managed lands. However, over half (54%) of the total Wash Plan HCP Preserve SBKR conservation lands are considered low or very low suitability for SBKR, and only 18% of the conservation lands are considered high suitability for SBKR (ICF 2018). While the plan impacts relatively little highly suitable habitat, and seeks to balance interests, it nevertheless would permit the continued loss of SBKR habitat and relies on unproven management measures.

Further downstream, the Upper Santa Ana River HCP is being undertaken primarily to address the endangered Santa Ana suckerfish, but will propose some SBKR impacts in retention basin facilities. Both the Wash Plan HCP and the Upper Santa Ana River HCP are properly coordinating with state and federal regulatory agencies to address specific impacts to SBKR and are being designed to meet both state and federal permitting standards. However, the effect of the loss of natural hydrology on the Santa Ana River population due to SOD remains an overwhelming obstacle to the viability of this population over the long term. To date, efforts to enhance habitat quality downstream of the dam have been unsuccessful in establishing persistently occupied habitat.

San Jacinto River

SBKR habitat in this area falls under the Western Riverside County Multiple Species Habitat Conservation Plan (WRC MSHCP), implemented by the Western Riverside County Regional Conservation Authority (RCA 2003). Conservation objectives for SBKR include 4,440 acres of conserved habitat, of which 75% (3,300 acres) is to be occupied, and at least 20% of the occupied habitat is to support medium to high population densities. Monitoring for SBKR in 2015 demonstrated that there were only 451 acres of occupied habitat in the MSHCP preserve, far short of the MSHCP conservation objective for this species (Biological Monitoring Program 2016). In light of future proposed projects along the San Jacinto River (e.g., San Jacinto River

Levee Project Stage 4 Project, etc.), there is low probability of the WRC MSHCP achieving its conservation objectives for this species.

Furthermore, as part of a reconsultation under ESA section 7 with the Service, SBKR were translocated as mitigation for an Eastern Municipal Water District water recharge project that impacted occupied habitat. The RCA implemented a Vegetation Control Plan in this area to improve habitat suitability for the translocated individuals. However, no SBKR were detected in the translocation area (Biological Monitoring Program 2016), suggesting that this mitigation effort failed. Thus, additional occupied habitat in the San Jacinto River was lost as a result of the water recharge project and not adequately mitigated, and additional water recharge projects are being contemplated on EMWD lands in the San Jacinto River.

Lytle Creek/Cajon Wash

Vulcan Materials Corporation owns and operates the Cajon Wash Habitat Conservation Area on Cajon Wash and Lytle Creek, totaling about 1,300 acres. It is both a state and federally permitted mitigation bank. Wildlands, Inc. established the 182-acre Lytle Creek Conservation Bank in 2014 to provide Service-approved mitigation credits for SBKR. CDFW is considering using the Bank for mitigating State of California-permitted impacts to SBKR. Funding for management derives from endowments, and management plans have been developed for both banks, with implementation of those plans in early stages.

9. SUGGESTIONS FOR FUTURE MANAGEMENT

The most critical actions to protect existing SBKR populations are: (1) preventing additional significant loss of suitable habitat and particularly occupied habitats and those with a functional hydrologic system, and (2) expanding areas occupied by SBKR. Clearly, preventing the additional loss of habitat requires preventing the direct loss of habitat via land use conversion, which has still occurred via Federal Endangered Species Act consultations with the Service. The proposed loss of occupied habitat by the Lytle Creek Ranch project would continue this trend. Developments should be permitted only if impacts avoid occupied habitat with long term biological viability. Stronger hazard zoning for floodplains is warranted in jurisdictions with SBKR habitat so that there is no further channelization of creeks.

In addition to habitat loss, SBKR has been affected negatively by changes in ecological processes, habitat fragmentation, edge effects, and invasion by nonnative species. Developing management actions to prevent loss of currently suitable habitat adversely affected by factors such as altered hydrologic processes and nonnative plant invasions will also be required to secure the long-term persistence of SBKR in areas it currently occupies.

Additional conservation banking should be encouraged, such as on the Lytle Creek Ranch development site, where a smaller project could be coupled with highly marketable credits.

To date, as shown by the results of numerous Section 7 consultations, techniques for enhancing SBKR habitat have not proven successful. Nevertheless, such efforts should continue, noting, for example, that soil restoration on the Cajon bank has shown initial promise in a limited location.

The management activities discussed below should be explored for their efficacy in enhancing SBKR populations, but these activities should not be considered “mitigation measures” for loss of additional occupied habitat until they are proven successful in other contexts (such as those described below) and the status of SBKR is stable. They are presented here merely to be complete.

Enhancing Sediment Transport – SBKR habitat requires active fluvial processes that in many areas have been modified, leaving unsuitable conditions. For example, reaches of Lytle Creek have a boulder-cobble substrate unsuitable for SBKR. Increased sand deposition could hypothetically improve the substrate for SBKR. Installing culverts under Glen Helen Parkway to allow sand to move downstream, would be beneficial. Glen Helen Parkway was widened in 2006 to accommodate the Lytle Creek North development without a section 7 consultation for impacts to SBKR. It was designed with three small culverts and one large culvert to allow water through, but the culverts essentially prevent most sediment from passing under the road. San Bernardino County Flood Control District has been mechanically straightening the channel upstream to ensure that the water flows through the main culvert (creating further impacts to SBKR habitat). The creek downstream of Glen Helen will continue to be deprived of sand that is captured behind Glen Helen Parkway. Modifying the structures that provide for water flow under Glen Helen Parkway or bridging the creek to allow transport of sand during small and moderate events would decrease the time required to reestablish SBKR use areas in the scour zones. It could promote connectivity across scour areas and maximize the area available for use by SBKR.

Nonnative Plant Management – Invasion of nonnative annual grasses into SBKR habitat reduces its quality. Management activities that reduce cover of nonnative annual grasses and promote native annuals, would benefit SBKR. Active vegetation management may be one of the most cost-effective management measures for SBKR, but its ultimate efficacy and benefit are unproven. The upper Santa Ana River, which is now deprived of fluvial processes, is a logical place for testing such measures.

Translocation of SBKR – Moving SBKR into suitable but unoccupied habitats may be necessary to recover the species. This assumes that individual SBKR and suitable receiver sites would be available for such translocations. However, translocations have had very limited success. In 2012, 60 SBKR were relocated within the San Jacinto River floodplain to a receiver site just upstream. In the following year, only one SBKR was captured at the receiver site, and zero to one was trapped in the 5 years following. In 2015 and 2016, 366 SBKR were relocated from a site within the Santa Ana River floodplain to the Cajon Conservation Area. Only 59 SBKR were captured at the receiver site in 2018, a low success rate of the translocation.

Captive Propagation – If SBKR could be successfully translocated, captive propagation may be a means of providing individuals. However, the limiting factor for this species is not reproductive capacity but rather a lack of suitable habitat across its range. Thus, methods for captive propagation should not be explored until there is a conservation rationale. The primary threat to SBKR is habitat loss, the conservation and recovery strategy must be to conserve as much remaining habitat as possible.

Restoration of Hydrological Processes – Outside of Lytle Creek-Cajon Wash, all SBKR habitat is downstream of flood control structures that have eliminated historical flooding regimes. The result has been markedly diminished flood flows and associated sediment dynamics and has reduced sediment contributions from tributary streams, leaving systems that are unable to rejuvenate late-successional habitats that eventually become unsuitable for SBKR. Indeed, recent studies have shown that, due to construction constraints, even maximal releases from SOD would be too small to hydrologically connect the historical floodplain to the currently deeply incised channels along the Santa Ana River. However, it might be possible to install berms, modify streambed elevation with transported sediment, or construct channels to create overbank flows from Mill Creek or other tributaries. Further investigation is warranted, with close attention to unintended consequences and potential adverse effects downstream of the berms on high density populations of SBKR and other species of concern, such as the Santa Ana sucker. New – and heretofore unprecedented – collaborations between the ACOE, local flood control districts, local water districts, and state and federal wildlife agencies would be essential. Maintaining natural hydrology and floodplain integrity and connectivity along Lytle Creek and Cajon Wash remains a top priority.

In addition, the current population status of SBKR in existing conserved lands is unclear, and a range-wide monitoring program is necessary to make informed decisions on management and any permitted conversion of habitat. Population viability and minimum viable population analyses would be useful tools for developing recovery objectives and targets for population management and would help planners and managers better understand the implications of development decisions.

California Endangered Species Act Protections

An endemic taxon of California, SBKR is part of the unique biological heritage of the state. It has been recognized as worthy of protection and conservation by the Service. However, federal Endangered Species Act processes have not halted its precipitous decline. A new and objective look at SBKR status, trends, and conservation needs is essential. Innovative and creative conservation actions are needed to be based upon an assessment of what has not worked in the past and what has promise in the future. While the federal Endangered Species Act process is not providing these functions, the State of California is well suited to do so. CESA requires that "all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved."

The tools currently available to the State to conserve and manage SBKR – Streambed Alteration Agreements and the CEQA comment process – are either inherently limited in scope (the former) or have proven ineffective (the latter). For example, recommendations offered by the California Department of Fish and Wildlife during the Lytle Creek Ranch CEQA process were ignored by the lead agency.

State listing will also remedy a serious limitation in the federal system that has contributed to SBKR decline. Due to proximity of SBKR habitat to river systems, federal permitting for SBKR impacts typically occurs via section 7 consultations (with resulting Biological Opinions)

requested by the Army Corps of Engineers in association with impacts to Waters of the United States, rather than through Habitat Conservation Plans under section 10 of the ESA. Indeed, a review of all Habitat Conservation Plans and Biological Opinions issued by the Service from 1997 to the present shows 61 (94%) Biological Opinions and 5 (6%) Habitat Conservation Plans.

Unlike a Habitat Conservation Plan and section 10 consultation under the ESA, there is no general requirement in a section 7 consultation to minimize and mitigate the impacts of the take of an endangered species to the maximum extent practicable. Indeed, unless the extreme case of jeopardy to the very existence of a federally endangered species is reached, *no mitigation whatsoever is required* (per the Endangered Species Consultation Handbook, "It is not appropriate to require mitigation for the impacts of incidental take." USFWS and NMFS 1998). Rather, section 7 seeks to minimize take as long as such measures are "reasonable and prudent" and "minor" in extent. Under these circumstances, and with more than 9 of every 10 take permits issued through section 7 rather than section 10, it is not surprising that mitigation for impacts to SBKR under the federal listing has failed to compensate for the substantial loss of habitat that has occurred.

To the contrary, under the California Endangered Species Act (CESA), project applicants would not be able to circumvent providing effective mitigation. Under CESA, take must be minimized and "fully mitigated." Elevating the regulatory status of SBKR in California to Endangered will provide the Department of Fish and Wildlife a heightened level of review and regulatory authority to arrest the decline of SBKR. Only with sufficient mitigation on all projects can the negative trends in SBKR population begin to be reversed. U.S. Army Corps regulations are no substitute, as its focus is on wetlands and Waters of the U.S. rather on the surrounding uplands that are vital to SBKR.

Finally, there is strong and ample evidence of the politicization of federal regulatory agencies under the current Executive Administration and the ascent of an anti-science and anti-regulatory agenda. Scientific panels have been disbanded and there is open hostility to objective science, such as in the realm of climate change. State listing is a necessary backstop to the disregard of law and science by federal environmental agencies under the current Administration.

10. AVAILABILITY AND SOURCES OF INFORMATION

Literature cited

Behrends, P., M. Daly, and M.I. Wilson. 1986. Range use patterns and spatial relationships of Merriam's kangaroo rats (*Dipodomys merriami*). Behaviour 96:187-209.

Beier, P. 2006. Effects of artificial night lighting on Terrestrial mammals. Pgs. 19-42 in Rich, C. and T. Longcore (eds.) Ecological Consequences of Artificial Night Lighting. Island Press.

Biological Monitoring Program. 2016. Western Riverside County MSHCP Biological Monitoring Program 2015 San Bernardino Kangaroo Rat Survey Report. Prepared for the Western Riverside County Multiple Species Habitat Conservation Plan. Riverside, CA. Available online: http://wrc-rca.org/about-rca/monitoring/monitoring-surveys/.

Brown, J.H. and B.A. Harney. 1993. Population and community ecology of heteromyid rodents in temperate habitats. *In*: H.H. Genoways and J.H. Brown (eds.), Biology of the Heteromyidae, pp. 539-574. Special Publication No. 10, the American Society of Mammalogists; August 20, 1993.

Brown, J.H., B.P. Kotler, R.J. Smith and W.O. Wirtz II. 1988. The effects of owl predation on the foraging behavior of heteromyid rodents. Oecologica 76:408-415.

Cal-Adapt. 2018. Annual average precipitation for the Lytle Creek watershed. http://cal-adapt.org/tools/annual-averages/#climatevar=pr&scenario=rcp45&lat=34.24639&lng=-117.47277&boundary=hydrounits&units=inches%20per%20day

Cayan, D.R., E.P. Maurer, M.D. Dettinger, M. Tyree and K. Hayhoe, 2008, Climate change scenarios for the California region, Climatic Change, Vol. 87, Suppl. 1, 21-42 doi: 10.1007/s10584-007-9377-6

Cbec Eco Engineering (cbec). 2018. Technical Memorandum on the Potential Impacts to San Bernardino Kangaroo Rat Habitat. Project: 16-1011-2 Lytle Creek Sediment Transport and Hydrodynamic Modeling. From: Gavin Downs, Chris Campbell, To: Dan Silver. November 29, 2018.

Chang, Wayne (Chang Consultants). 2016. Hydraulic Sediment Transport Analysis for CEMEX Lytle Creek Quarry. March 15.

Crimmins, S.M., S.Z. Dobrowski, J.A. Greenberg, J.T. Abatzoglou, and A.R. Mynsberge. 2011. Changes in climatic water balance drive downhill shifts in plant species' optimum elevations. Science 331:324-327.

Daly, M., P.R. Behrends, M. Wilson, and L.F. Jacobs. 1992. Behavioural modulation of predation risk: moonlight avoidance and crepuscular compensation in a nocturnal desert rodent, *Dipodomys merriami*. Anim. Behav. 44:1-9.

Developers Research. 2016. Technical Memorandum on the Economic Feasibility of the Balanced Alternative for the Lytle Creek Ranch Specific Plan. June 2016.

Eisenberg, J. 1993. Ontogeny. *In*: H. H. Genoways and J. H. Brown (eds.), Biology of the Heteromyidae, pp. 479-490. Special Publication No. 10, the American Society of Mammalogists; August 20, 1993.

Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. Ann. Rev. Ecol. Syst. 34:487–515.

FORMA. 2015. Exhibits and Specific Plan Objectives & Comments for the Lytle Creek Specific Plan Balanced Alternative. December 16.

French, N.R., B.G. Maza, and A.P. Aschwanden. 1967. Life spans of *Dipodomys* and *Perognathus* in the Mojave Desert. Journal of Mammalogy 48:537-548.

Gard, Mark, US Fish and Wildlife Service, Lytle Creek Rainfall Analysis, Memo to File, March 21, 2017

Goldingay, R.L., P.A. Kelly, and D.F. Williams. 1997. The kangaroo rats of California: endemism and conservation of keystone species. Pacific Conservation Biology 3:47-60.

Hall, E.R. 1981. The Mammals of North America, 2nd Edition. John Wiley and Sons, New York.

Hall, A., F. Sun, D. Walton, S. Capps, X. Qu, H. Huang, N. Berg, A. Jousse, M. Schwartz, M. Nakamura, and R. Cerezo-Mota. 2012. Mid-century warming in the Los Angeles Region. UCLA Institute of the Environment and Sustainability, Working Paper #11. Available at: http://escholarship.org/uc/item/6v88k76b. University of California, Los Angeles, Los Angeles, CA.

Hanes, T.L., R.D. Friesen, and K. Keane. 1989. Alluvial scrub vegetation in coastal southern California. *In*: D.L. Abell (tech. coord.). Proceedings of the California Riparian Systems Conference: Protection, management, and restoration for the 1990s. September 22-24, 1988. Davis, CA. Gen. Tech. Rep. PSW-110. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, USDA.

Harris, L.D. 1988. Edge effects and conservation of biotic diversity. Conservation Biology 2:330-332.

Hayhoe, K., D. Cayan, C.B. Field, P.C. Frumhoff, E.P. Maurer, N.L. Miller, S.C. Moser, S.H. Schneider, K. Nicholas Cahill, E.E. Cleland, L. Dale, R. Drapek, R.M. Hanemann, L.S. Kalkstein, J. Lenihan, C.K. Lunch, R.P. Neilson, S.C. Sheridan, and J.H. Verville. 2004. Emissions pathways, climate change, and impacts on California. PNAS 101(34):12422-12427.

ICF. 2018. Draft Public Review Wash Plan. January.

Jenkins, S.H., A. Rothstein, and W.C.H. Green. 1995. Food hoarding by Merriam's kangaroo rats: a test of alternative hypotheses. Ecology 76(8):2470-2481.

Jones, W.T. 1993. The social systems of heteromyid rodents. *In*: H. H. Genoways and J. H. Brown (eds.), Biology of the Heteromyidae, pp. 575-595. Special Publication No. 10, the American Society of Mammalogists; August 20, 1993.

Kotler, B.P. 1984. Effects of illumination on the rate of resource harvesting in a community of desert rodents. American Midland Naturalist 111:383-389.

Kueppers, L., M. Snyder, L. Sloan, E. Zavaleta, and B. Fulfrost. 2005. Modeled regional climate change and California endemic oak ranges. Proceedings of the National Academy of Sciences of the United States of America 102(45):16281-16286.

Lidicker, W.Z., Jr. 1960. An analysis of intraspecific variation in the kangaroo rat *Dipodomys merriami*. University of California Publications in Zoology 67:125-218.

Lindenmayer, D.B. and G. Luck. 2005. Synthesis: thresholds in conservation and management. Biological Conservation 124:351-354.

Lytle Creek supporting documents. Various dates.

McKernan, R.L. 1997. The status and known distribution of the San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*): field surveys conducted between 1987 and 1996. Prepared for U. S. Fish and Wildlife Service.

MEC Analytical Systems. 2000. Final report of findings for the San Bernardino kangaroo rat and habitat relationships 1999 field survey for the Santa Ana River alluvial fan, San Bernardino County, California. Prepared for U.S. Army Corps of Engineers, Los Angeles District.

Montgomery, S.J. 2011. San Bernardino kangaroo rat percent area occupied (PAO) survey at the Santa Ana River Woolly Star Preserve Area, May-June 2011. Unpublished report prepared for U.S. Army Corps of Engineers.

Murray, A.L., A.M Barber, S.H. Jenkins, and W.S. Longland. 2006. Competitive environment affects food-hoarding behavior of Merriam's kangaroo rats (*Dipodomys merriami*). Journal of Mammalogy 87(3): 571-578.

Mussetter Engineering. 1999. Geomorphic evaluation of Santa Ana River alluivial fan and San Bernardino kangaroo rat habitat California. Prepared for U.S. Army Corps of Engineers. MEI project 99-06.

Prugh, L.R., K.E. Hodges, A.R.E. Sinclair, and J.S. Brashares. 2008. Effect of habitat area and isolation on fragmented animal populations. PNAS 105(52):20770-20775.

Reichman, O.J. and M.V. Price. 1993. Ecological aspects of heteromyid foraging. *In*: H.H. Genoways and J.H. Brown (eds.), Biology of the Heteromyidae, pp. 539-574. Special Publication No. 10, the American Society of Mammalogists; August 20, 1993.

Rhodes, J.R., J.G. Callaghan, C.A. McAlpine, C. de Jong, M.E. Bowen, D.L. Mitchell, D. Lunney, and H.P. Possingham. 2008. Regional variation in habitat-occupancy thresholds: a warning for conservation planning. J. Appl. Ecol. 45:549-557.

Root, B. 2008. 2006-2007 San Bernardino Kangaroo Rat Occupancy Survey Analyses from the Woolly Star Preserve Area, San Bernardino County, California. Prepared for the U.S. Army Corps of Engineers. U.S. Fish and Wildlife Service. December.

Root, B. 2010. 2005-2009 San Bernardino Kangaroo Rat Survey Analyses from the Woolly Star Preserve Area, San Bernardino County, California. Prepared for the U.S. Army Corps of Engineers. U.S. Fish and Wildlife Service. September.

Shier, D.M., A. Navarro, E. Gray, and T. Wang. 2018. Range-wide genetics of the endangered San Bernardino kangaroo rat (*Dipodomys merriami parvus*). Final Report for the period

September 2014-September 2018, Federal Permit Number TE-142435-5; State SC-002508.

Smith, R.L. 1980. Alluvial scrub vegetation of the San Gabriel River floodplain, California. Madrono 27(3):126-138.

Tremor, S., D. Stokes, W. Spencer, J. Diffendorfer, H. Thomas, S. Chivers, and P. Unitt (eds.). 2017. San Diego County Mammal Atlas. San Diego Natural History Museum.

U.S. Fish and Wildlife Service (USFWS). 1998a. Endangered and Threatened Wildlife and Plants; Final Rule to List the San Bernardino Kangaroo Rat as Endangered (63 FR 3835 3843).

USFWS. 2002a. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the San Bernardino Kangaroo Rat; Final Rule (67 FR 19812 19845).

USFWS. 2002b. Section 7 Consultation for Operations of Seven Oaks Dam, San Bernardino County, California (1-6-02-F-1000.10).

USFWS. 2008. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the San Bernardino Kangaroo Rat; Final Rule (73 FR 61936 62002).

USFWS. 2009. San Bernardino kangaroo rat (*Dipodomys merriami parvus*), 5-Year Review: Summary and Evaluation. Carlsbad Fish and Wildlife Office, August 14.

USFWS. 2017. Lytle Creek Rainfall Analysis. Memo from Mark Gard, Fish and Wildlife Biologist to File. March 21.

USFWS 2018. Lytle Creek RO Packet_2018-821.

U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). 1998. Endangered Species Consultation Handbook: procedures for conducting consultation and conference activities under section 7 of the Endangered Species Act. March.

Wang, T. and D.M. Shier. 2017. Effects of anthropogenic lighting on San Bernardino kangaroo rat (*Dipodomys merriami parvus*) foraging behavior, persistence and fitness. Final Report to USFWS.

Wilcove, D.S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States: assessing the relative importance of habitat destruction, alien species, pollution, overexploitation, and disease. BioScience Vol. 48:607-615.

Williams, D.F., H.H. Genoways, and J.K. Braun. 1993. Taxonomy. *In*: H. H. Genoways and J. H. Brown (eds.), Biology of the Heteromyidae, pp 38-196. Special Publication No. 10, the American Society of Mammalogists.

Zeng, Z. and J.H. Brown. 1987. Population ecology of a desert rodent: *Dipodomys merriami* in the Chihuahuan desert. Ecology 68: 1328-1340.

Additional relevant literature and reports are provided digitally

Biological consultant (CV enclosed)

Phil Brylski, PhD

Credits

GIS analyses and maps prepared by Streamscape Environmental

Salvador Contreras

Jennifer Mongolo

Individuals supporting the petition

Dr. Wayne Spencer, Conservation Biology Institute, wdspencer@consbio.org

Scott Tremor, San Diego Natural History Museum, stremor@sdnhm.org

Organizations supporting the petition

Defenders of Wildlife

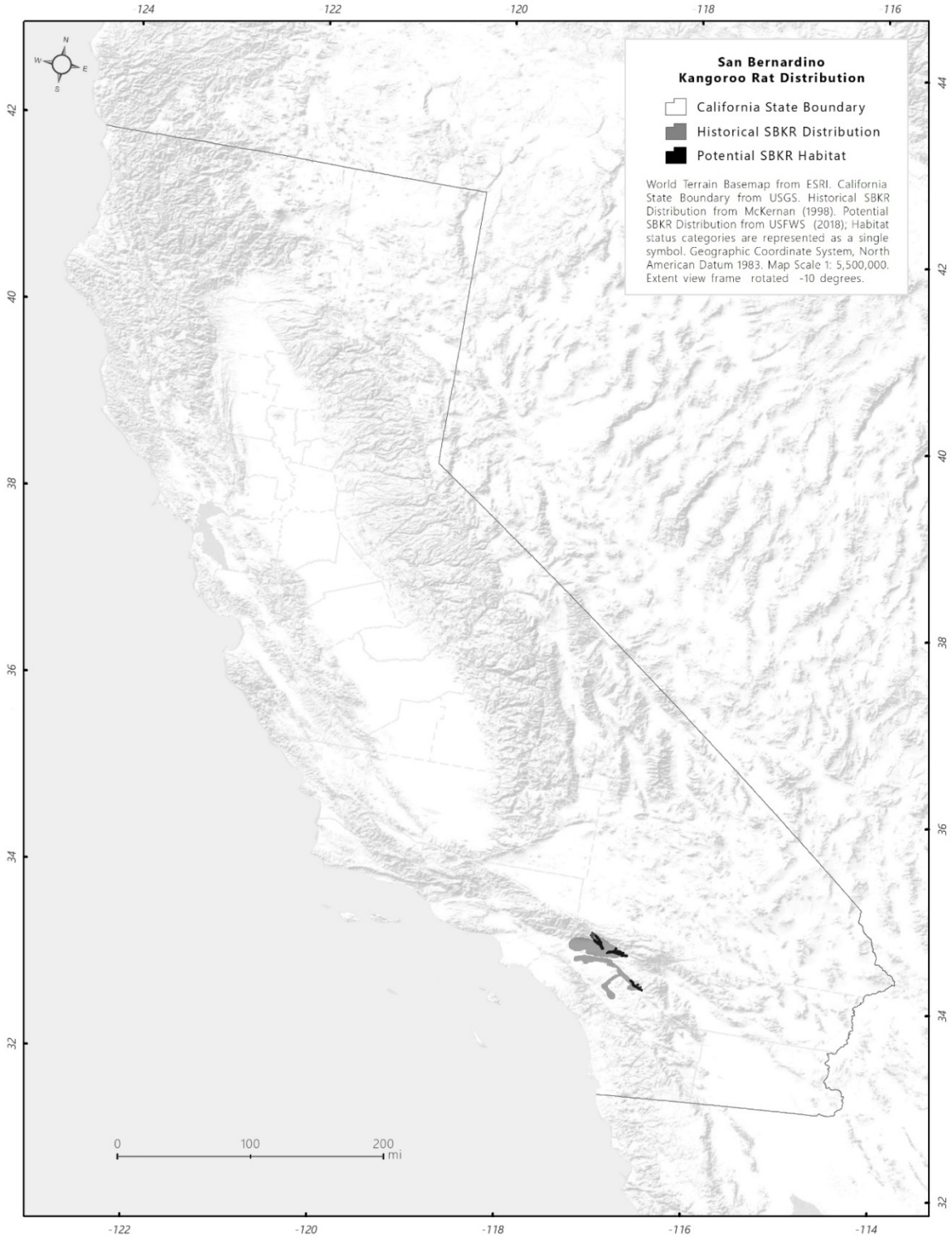
Natural Resources Defense Council

Audubon California

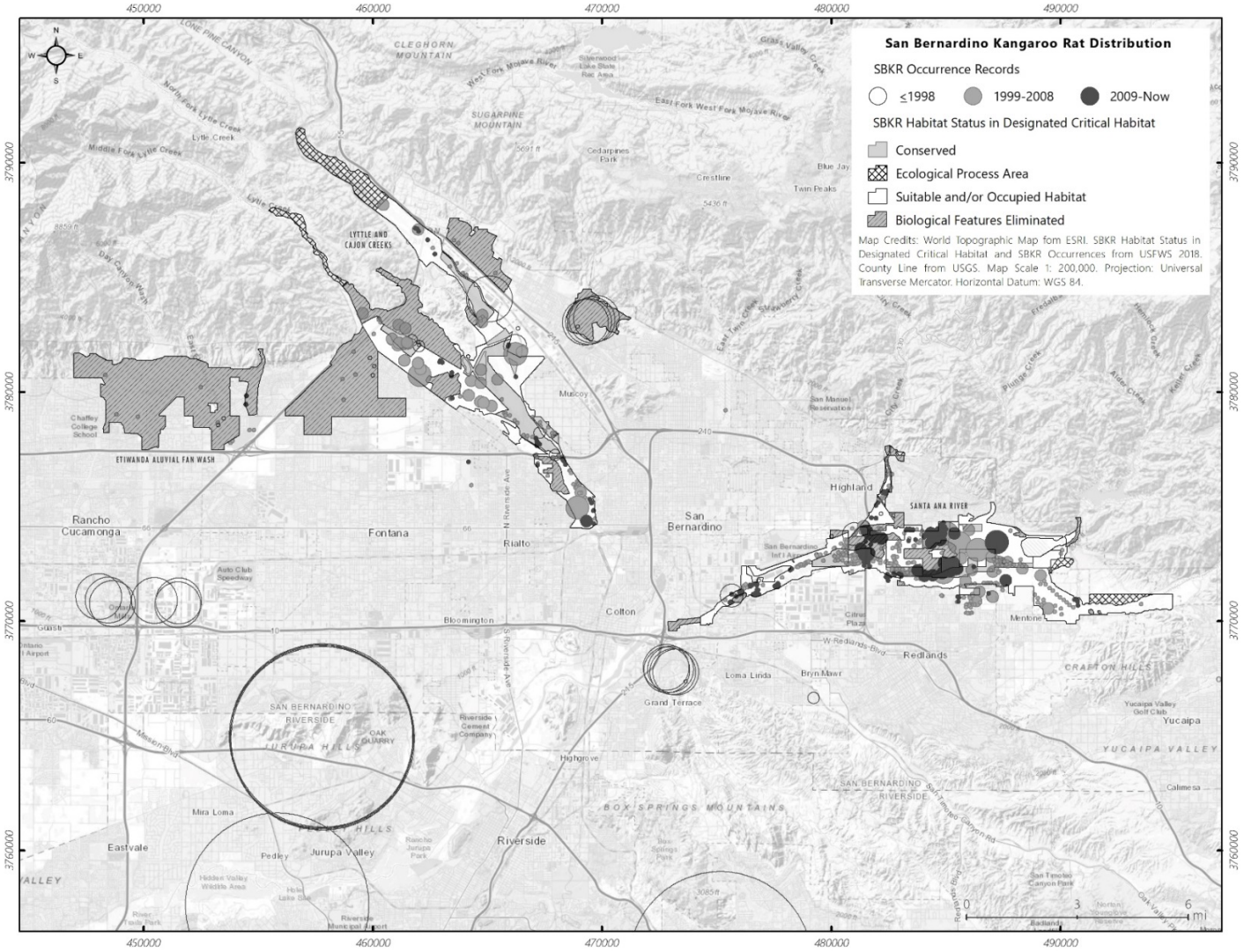
Save Lytle Creek Wash

11. DETAILED DISTRIBUTION MAP

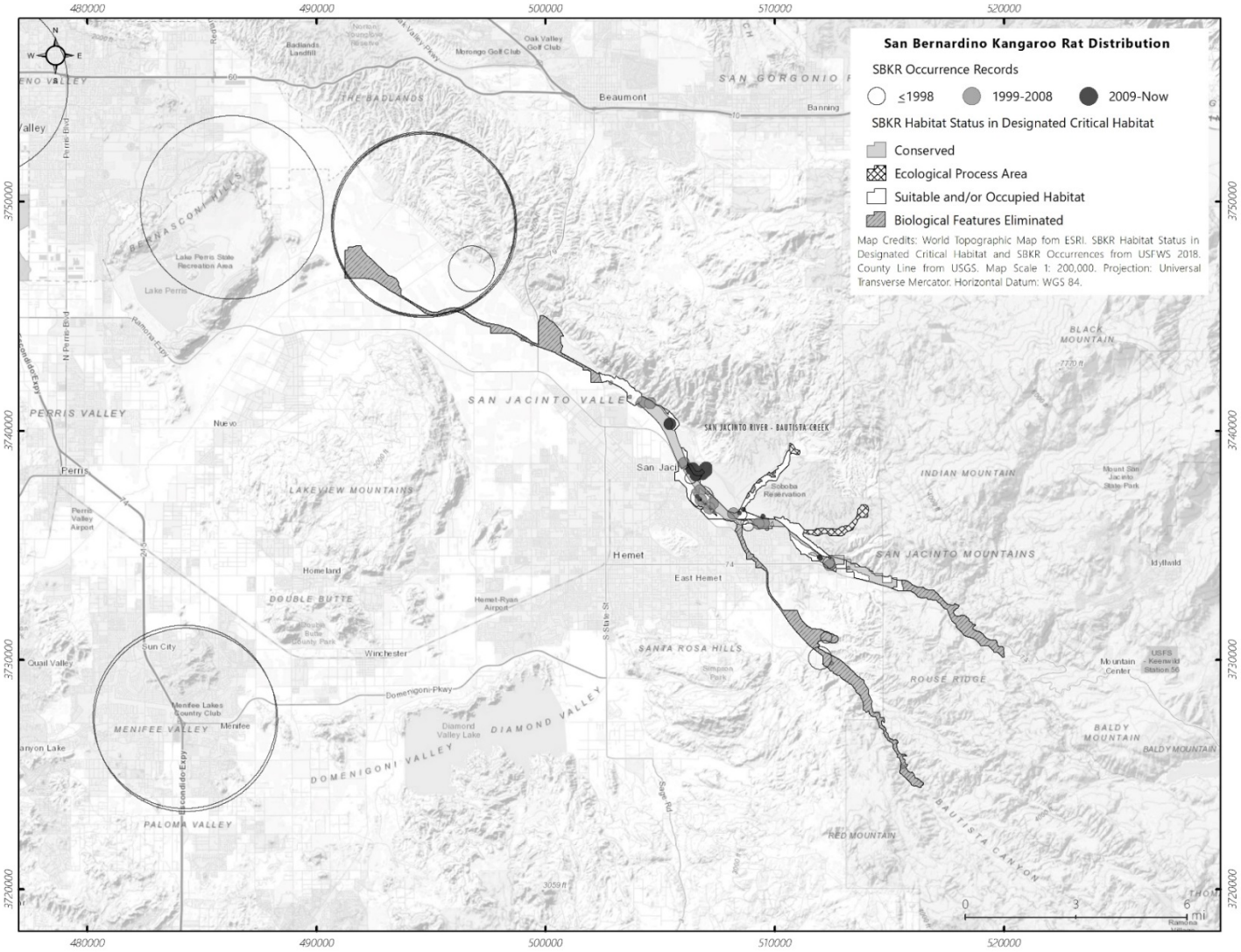
Map 1: Distribution of historical and current, potentially suitable habitat for the San Bernardino kangaroo rat.



Map 2a: San Bernardino kangaroo rat habitat status and occurrence records in the northern portion of its current range. The size of the circle around the occurrence record indicates the level of uncertainty of its location.



Map 2b: San Bernardino kangaroo rat habitat status and occurrence records in the southern portion of its current range. The size of the circle around the occurrence record indicates the level of uncertainty of its location.



White, Braden, Silver and Brylski CVs

Michael D. White, Ph.D.

Michael White Consulting

Dr. White is an ecologist with 30 years of professional experience with conservation planning, environmental regulations, and ecosystem assessment, management, and restoration. Has work has required extensive coordination with local government agencies, state and federal wildlife and land management agencies, local academic and research institutions, non-governmental organizations, private and foundation funders, landowners, and the general public.

Dr. White has served as the lead biologist on many high-visibility and multi-stakeholder projects in California. These included developing management and restoration strategies for the Lower Colorado River Multiple Species Conservation Program, developing a reserve design and adaptive management plan for the Tejon Ranch, producing a conservation framework for Las Californias Binational Conservation Initiative, resource management planning for the Sonoran Desert in California, and identifying conservation priorities and forest management strategies for the Sierra Checkerboard Initiative. In these efforts, he has used an objective science-based approach to develop practical land use and conservation outcomes that are trusted by diverse stakeholders.

From 2004-2008, Dr. White was science advisor to the environmental groups that negotiated the Tejon Ranch Conservation and Land Use Agreement, which conserved 90% of the 270,000-acre Tejon Ranch, the largest private property in California. The Agreement created the Tejon Ranch Conservancy to steward its diverse and unique conservation resources. Dr. White served as the Conservancy's first Conservation Science Director from 2009-2017, where he hired and directed staff to develop and implement Science, Stewardship, and Public Access programs; developed partnerships with universities, governmental agencies, and other nonprofits; helped to develop and implement organizational policies and procedures necessary to obtain the Conservancy's accreditation from the Land Trust Alliance; and worked closely with the Executive Director and Board to acquire funding to purchase over 60,000 acres of conservation easements and support the Conservancy's programs. He led public education tours and taught the California Naturalist course for 3 years as part of developing the Conservancy's volunteer program. Working collaboratively with the landowner, Dr. White prepared the first adaptive management plan for Tejon Ranch, and worked with the landowner and its ranching lessees to raise funding to implement elements of the plan.

Dr. White presently a Visiting Scholar at University of California Berkeley Department of Environmental Sciences, Policy and Management, an Adjunct Associate Professor at San Diego State University Department of Biology, and Principal of Michael White Consulting, which advises nonprofit organizations on conservation and management issues.

March 2019

EDUCATION

Ph.D. Ecology, San Diego State University and University of California, Davis, 1991. Dissertation: *Horizontal distribution of pelagic zooplankton in relation to predation gradients.*

B.A. Ecology, Behavior and Evolution, University of California, San Diego, 1982.

PERSONAL

Born July 20, 1960, Los Angeles, California (citizen of U.S.A.).
Married.

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

Visiting Scholar, Department of Environmental Sciences, Policy and Management, University of California Berkeley 2017-present

Adjunct Associate Professor, San Diego State University 1991-present

Society for Conservation Biology

Southwest Association of Naturalists

Society for Range Management

Natural Areas Association

California Native Plant Society

EMPLOYMENT HISTORY

August 2017 – present. Principal, Michael White Consulting. Providing environmental consulting services to nonprofit organizations in the areas of environmental analyses, habitat and species conservation, land management and monitoring, and fundraising.

July 2017 – present. Visiting Scholar, University of California Berkeley, Department of Environmental Science, Policy and Management. As a Visiting Scholar, Dr. White is continuing his work with Dr. Bartolome and his lab members developing models for conservation management of rangeland resources in California. Building on years of collaborative field ecology studies of grasslands and riparian systems at Tejon Ranch, Dr. White is working with the lab to synthesize these findings into a deeper understanding of system structure and function and implications for conservation management of rangeland resources in an under-studied part of California.

August 2009 – June 2017. Conservation Science Director of the Tejon Ranch Conservancy. Responsible for developing and implementing research, management, and public access programs for 240,000 acres of Tejon Ranch. Responsibilities included research and monitoring, development and implementation of a Ranch-wide Management Plan for conserved lands, science staff supervision, coordination of research projects, fundraising, and annual planning and budgeting.

July 1999 – July 2009. Senior Ecologist and San Diego Director of the Conservation Biology

Institute, Encinitas, California. Providing administrative and fiscal oversight of a four-person operation with a budget of approximately $500K/yr. Responsibilities include annual budgeting, fundraising and proposal preparation, oversight of office contracts, staff timekeeping and project tracking, accounts payable, accounts receivable, project management, and technical studies.

July 1998 – July 1999. Senior Technical Specialist. Ogden Environmental and Energy Services Co., Inc., San Diego, California. Responsibilities included providing technical oversight of the Lower Colorado River Multiple Species Conservation Program project and senior technical support of project staff.

January 1997 – June 1998. Manager, Aquatic Sciences Group. Ogden Environmental and Energy Services Co., Inc., San Diego, California. Managed a group of nine professional aquatic scientists with revenues of approximately $2M/year. Responsibilities included administration, marketing and proposal preparation, strategic planning, annual budgeting and performance tracking, timekeeping oversight, personnel supervision (including direct supervision of four professional biologists), project management, and project technical support.

January 1994 – December 1996. Deputy Manager, Biological Resources Group, Ogden Environmental and Energy Services Co., Inc., San Diego, California. Deputy Manager for a group of 23 professional biologists. Responsibilities included marketing and proposal preparation, strategic planning, annual budgeting, group health and safety program oversight, personnel supervision (including direct supervision of five professional biologists), project management, and project technical support.

September 1989 – July 1994. Senior Ecologist, Ogden Environmental and Energy Services Co., Inc., San Diego, California. Responsibilities included marketing and proposal preparation, project management, project technical support, and direct supervision of three professional biologists.

September 1983 – December 1990. Graduate Assistant, San Diego State University, San Diego, California.

July 1984 – June 1985. Graduate Assistant, UC Davis Tahoe Research Group, Lake Tahoe City and Davis, California.

SELECTED PROJECT EXPERIENCE

Conservation Science Director – Tejon Ranch Conservancy. As the first Conservation Science Director of the new Conservancy, Dr. White was responsible for creating the Conservancy's science and stewardship programs from scratch. This entailed synthesizing existing information, prioritizing research and monitoring efforts, planning and budgeting, developing funding proposals, coordinating researchers and contractors, interfacing with the landowner, overseeing conservation easement stewardship, and hiring and managing staff. He regularly presents to public, as well as academic and professional audiences on the work of the Conservancy.

One of Dr. White's primary responsibilities at the Conservancy was preparing the first adaptive management plan for the conserved lands at Tejon Ranch (called the Ranch-wide Management

Plan [RWMP]). The Tejon Ranch Conservation and Land Use Agreement provides for the continued use of lands under easement by the landowner, the Tejon Ranch Company, for commercial ranching, hunting and other compatible uses. Thus, the focus of the RWMP was to maintain, enhance and restore conservation values within a private, working lands context. Working with contractors, academic partners, and citizen scientists, the Conservancy's Science Program has been inventorying the natural resources on Tejon Ranch, elucidating drivers of ecosystem structure and function, and hypothesizing management actions to enhance resource conditions to inform resource management planning. The RWMP defined the Conservancy's rationale and vision for adaptive management at Tejon, and established Best Management Practices (BMPs) for the landowner's land uses to protect and, where feasible, enhance conservation values.

Following adoption of the RWMP in 2013, Dr. White's focus has prioritized and implemented stewardship actions laid out in the plan. These have primarily involved cattle grazing management to achieve conservation objectives in grasslands and riparian and wetland ecosystems across tens of thousands of acres of Tejon Ranch. Grasslands enhancement projects seek to use cattle to reduce the biomass of nonnative Mediterranean grasses to favor native forb species and improve habitat structure for native animals. Riparian and wetland enhancement projects intend to reduce livestock grazing pressure during summer and fall months to enhance diversity, cover and structure of vegetation communities to improve habitat condition and function. These grazing management projects have required installation and reconfiguration of ranching infrastructure (e.g., fences and water systems) to enable the desired conservation grazing management, which has required extensive coordination with the landowner, ranching operators, funding and permitting agencies, and contractors.

Dr. White facilitated an extensive amount of external research at Tejon Ranch, with over 40 research projects started on the property during his tenure. These projects ranged in scope from species inventories, habitat modeling, population dynamics, climate change responses and adaptation, and various geological investigations. Dr. White served on several graduate committees for Tejon-related projects and has overseen several group projects with universities. He developed and coordinated the first Citizen Science projects at Tejon Ranch, co-taught the Conservancy's California Naturalist (Master Naturalist) coarse to members of the public, and frequently led public tours.

REGIONAL HABITAT CONSERVATION PLANNING, MONITORING, RESTORATION, AND MANAGEMENT

State Wildlife Action Plan Forest and Rangelands Companion Plan Development Team – California Department of Fish and Wildlife. While with Tejon Ranch Conservancy, served as part of a technical advisory group to the Department and their consultant team during the development of the Forest and Rangelands Companion Plan to California's State Wildlife Action Plan revision in 2016. The role of the advisory group was to help identify conservation issues and strategies pertinent to forest and rangeland ecosystems.

California Landscape Conservation Collaboration Technical Advisory Team. While with Tejon Ranch Conservancy, served on the Technical Advisory Team for the development of a Strategic Plan and Scientific Management Framework for the California LCC. The role of the advisory group was to provide technical input to LCC staff on conservation and adaptive management issues in the planning area.

Yuba Foothills Conservation Assessment – The Trust for Public Land. Dr. White prepared a conservation assessment of a 600,000-acre study area in the northern Sierra Nevada foothills. The purpose of the assessment was to identify meaningful conservation objectives and opportunities and provide a case statement for the study area to guide TPL's land conservation work. As part of the assessment, Dr. White conducted a landscape integrity analysis for the entire northern Sierra Nevada foothills subregion as a way of providing a regional context for the conservation values of the study area.

Effective Conservation and Management of the Sonoran Desert of California – The Nature Conservancy. Working with TNC, CBI evaluated ways of increasing the effectiveness of conservation and management over the 6 million-acre portion of the Sonoran Desert ecological region within California. CBI and TNC made use of the Marxan reserve selection algorithm to identify portions of the study area that support specific conservation values, and then identified how existing land ownership and management patterns protect these conservation values from an array of potential threats, including land conversion, inappropriate recreational activities, mining, alternative energy production, and exotic plant species. The results of this project will be used to guide TNC's conservation activities in the region.

Northstar Habitat Management Plan – Booth Creek. Dr. White provided technical review of the Habitat Management Plan (HMP) developed for the 8,000-acre Northstar at Tahoe ski resort in the Martis Valley, California. Development of the HMP was an obligation of the settlement agreement between Northstar and local environmental organizations for which Dr. White served as a technical expert. The Northstar ski resort supports areas of relatively intact late seral conifer forest supporting species such as California spotted owl, pine martin, and northern goshawk, as well as high quality riparian and aquatic habitats, meadows, and deer fawning habitat. The HMP will be used to guide expansion of the ski resort authorized by the settlement agreement, and forest management measures to enhance late seral forests and other habitats on the property.

Tejon Ranch Reserve Design. CBI, working with the South Coast Wildlands Project, developed a science-based reserve design for the 270,000-acre Tejon Ranch. The reserve design used a series of conservation planning principles and the results of previous CBI studies conducted for the Ranch to design and justify a reserve that captures regional conservation objectives, such as habitat representation goals, protection of intact watersheds, rare and endangered species protection and recovery, and maintenance of intact core reserve areas. The reserve design underwent peer review by a group of academics, resource agency staff, and local experts. The final reserve design was provided to stakeholders with an interest in significant conservation on Tejon Ranch for use in negotiations with the landowner.

Environmental Monitoring and Habitat Management Planning Program for the Ramona Grasslands – The County of San Diego Department of Parks and Recreation and The Nature Conservancy. Dr. White was the lead scientist for the development of a habitat management plan for the Ramona Grasslands in central San Diego County. The Ramona Grasslands are a regionally important conservation area, supporting a variety of target resources, including vernal pools and rare vernal pool species, Stephens' kangaroo rat, wintering and breeding raptors, riparian habitats and arroyo southwestern toads, and native grasslands. Development of the management plan was preceded by a 2-year baseline field monitoring program that was coordinated by Dr. White. The Ramona Grasslands are grazed by cattle, which maintain habitat suitability for some species but can adversely affect other natural resources. The adaptive management plan proposed a managed grazing strategy to balance these resource needs and optimize habitat quality across the preserve. Monitoring activities proposed by the management plan include surveys of grassland, vernal pool, and riparian plants; characterization of stream channel geomorphology and water quality; and avian, small mammal, amphibian, and fairy shrimp surveys. The management plan built on the science foundation CBI articulated for the Ramona Grasslands in the Framework Management Plan previously developed for The Nature Conservancy.

Hydrologic and Hydraulic Assessment of Santa Maria Creek – The Nature Conservancy. Dr. White was the lead scientist for a project conducted in collaboration with researchers from San Diego State University's Department of Geography. The purpose of the project was to analyze historic, current, and future hydrologic and hydraulic regimes, and associated changes in channel geomorphology and riparian vegetation of Santa Maria Creek, Ramona, San Diego County. The analysis focused on how changes in land uses in the watershed affect runoff quantity, stream discharge and stage, and channel geomorphology and riparian vegetation distribution. Historic land uses were quantified from California Department of Water Resources land use maps and historic channel geomorphology and riparian vegetation distribution from historic aerial photography. Future land use was projected from County of San Diego General Plan information. This information is being incorporated into management planning for the Ramona Grasslands Open Space Preserve, which is traversed by Santa Maria Creek.

Shirttail Creek Forest Property Conservation Assessment – Endangered Habitats Conservancy and California Wildlife Foundation. Dr. White prepared a conservation assessment to support the acquisition of the 1,000-acre Shirttail Creek Forest Property outside of Foresthill, California in the northern Sierra Nevada. The assessment characterized the resource values of the property, which included pristine reaches of Shirttail Creek, oak woodlands, and old-growth conifer forests, special status species supported by the property, and the role of the property

in regional connectivity.

El Monte Valley Restoration Project – Endangered Habitats Conservancy. Dr. White is directing restoration planning for approximately 450 acres of the San Diego River and its floodplain in the El Monte Valley, Lakeside, California. The riverine functions and values of the site are currently compromised by a lack of surface-water hydrology due to the El Capitan dam upstream of the site, lowered groundwater elevations from groundwater withdrawals, and significant invasion of the river channel by exotic species. The project entails coordinating the design of the restoration project with a groundwater recharge project proposed for the Valley by the Helix Water District. Dr. White coordinated field studies within the project area including vegetation mapping, avian point counts, and establishment of a bird banding (MAPS) station.

Conservation Assessment of Ranch Guejito. CBI prepared a conservation assessment for the 20,000-acre Rancho Guejito in northern San Diego County, one of the most important conservation targets in the region. The assessment documents the conservation significance of Rancho Guejito from both a natural and cultural resources perspective. The assessment evaluated the resources of Rancho Guejito within a Southern California regional context, and assessed its potential contribution to conservation of landscape-scale processes, protecting intact watershed basins, under-protected vegetation associations, and key sensitive species, as well as prehistoric and historic cultural resources. The assessment is being used by conservation organizations to justify and develop strategies for conservation of the property.

Las Californias Binational Conservation Initiative – San Diego Foundation and Resources Legacy Fund Foundation. In partnership with the Mexican non-governmental organization, *Pronatura*, and The Nature Conservancy, CBI designed a conservation reserve for a 2.5 million-acre area of Southern California and northern Baja California. The study area extends from the Sweetwater River watershed in California to the Rio Guadalupe watershed in Baja California. The project used the reserve selection algorithm, *SPOT*, to select a reserve portfolio. The project has required extensive manipulation and merging of various U.S. and Mexican digital datasets (e.g., land cover, roads, digital elevation models, etc.) and cross-walking of different vegetation classification systems. Conservation achievements within the Las Californias Binational Conservation Initiative study area total over 3,500 acres to date, and are currently a priority of local, state, and federal governmental agencies and non-governmental conservation organizations.

Sierra Nevada Checkerboard Initiative – The Trust for Public Land. Ownership in the Central Sierra Nevada is characterized by a "checkerboard" pattern of public and private land, which potentially complicates management of the landscape for conservation, recreational, and timber harvest values. The Trust for Public Land's Sierra Checkerboard Initiative attempts to affect changes in ownership and management patterns in the northern Sierra to ameliorate the conflicts caused by the checkerboard ownership. Dr. White, working with TPL and its conservation partners, Sierra Nevada Forest Protection Campaign and California Wilderness Coalition, first conducted a science assessment of the 1.5-million acre Sierra Checkerboard Initiative study area to identify high resource value areas, threats to these resources, and spatially explicit management strategies that could be implemented by TPL and its partners to improve resource values. As part of the assessment, Dr. White assembled and worked with a Scientific Advisory Panel of academics and resource agency staff with relevant experience in the Sierra Nevada to advise and review our

work on the project. Working with TPL's forestry consultant, Dr. White then prepared a conservation strategy that identified priority areas for conservation actions and available private lands conservation approaches. TPL is currently implementing the conservation vision developed for the Initiative.

Tejon Ranch Conservation Assessments – Environment Now and Resources Legacy Fund Foundation. Dr. White was the lead scientist for two assessments characterizing the conservation value of the 270,000-acre Tejon Ranch, California. The Conservation Significance Project was conducted in partnership with the South Coast Wildlands Project and California Wilderness Coalition. The Conservation Significance Project made use of available data, museum records, and expert opinion and assessed the biogeographic importance of the Tejon Ranch, its core habitat and natural community representation values, roadlessness, terrestrial and watershed integrity, importance as a habitat linkage, and habitat for rare and endangered species. CBI also conducted an additional Conservation Assessment Project that identified the distribution of a set of conservation values across Tejon Ranch. Conservation values included threatened, endangered and endemic species distributions, roadless areas analysis, watershed integrity analysis, habitat diversity, and regionally under-protected vegetation communities. As part of the Conservation Assessment Project, CBI conducted a remote sensing analysis to update information on roads, land cover, and vegetation community distributions.

South Coast Missing Linkages Project – South Coast Wildlands Project. Dr. White participated in partnership with the South Coast Wildlands Project, The Nature Conservancy, and Pronatura to conduct planning studies on five important habitat linkages in the U.S.-Mexico border region. The CBI is took the lead on two of the five linkages. One was linking National Forest land in the Laguna Mountains with important habitats in Baja California through the Campo Valley area of San Diego County. The other was linking habitats in the Jacumba Mountains with those in the Sierra Juarez in Baja California.

Habitat Management Planning for the Lake Hodges/San Pasqual Valley MSCP Preserve Area – City of San Diego. Dr. White developed a habitat management plan for the over 9,000-acres Lake Hodges/San Pasqual Valley MSCP Preserve Area. He coordinated a team of specialists comprised of local biologists, the U.S. Geological Survey, and San Diego State University to conduct baseline field surveys and map the distributions of key resources, including vegetation communities, rare plants, Hermes Copper butterfly, herpetofauna (including the endangered arroyo southwestern toad), and breeding riparian birds (including the endangered least Bell's vireo and southwestern willow flycatcher). The management plan addressed issues such as control of adjacent land use impacts, fire management, recreational access, fencing, exotic species control, monitoring, and research.

Monitoring Program for the Santa Margarita River – The Nature Conservancy. Dr. White developed a program to monitor future potential changes in the Santa Margarita River associated with modification of base flows resulting from a water rights settlement on the river. Base flow augmentation resulting from the settlement has been designed to mimic natural discharge patterns historically observed in the river. The objective of the monitoring program was to quantify conditions prior to the modification of base flows and to track changes following base flow augmentation. The monitoring plan was structured around distinct reaches of the river that are

anticipated to respond similarly to river hydrology. Elements considered in the monitoring plan include biological resources (riparian and coastal stream communities), water quality, discharge, and channel geomorphology.

Regional Conservation Planning and Constraints Analyses for Eastern San Diego Mountains – The Nature Conservancy. CBI worked with The Nature Conservancy and a team of regional scientific experts to prioritize conservation opportunities for a 400,000-acre area in San Diego County that includes the headwaters of five major watersheds. The study involved development and review of a spatial and non-spatial database for the area, identification of regionally important resources and landscape connections, and a gap analysis to identify regionally important resources that were in private ownership and zoned for development or agriculture. CBI identified and evaluated the potential effects of land uses and other stressors, including those that may affect downstream portions of the watersheds. CBI and a team of scientists conducted biological surveys of selected properties. As a result of the studies, CBI prepared a conservation strategy report that identifies conservation priorities, research needs, land use constraints, potentially compatible land uses and appropriate locations, restoration opportunities, and habitat management goals.

MSCP Monitoring Program Coordination – California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS) and City of San Diego. CBI worked with the City of San Diego and other San Diego County jurisdictions, USFWS, and CDFG to implement the Subregional Biological Monitoring Program for the San Diego MSCP. As part of this effort, CBI compiled an inventory of existing monitoring efforts in western San Diego County, developed a strategic framework of the roles and responsibilities of the monitoring partners, refined biological monitoring protocols, developed structures and protocols for managing large biological databases, formulated a strategy for developing a centralized database repository, and developed a web site to disseminate MSCP-related information to the public.

Regional Biological Monitoring Plan for the Multiple Habitats Conservation Program – San Diego Association of Governments. In coordination with the California Department of Fish and Game and the U.S. Fish and Wildlife Service, and the seven North San Diego County cities participating in the Multiple Habitats Conservation Program (MHCP), CBI developed a regional biological monitoring plan for the MHCP planning area. The MHCP biological monitoring program is intended to provide a systematic data collection effort to gauge the progress and success of the habitat preserve system. The plan addresses regional monitoring objectives and describes specific monitoring approaches for riparian communities, uplands, vernal pools, coastal lagoons, and wildlife movement corridors within the preserve system.

Habitat Management Planning for the Marron Valley Preserve Area – City of San Diego. Dr. White developed a habitat management plan for the 2,600-acre Marron Valley MSCP Preserve Area. He coordinated a team of biologists associated with CBI, the U.S. Geological Survey, and the San Diego Natural History Museum to conduct baseline field surveys and map the distributions of key resources, including vegetation communities, rare plants, endangered Quino checkerspot butterflies, herpetofauna (including the endangered arroyo southwestern toad), and breeding riparian birds (including the endangered least Bell's vireo and southwestern willow flycatcher). Dr. White conducted surveys for the endangered San Diego fairy shrimp in vernal pools on the property. The management plan addressed issues such as cattle grazing, fire management, access,

fencing, exotic species control, monitoring, and research.

Wildlife Corridor Monitoring Study – City of Poway and City of San Diego. This study evaluated the use of designated wildlife corridors by target mammal species, including mountain lions, bobcats, coyotes, mule deer. Field monitoring was conducted in the Los Peñasquitos, Carmel Valley, Carmel Mountain/Del Mar Mesa, and eastern Poway areas by a graduate student and by a local volunteer organization using different methodologies over several seasons. Dr. White analyzed the data generated to assess the functionality of the wildlife corridors and to compare the methods. CBI's report made recommendations on wildlife corridor monitoring methodologies for the MSCP.

Lower Colorado River Multi-Species Conservation Program – National Fish and Wildlife Foundation. Dr. White served as the Technical Coordinator of the plan development team for the Lower Colorado River Multiple Species Conservation Program (LCR MSCP). The LCR MSCP plan was prepared for a consortium of federal and state agencies (California, Nevada, and Arizona), water and hydropower interests, and Native American Tribal governments. The LCR MSCP was initiated to optimize opportunities for current and future water and power development in the lower Colorado River basin, while working towards conservation of listed and selected unlisted species and their habitats in compliance with both the federal and California Endangered Species Acts. The result of the plan will be the issuance of incidental take authorizations under Sections 7 and 10(a)(1)(B) of the Endangered Species Act, and Section 2835 of the California Natural Communities Conservation Program Act for those species deemed to be adequately addressed by the plan, through a combination of conservation, management, restoration, and operational measures.

Dr. White's responsibilities included providing overall technical oversight for the project team, including development of a conservation strategy for the program and alternatives for evaluation under the California Environmental Quality Act and National Environmental Policy Act. The conservation strategy involved a strong riparian habitat restoration component, which involves integrating the requirements of riparian species with the hydrologic and hydraulic conditions on the river in light of future water management scenarios (e.g., intrastate water transfers to achieve compliance with California's 4.4 Plan, offstream storage and interstate transfer rules). The conservation strategy had to consider large-scale water management activities and water accounting practices dictated by the large body of legislation and court decrees collectively known as the Law of the River.

Multiple Species Conservation Program – City of San Diego Clean Water Program. Dr. White participated in development of a conservation and management plan for federally listed species and key candidate species and their habitats in a 900-square-mile area in San Diego County. He coordinated the development of a GIS-based habitat evaluation model, prepared hydrologic management guidelines for the preserve system, and assisted with development of the species and habitat monitoring program for the preserve system.

TECHNICAL STUDIES

Fairy Shrimp Survey Protocol Analysis – Western Riverside County Regional Conservation Authority. Dr. White performed an analysis of Endangered Species Act section 10(a)(1)(A) fairy shrimp survey data to assess the adequacy of a single survey, as opposed to multiple surveys, in detecting fairy shrimp in vernal pools. The analysis used the survey data to determine the conditional probability of detecting shrimp in the second survey period if shrimp either were or were not collected in the first survey period.

The Influence of Watershed Urbanization on the Hydrology and Biology of Los Peñasquitos Creek – The San Diego Foundation Blasker Rose-Miah Fund. Dr. White was awarded a research grant to study the effects of urbanization in the Los Peñasquitos Creek watershed. The Los Peñasquitos Creek watershed is a small coastal watershed in San Diego, California that contains significant areas of conserved natural habitats, but has experienced rapid urban growth. The study examined how patterns of land use change in the Los Peñasquitos Creek watershed have affected downstream hydrology of the creek, channel geomorphology, and associated riparian vegetation communities. The research showed that urbanization of the watershed has resulted in significant increases in discharge, annual runoff, flood peaks, and dry-season flows. These hydrologic changes have driven changes in the distribution and composition of riparian habitats associated with Los Peñasquitos Creek.

Source Water Protection Guidelines – The City of San Diego Water Department. Dr. White provided technical assistance to City of San Diego Water Department staff in preparing development guidelines intended to ensure protect of the quality of San Diego source water supply reservoirs. The project was conducted by a consulting firm, Brown and Caldwell, and Dr. White served as a technical advisor directly to the City.

Guajome Lake Water Quality Assessment Project – County of San Diego. Dr. White served as project manager for a water quality study at Guajome Lake in northern San Diego County funded under the U.S. Environmental Protection Agency's (USEPA) Clean Lakes Program. The focus of the project was to characterize water quality in the lake through field sampling and chemical analysis of soil, sediment, stream flow, and lake water to identify pollution problems in the lake and its watershed. The project included preparation of a Quality Assurance Project Plan (QAPP), assessing historic uses of agricultural chemicals in the watershed, estimating sediment and chemical constituent loadings to the lake with watershed modeling techniques, developing and assessing pollution control measures, and developing pollution control and water quality monitoring programs for the lake.

San Diego River Live Stream Discharge Studies – City of San Diego. Dr. White was biology task manager for analysis of potential effects of live stream discharge of reclaimed water to the San Diego River. The objectives of the study were to determine the feasibility of a live stream discharge program in light of the potential effects to wetlands (including habitat for the endangered least Bell's vireo), aquatic fauna, water quality, and public health. Responsibilities included an assessment of the effects of varying quantities of live stream discharge on fisheries habitat, riparian and salt marsh wetlands, wetland-associated terrestrial species, and disease vectors. Completion of this task required interpretation of the QUAL2E water quality model output and hydraulic

modeling output.

Salton Sea Water Quality Management Project – Salton Sea Authority. As project manager for a program funded under a USEPA Clean Lakes Grant, Dr. White summarized and presented environmental and economic analyses of salinity and surface elevation management alternatives at the Salton Sea. The project entailed interaction with the USEPA, U.S. Army Corps of Engineers, Bureau of Reclamation, U.S. Fish and Wildlife Service, California Department of Fish and Game, Regional Water Quality Control Board, California Environmental Protection Agency, and local citizens groups to identify and summarize their concerns.

Olivenhain Reservoir Limnological Assessment – Olivenhain Water District. Dr. White served as project manager and technical lead for the assessment of anticipated limnological conditions of a reservoir planned for San Diego County (Olivenhain Reservoir). The assessment projected anticipated thermal stratification and dynamics of nutrients, dissolved oxygen, and other water quality constituents. He recommended design features to better manage water quality in the reservoir, including a multi-port outlet tower to allow selective withdrawals, artificial circulation/hypolimnetic aeration, and a separate inlet structure for aqueduct inflows.

Fairy Shrimp Survey and Assessments – Twentynine Palms Marine Corps Air Ground Combat Center. Dr. White directed field surveys of anostracans (primarily fairly shrimp) in desert playas and impact assessments of base operations on these resources. Field surveys involved collecting samples of sediments containing anostracan eggs that were reared in controlled conditions in the laboratory. The impact assessment primarily evaluated the effects of vehicle traffic (e.g., tanks and armored personnel carriers) on desert playa habitats.

Fisheries Survey – Newhall Land and Farming. Dr. White conducted a field survey of native fishes in the Santa Clara River, Los Angeles County, California, as part of an emergency road crossing project. The purpose of the survey was to document the species present in the study area and to relocate fish potentially impacted by construction operations to areas outside of the impact zone as conditioned in the California Department of Fish and Game Streambed Alteration Agreement for the project. Species of particular interest were three-spined stickleback (*Gasterosteus aculeatus*), arroyo chub (*Gila orcutti*), and Santa Ana sucker (*Catostomus santaanae*).

Impacts of Threadfin Shad on Largemouth Bass – San Diego State University. Dr. White participated in a project to examine the impacts of threadfin shad introductions on aquatic biota in Southern California reservoirs. He sampled fish and plankton, conducted physical and chemical analyses, and conducted echo-sounding in six lakes in San Diego County. Dr. White identified zooplankton and provided statistical review.

Impacts of Opossum Shrimp on Zooplankton – Tahoe Research Group. Dr. White participated in a project assessing the impacts of opossum shrimp (*Mysis relicta*) introductions on Lake Tahoe zooplankton. He installed experimental enclosures with scuba, sampled and counted zooplankton, and performed a variety of routine limnological analyses, as well as conducted short-term opossum shrimp feeding experiments.

ANALYSIS OF ENVIRONMENTAL IMPACT AND REGULATORY COMPLIANCE

Martis Valley Community Plan – Sierra Watch and Mountain Area Protection Foundation. Dr. White conducted a review and provided comments on the Environmental Impact Report prepared of for the update to the Martis Valley Community Plan on behalf of Sierra Watch and Mountain Area Protection Foundation. The Community Plan Update proposed alternatives that would change development patterns in the Martis Valley Community Planning Area, Placer County, California. These impacts would have potentially significant impacts to high value terrestrial and aquatic resources, including forests, shrub communities, meadows, and stream systems. To assist with critiquing the biological resources analyses in the EIR, CBI developed a natural resources conservation vision for the Martis Valley and identified how the proposed developments authorized under the proposed Community Plan would adversely affect these resources. Dr. White participated in landowner negotiations over development designs and provided litigation support.

Evaluation of the Cabo San Quintín Development Project and Environmental Impact Study – *pro esteros* and Endangered Habitats League. CBI conducted an evaluation of the proposed Cabo San Quintín development plan and associated Mexican environmental impact study (Manifestación de Impacto Ambiental) for the Punto Mazo peninsula, San Quintín, Baja California, Mexico. The evaluation discussed inadequacies and inconsistencies of the environmental analysis, and presented an independent analysis of key project features and their potential impacts. Key points discussed in the evaluation included the inadequate consideration of Mexican endangered species laws, state land use regulations, potable and irrigation water supply issues, waste water treatment and potential nutrient loading, potential effects of marina dredging on the Bahía San Quintín, potential impacts to endemic species and sensitive habitats, and potential socioeconomic impacts associated with the increased regional infrastructure and services needs that would result from implementing the project.

Wetlands Permitting, Mission Valley West Light Rail Transit – Metropolitan Transit Development Board. Dr. White was the project manager responsible for coordinating wetlands and endangered species permitting for the Mission Valley West Light Rail Transit project. He conducted a Section 404(b)(1) alternatives analysis, selected potential riparian mitigation sites, acted as permitting agency liaison, coordinated development of a wetlands mitigation plan, conducted U.S. Army Corps of Engineers 404 and California Department of Fish and Game Streambed Alteration Agreement permitting, and coordinated Section 7 consultation for the endangered least Bell's vireo.

Wetlands Permitting and Mitigation Plan, East Mission Gorge Sewer Interceptor Force Main and Pump Station – City of San Diego Water Utilities Department. Dr. White coordinated the development of a detailed wetlands mitigation plan for impacts associated with the construction of a sewage pump station and force main. The wetlands mitigation plan was developed in consultation with the U.S. Fish and Wildlife Service, California Department of Fish and Game, and City of San Diego. The mitigation plan was required for the U.S. Army Corps of Engineers' Section 404 and California Department of Fish and Game 1601 permitting process. Dr. White also conducted the biological resources impact analysis for the California Environmental

Quality Act (CEQA) compliance.

CONSERVATION OUTREACH, TRAINING, AND EDUCATION

San Dieguito River Watershed Information System – San Dieguito River Valley Conservancy. Dr. White directed the development of a Geographic Information System (GIS) based information system that will assist the Conservancy and the San Dieguito River Valley Joint Powers Authority (JPA) with planning, land acquisition and conservation, and community outreach. The project was funded by the San Diego Foundation. The GIS tool combines available regional data layers such as land use, land ownership, biological resources information, topography, water resources information, and political boundaries, into a user-friendly mapping and analysis tool. The tool allows staff at the Conservancy and JPA to combine various data layers for environmental analyses, to track resource and land status in the watershed, and to create maps and displays for outreach purposes.

Conservation Resource Center Feasibility Study – San Dieguito River Valley Conservancy. CBI prepared a study evaluating the feasibility and desirability of establishing a resource support service for conservation groups in San Diego County. The first phase of the study included an exploratory workshop and discussions with individuals from the San Diego conservation community about alternative strategies for sharing resources. CBI conducted research on other organizational models across the country and evaluated the local availability of technical services. We prepared a report summarizing the results of our study and that provided recommendations on a structure and strategy for developing a resource center.

Aquatic Ecology Training Program – Campo Environmental Protection Agency. Dr. White conducted training of tribal members working for the Campo Band of Mission Indians Environmental Protection Agency (Campo EPA) in aquatic and riparian resource ecology, inventory, and restoration. The program was funded under Section 106 of the Clean Water Act. The ultimate goal of the program was to provide tribal members sufficient training to allow for an efficient and effective transition of delegation of authority over water resources matters to the Campo Band. He conducted training in riparian ecology, aquatic invertebrate ecology, Rapid Bioassessment Protocols, and stream and riparian restoration techniques.

ECOLOGICAL RISK ASSESSMENTS

Ecological Risk Assessment, U.S. Naval Activities (NAVACTS), Guam – U.S. Navy. Dr. White coordinated investigations in support of ecological risk assessments for terrestrial and freshwater habitats at four sites at NAVACTS Guam. Field studies included mapping and characterization of vegetation and wildlife habitat, floral and faunal inventories, collection of soils and sediments for toxicity tests and chemical analyses, and analysis of resident biota for contaminant bioaccumulation. This information was compared to data from offsite reference areas. These data were used to develop preliminary ecological risk assessments evaluating the potential risk that the chemicals onsite posed to aquatic and terrestrial communities. Of special concern was the potential for adverse impacts to the endangered Mariana common moorhen, which utilizes freshwater marshes in the area. Chemicals of concern for these sites included metals, pesticides, polychlorinated biphenyls (PCBs), dioxins, petroleum hydrocarbons, and polynuclear

aromatic hydrocarbons (PAHs).

Ecological Risk Assessment, Old WESTPAC Site, NAVACTS, Guam – U.S. Navy. Dr. White coordinated field studies at NAVACTS, Guam to sample soils and freshwater sediments for chemical analyses and toxicity tests. Collected aquatic and terrestrial organisms for tissue analyses to determine bioaccumulation of chemicals found onsite. These data were used to develop a preliminary ecological risk assessment evaluating the potential risk that the chemicals onsite posed to aquatic and terrestrial communities. Of particular concern were wetlands supporting the endangered Mariana common moorhen. Chemicals of concern included metals, pesticides, PCBs, petroleum hydrocarbons, and PAHs.

Ecological Risk Assessment RCRA Facilities Investigation – Rocketdyne Division, Boeing North American. Dr. White oversaw the development of ecological risk assessments at 36 sites at the 2,500-acre Santa Susana Field Laboratory (SSFL) for the Rocketdyne Division of Boeing North American. He supervised biologists conducting extensive field surveys of the SSFL that involved vegetation community mapping, rare plant surveys, and wildlife species inventories. He coordinated with the California Department of Toxic Substances Control (DTSC) on development of a series of "white papers" describing the approach and methodologies that will ultimately be employed to conduct the risk assessments for the SSFL. The white papers dealt with issues such as determining background concentrations, selecting contaminants of concern, proposed conceptual site models, calculation of exposure point concentrations, development of exposure model parameters, and risk-based decision criteria.

PUBLICATIONS AND PRESENTATIONS

PUBLICATIONS AND REPORTS

Tabak, M.A., M.S. Norouzzadeh, D.W. Wolfson, S.J. Sweeney, K.C. Vercauteren, N.P. Snow, J.M. Halseth, P.A. Di Salvo, J.S. Lewis, M.D. White, B.Teton, J.C. Beasley, P.E. Schlichting, R.K. Boughton, B. Wight, E.S. Newkirk, J.S. Ivan, E.A. Odell, R.K. Brook, P.M. Lukacs, J. Clune, R.S. Miller.2018. Machine learning to classify animal species in camera trap images: applications in ecology. *Methods in Ecology and Evolution* 2018;00:1-6. https://doi.org/10.1111/2041-210X.13120

Ratcliff, F.P., J.W. Bartolome, L. Macauly, S. Spiegal, and M.D. White. 2018. Applying ecological site concepts and state-and-transition models to a grazed riparian rangeland. *Ecology and Evolution* 8:4907-4918. https://doi.org/10.1002/ece3.4057.

White, M.D., K. Kauffman, J. Lewis, and R. Miller. 2018. Wild pig use of fenced farm fields in California's San Joaquin Valley. *California Agriculture* 72(2):120-126.

Robeson, M.S., K. Khanipov, G. Golovko, S.M. Wisely, M.D. White, M. Bodenchuck, T.J. Smyser, Y. Fofanov, N. Fierer, and A.J. Piaggio. 2017. Assessing the utility of metabarcoding for diet analyses of the omnivorous wild pig (*Sus scrofa*). *Ecology and Evolution* 00:1-12. https://doi.org/10.1002/ece3.3638.

Mayence, C.E., N. Jensen, N. Kramer, L. Pavliscak, and M.D. White. 2017. Tejon Ranch-Land of contrast, botanical richness, and ongoing discovery. *Fremontia* 45(1&2):25-29.

White, M.D. and K. Kunkel. 2016. Evaluating feral pig management strategies at Tejon Ranch, California. Proceedings of the 27th Vertebrate Pest Conference (R.M. Timm and R.A Baldwin Eds). Pgs. 124-127. University of California, Davis, CA.

Teton, B., M.D. White, and K. Kunkel. 2016. Grappling with pigs in California High Country: Wild pig population

and disturbance research at Tejon Ranch. Proceedings of the 27th Vertebrate Pest Conference (R.M. Timm and R.A Baldwin Eds.). Pgs. 128-132. University of California, Davis, CA.

Spiegal, S., J.W. Bartolome, and M.D. White. 2016. Applying ecological site concepts to adaptive conservation management on an iconic Californian landscape. *Rangelands* 38(6):365-370.

White, M.D. 2015. Status, conservation, and management of oaks at Tejon Ranch, California. Pgs 495-503 in: Standiford, Richard B.; Purcell, Kathryn L., tech. cords. 2015. Proceedings of the seventh California oak symposium: managing oak woodlands in a dynamic world. Gen. Tech. Rep. PSW-GTR-251. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 579 p.

Ratcliff, F.P., J.W. Bartolome, M. Hammond, S. Spiegal, and M. White. 2015. Developing Ecological Site and State-and Transition Models for Grazed Riparian Pastures at Tejon Ranch, California. Pgs 209-218 in: Standiford, Richard B.; Purcell, Kathryn L., tech. cords. 2015. Proceedings of the seventh California oak symposium: managing oak woodlands in a dynamic world. Gen. Tech. Rep. PSW-GTR-251. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 579 p.

Principe, Z. and M.D. White. 2015. Hidden treasures of the Tehachapi Region. *Fremontia* 43(2):2-9.

Bartolome, J.W., B. H. Allen-Diaz, S. Barry, L. D. Ford, M. Hammond, P. Hopkinson, F. Ratcliff, S. Spiegal, and M. D. White. 2014. Grazing for biodiversity in Californian Mediterranean grasslands. *Rangelands* 36:36–43.

White, M.D. and J.R. Strittholt. 2014. Forest conservation planning. *In* Reynolds, K.M., P.F. Hessburg, and P.S. Bourgeron (eds). 2014. *Making Transparent Environmental Management Decisions: Applications of the Ecosystem Management Decision Support System*. Berlin: Springer.

White, M.D. and K. Penrod. 2012. The Tehachapi Connection: a case study of linkage, design, conservation, and restoration. *Ecological Restoration* 30(4):279-282.

White, M.D., E.R. Pandolfino, and A. Jones. 2011. Purple Martin survey results at Tejon Ranch in the Tehachapi Mountains of California. *Western Birds* 42(3):164-173.

White, M.D., J.A. Stallcup, K. Comer, M.A. Vargas, J.M. Beltran-Abaunza, F. Ochoa, and S. Morrison. 2006. Designing and establishing conservation areas in the Baja California-Southern California border region. *In* Hoffman, K. (ed.), *The U.S. – Mexican Border Environment: Transboundary Ecosystem Management*. Southwest Consortium for Environmental Research and Policy Monograph Series, no. 15. San Diego State University Press.

White, M.D., and K.A. Greer. 2006. The effects of watershed urbanization on stream hydrologic characteristics and riparian vegetation of Los Peñasquitos Creek, California. *Landscape and Urban Planning* 74(2):125-138.

Strittholt, J.R., N.L. Staus, and M.D. White. 2000. Importance of Bureau of Land Management Roadless Areas in the Western U.S.A. Prepared for the National Bureau of Land Management Wilderness Campaign by the Conservation Biology Institute. March.

White, M.D. 1998. Horizontal distribution of pelagic zooplankton in relation to predation gradients. *Ecography* 21:44-62.

Hurlbert, S.H., and M.D. White. 1994. Experiments with invertebrate zooplanktivores: Quality of statistical analysis. *Bulletin of Marine Science* 53(2):128-153.

PRESENTATIONS

White, M.D., S. Spiegal, and J.W. Bartolome. 2019. Using ecological site descriptions and State and Transition Models to inform native plant restoration strategies. Society for Range Management 2019 Annual Meeting. Minneapolis, MN. February.

Bartolome, J.W., P.J. Hopkinson, and M.D. White. 2018. Drivers of California Mediterranean grassland biodiversity. Presented at the Society for Range Management 2018 Annual Meeting. February.

White, M.D. 2016. Private Lands Conservation and Management in the Face of Changing Climates: a Case Study from Tejon Ranch. Natural Areas Association Conference. October.

White M.D. and K. Kunkel. 2016. Evaluating Feral Pig Management Strategies at Tejon Ranch, California. 27th Vertebrate Pest Conference, Newport Beach, CA. March.

Jesse S. Lewis, Matthew L. Farnsworth, Ryan S. Miller, Daniel Grear, Steven J. Sweeney, Raoul Boughton, Michael White, Dennis Orthmeyer, and Kurt C. VerCauteren. 2016. Development of a comprehensive feral swine field study: population dynamics, response to culling, space use patterns, and behavioral interactions. 2016 International Wild Pig Conference, April.

Maloney, T., Z. Principe, and M.D. White. 2015. The Tehachapi Linkage: large landscape conservation success. Part of a workshop at the Land Trust Alliance Rally. October.

White, M.D. 2015. Using an ecological sites framework to prioritize conservation management of grasslands at Tejon Ranch, California. Presented at the California Native Plant Society 2015 Conservation Congress. January.

White, M.D. 2014. Status, conservation, and management of oaks at Tejon Ranch, California. Presented at the 7th California Oak Symposium. November.

White, M.D. 2014. Conservation management of San Joaquin Valley grasslands at Tejon Ranch. Presented at the San Joaquin Valley Natural Communities Conference, The San Joaquin Valley chapter of The Wildlife Society. March.

White, M.D. 2013. Ecological restoration from a conservation practitioner's perspective. Presented at the Pritzlaff Conservation Symposium, Santa Barbara Botanic Garden. October.

White, M.D. 2012. Developing conceptual models to inform conservation management of working landscapes at Tejon Ranch, California. Presented at the North American Congress of the Society for Conservation Biology. July.

White, M.D. 2011. Conservation management planning at Tejon Ranch, CA, USA. Presented at the MEDECOS XII conference. September.

White M.D., E.R Pandolfino, and A. Jones. 2010. A Purple Martin survey expedition on Tejon Ranch, California. Presented at the Western Field Ornithologists Annual Conference. October.

White, M.D. 2009. Conservation in the Tehachapi Connection. Presented at the California Native Plant Society Conservation Conference. January.

White, M.D. 2007. Designing landscape reserves in light of climate change. Presented at the Public Lands and Climate Change Symposium, Berkeley, CA. November.

White, M.D. 2007. Las Californias Binational Conservation Plan: Importance of the Sierra Juárez. Presented at the National Ecology Week Symposium, Universidad Autonomia Baja California, Ensenada, Baja California. November.

White, M.D. 2006. Applying landscape ecology to wetland and watershed management in Southern California. Presented at the Southern California Wetlands Recovery Project Symposium 2006, Santa Barbara, CA. March.

White, M.D., J.A. Stallcup, K. Comer, M.A. Vargas, J.M. Beltran-Abaunza, F. Ochoa, and S. Morrison. 2004. Designing and establishing conservation areas in the Baja California-Southern California border region. Presented at Border Institute VI, Transboundary Ecosystem Management, organized by the Southwest Center for Environmental Research and Policy. April.

White, M.D., and K.A. Greer. 2003. The effects and conservation implications of watershed urbanization in a Southern California stream system. Presented at the Society for Conservation Biology Annual Meeting, Duluth, MN. July.

White, M.D. 2003. The influence of human land use modifications on Southern California stream hydrology. Presented at the Western Division of the American Fisheries Society Annual Meeting, San Diego, CA. April.

Stallcup, J.A., and M.D. White. 2002. Wildlife corridor monitoring for the Multiple Species Conservation Program. Presented at the MSCP Annual Workshop. San Diego, CA. October.

White, M.D. 2002. A review of the ecological effects of roads with examples from Southern California. Presented to the National Research Council Committee on the Ecological Impacts of Road Density. Newport Beach, CA.

June.

White, M.D., and J.A. Stallcup. 2000. The Lower Colorado River – Conservation planning in a degraded riverine ecosystem. Presented at the Society for Conservation Biology Annual Meeting, Missoula, MO. June.

White, M.D. 1998. Moderator for a panel discussion on salinity and surface elevation management options for the Salton Sea. Salton Sea Symposium II. La Quinta, CA. January.

White, M.D. 1995. Managing salinity and surface elevation at the Salton Sea, California. Presented at the American Society of Civil Engineers Annual Convention 95, San Diego, CA. October.

White, M.D. 1993. Morphological characteristics of threespined sticklebacks (*Gasterosteus aculeatus*) from the Sweetwater River, San Diego County, California. Presented at the American Fisheries Society Western Division Annual Conference, Sacramento, CA. July.

White, M.D. 1991. Horizontal distribution of zooplankton in relation to predation gradients. Presented at the Zooplankton Ecology Symposium, Lawrence University, Appleton, WI. August.

Hurlbert, S.H., and M.D. White. 1991. Quality of statistical analyses in studies on the effects of invertebrate zooplanktivores. Presented at the Zooplankton Ecology Symposium, Lawrence University, Appleton, WI. August.

White, M.D., T. Morrison, G. Orlob, H. Chang ,and C. Nordby. 1991. An environmental assessment of the potential effects of live stream discharge of reclaimed water to the San Diego River. Presented at the Symposium on Water Supply and Water Reuse: 1991 and beyond. American Water Resources Association, San Diego, CA. June.

White, M.D. 1989. The role of vertebrate and invertebrate predation gradients in producing horizontal heterogeneity of zooplankton populations. Symposium on Intrazooplankton Predation, University of Sao Paulo, Sao Carlos, Brasil. June.

Hurlbert, S.H., and M.D. White. 1989. A review of the experimental intrazooplankton predation literature with emphasis on experimental design and analysis. Symposium on Intrazooplankton Predation, University of Sao Paulo, Sao Carlos, Brasil. June.

White, M.D. 1989. Evidence for diel horizontal migrations of an invertebrate predator, *Mesocyclops edax*. Southern California Academy of Sciences Annual Meeting, Thousand Oaks, California. May.

White, M.D. 1988. Predation-induced horizontal zooplankton gradients. Ecology Supplement 69(2) pg. 340. Ecological Society of America Annual Meeting, Davis, California. August.

CURRICULUM VITAE

Gerald T. Braden

Education

Bachelors of Arts - Environmental Studies. California State University San Bernardino, California. Graduated with Honors - 10 December, 1981
Bachelors of Arts - Physical Geography. California State University San Bernardino, California. Graduated with Honors - 10 December, 1981
Masters of Science - Biological Sciences. California State Polytechnic University, Pomona, California (CSPUP). Graduated with High Honors - 15 March 1991

Relevant Professional Work Experience

Position: Self employed: Independent Biological Consultant
From: January 2010 **To:** Present

Activities: Surveys of land, shore and water birds, reptiles, amphibians and small mammal communities. Also Desert Tortoise, California Gnatcatcher, Peninsular Bighorn Sheep, San Bernardino Kangaroo Rat, Vireo (Least and Arizona), Clapper Rail (Yuma, Light-footed, Black), Southwestern Willow Flycatcher and Yellow-billed Cuckoo surveys, monitoring, and habitat assessments. Bat surveys and habitat assessments. Fox trapping/relocation. Consultation and document review on threatened/endangered and sensitive species. Project and construction monitoring.

Research Biologist/ Interim Curator; San Bernardino County Museum Biological Sciences Division
From: October 1994 **To:** January 2010

Responsibilities: My primary responsibilities as a research biologist and interim curator were characterized by a high level of independence to design, perform, interpret, publish, and review original, professional, and scientific research using statistical, problem solving, personnel management, budget management, inter-agency coordination, and supervisory skills on a daily basis.

As Research Biologist (1994-2010) I was responsible for the development, implementation and supervision of Contract Field Studies program. The Contract Field Studies Program involved the conception, design, development, implementation, analysis, and reporting on original long-term field studies. Studies pertained to varied aspects of the distribution, life history, biology, and/or ecology of vertebrate taxa of the Southwestern United States and Northern Mexico. The studies involved the application of standard biological survey and sampling methodologies (for all plants and animals), development of new methodologies when warranted, and a strong capacity for independent problem solving and original thought. The studies required a working knowledge of contemporary scientific biological theories and

paradigms.

Many of the contract field studies involve federal and state threatened or endangered species, therefore the studies required a working knowledge, understanding, and application of state and federal environmental laws such as the Endangered Species Act, Clean Water Act, National Environmental Policy Act, Federal Coordination Act, and California Environmental Quality Act.

Contract field studies I was responsible for hiring, training, supervising and evaluating four permanent staff and up to forty-seven seasonal staff in standard scientific survey and data collection techniques, and a variety of population sampling, estimation, area use and persistence models. Duties required the application and interpretation of a broad array of univariate, multivariate, probabilistic and ecological statistics, and the ability to effectively use statistical packages and scientific plotting software, such as SASS, BMDP, SigmaStat, and SigmPlot, in addition to the commonly used spreadsheet and database software.

As interim curator (2003-2010) I was accountable for matters pertaining to the Biological Sciences Division. Responsibilities entail overseeing, augmenting, and maintaining regionally significant research collections of the herpetofauna, small mammals, avifauna, botanical, and invertebrate taxa of the Southwestern United States and northern Mexico. Duties included the collection, preparation, and preservation of specimens and tissues to modern museum standards and practices. Duties also entail developing and maintaining research collaboration and strong working relationships with local universities and museum scientists. Duties also included responding to requests and dissemination of collections information to professional and amateur biologists, resource managers, educators, and the general public.

Duties also included generating and managing a $500,000 annual budget (variable by year). Budget revenue was generated by contract solicitations and grant sources. Duties included hiring and supervising staff, assigning work details, scheduling, and performance evaluations. How many people?

Duties also included interfacing with museum visitors via tours, lectures, exhibit and web module conception, design, and creation. Consultation with other county departments, regulatory agencies, other museums, and academia pertaining to expertise, advice, environmental compliance, and general networking were likewise part of daily activities.

Wildlife Biologist; U. S. Fish and Wildlife Service/Ecological Services
From: May 1991 **To:** October 1994

Responsibilities: The federal wildlife biologist position was characterized by a high level of independence to provide guidance to federal, state, local, and private jurisdictions to facilitate compliance with the Endangered Species Act (ESA), Federal Coordination Act, National Environmental Policy Act, and Clean Water Act. The position was also characterized by a high level of independence to design and implement studies on threatened and endangered species to provide a scientific basis for endangered and threatened species survey protocols as well as management and recovery plans.

Foremost among these studies of threatened and endangered species were long-term life history, habitat/fitness, nest placement, parasitism, detection, and dispersal studies of the

threatened California Gnatcatcher. The results of these studies included three primary literature publications, multiple gray literature reports and the development of the present day U. S. Fish and Wildlife California Gnatcatcher Survey Protocol. Other field studies involved protocol surveys for other listed species including Stephens' Kangaroo Rat, Light-footed Clapper Rail, Southwestern Willow Flycatcher, and Least Bell's Vireo.

In addition to the skills necessary to conceive, implement, and successfully complete scientific research, responsibilities involved developing and maintaining partnerships among the FWS, University of California Riverside, San Bernardino County Museum, Riverside County Parks Department, Metropolitan Water District, and the private sector.

Other duties involving ESA guidance entailed working with jurisdictions to assure project compliance with the ESA and related environmental laws. Most often this involved providing guidance toward obtaining Threatened and Endangers Species take permits (Sections 10(a)1a, 10(a)1b, and 7) and advice on possible non-compliance (Section 9, illegal take) or other potential ESA and Clean Water Act violations. Not infrequently, these duties were performed in a highly charged emotional, often combative arena, which required substantial amounts of tact, diplomacy, creativity, and patience to arrive at constructive resolutions.

Graduate Student; Biological Sciences Department, California State Polytechnic University Pomona.
From: Oct. 1987 **To:** Oct. 1991

Responsibilities: My thesis worked consisted of four years of study on the territory size, habitat use, den characteristics, and seasonal ranges of Black Bears (*Ursus americanus*) in the San Gabriel Mountains of Southern California. The work involved trapping bears by culvert traps and leg snares, administering tranquilizers, attaching radio collars, determining locations and den sites through telemetry, converting telemetry locations to territory and seasonal use-areas using multiple home range algorithms, data analysis, report writing, and professional presentations to scientific organizations and the general public. The work involved long hours alone in remote locations of the San Gabriel Mountains in all types of weather conditions. Because the bear project was on going, duties also included training subsequent graduate students in proper use of traps, snares, and telemetry, sedating wild bears, and home range analyses.

I also trained and assisted graduate students studying habitat use and territory utilization of coyote, raccoon, and opossums along urban-rural interfaces. Duties included the live capture of coyote, raccoons, and opossums and home range/territory delineation for the same taxa using standard home-range algorithms. Independent of my graduate career I also studied age and growth patterns of California Walnut (*Juglans californica*) by analysis of tree ring growth data.

Hydrologist; U.S. Geological Survey
From: ca. March 1981 **To:** October 1987

Responsibilities: The hydrologist position involved the collection, analysis, and reporting of surface flow and ground water data. Duties involved constructing, maintaining, and monitoring surface water gage stations and measuring surface water discharges at remote locations in the deserts, mountains, and coastal valleys of Southern California. These duties required a practical knowledge of standard construction techniques and equipment, surface water flow

characteristics, hydrologic dynamics of current and historic flood events, the effects of varied geologic formations, soil types, and substrates on surface and subsurface flows, and the ability to work effectively under remote, hazardous, and unsupervised conditions under all extremes of weather. Analysis of surface and ground water data required a working knowledge of basic hydrological mathematics and principals. The position was a permanent federal government position with full benefits.

Miscellaneous Work Experience

In no particular order - fire fighter, bookstore clerk, drywall hanger, motorcycle/auto mechanic, water safety instructor, life guard, Iranian house parent, janitor, nightclub (rock and roll) worker, wood cutter, fish hatchery worker, construction worker, finish carpenter, college tutor (science, math, english, philosophy), graduate/teaching assistant, part-time college instructor.

Endangered/threatened species experience

- California Gnatcatcher (*Polioptila californica californica*): Principal investigator on an eight-year study of the life history, habitat affinities, fitness, detection, nest monitoring and dispersal of CAGN in western Riverside. Developed the current FWS CAGN survey protocol. Two years of protocol surveys for the San Bernardino Valley Multi-species Plan. Multiple gray literature reports and three peer reviewed publications in primary ornithological journals. Invited review of FWS population modeling, protocols and policies pertaining to the sub-species.

- Least Bell's Vireo (*Vireo bellii pusillus*): Five years of protocol surveys on the Santa Ana and Mojave Rivers and associated tributaries.

- Arizona Bell's Vireo (*Vireo bellii arizonae*): Five-years of surveys in the Lower Grand Canyon. Three years of surveys, nest monitoring, and habitat study on the Virgin River in Southern Nevada.

- Southwestern Willow Flycatcher (*Empidonax traillii extimus*): Nine years of study of the life history, distribution, habitat affinities, fitness, nest success, detection and dispersal of SWWF along the lower Colorado River and its tributaries. Six years of protocol surveys for the U. S. Forest Service. Multiple gray literature reports. Invited reviewer of FWS regulations, protocols and policies pertaining to the species.

- Yuma Clapper Rail (*Rallus longirostris yumanensis*): Nine years of Yuma Clapper Rail surveys along the Virgin River and its tributaries in Southern Nevada. Multiple gray literature reports. FWS invited reviewer of current YCRA/BLRA survey protocol.

- Light-footed Clapper Rail (*Rallus longirostris levipes*): Two years of presence/absence protocol surveys at the Southern California estuaries.

- Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*): Nine years of Yellow-billed Cuckoo surveys along the Virgin River and associated tributaries in Southern Nevada. Incidental observations on the lower Colorado River (Virgin River south to the Mexican

border, two years). Multiple gray literature reports.

- Stephens' Kangaroo (*Dipodomys stephensi*): Two years of protocol surveys in western Riverside County and Camp Pendleton.

- San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*): Five years of protocol trapping for SBKR for the San Bernardino Valley Multi-species Plan and the U.S. Forest Service. Multiple gray literature reports. FWS invited reviewer of current SBKR survey protocol. FWS invited reviewer of Seven Oaks Dam BA as it pertains to SBKR impacts and mitigation.

- Desert Tortoise *(Gopherus agassizii*): Relocation and radio telemetry study of Desert Tortoise in the west Mojave Desert in the late 1980's. A combined four years of Desert Tortoise surveys in the upper Coachella Valley and the eastern Mojave Desert.

- **FWS Permit # TE-43668A-0**: Authorization for-
  CAGN, SWWF, LBV, LFCL, YCLR; Includes surveys, nest searching, nest monitoring, cowbird egg removal, mist netting, and banding throughout each species' distribution.

  SKR, SBKR; Includes surveys, assessments, live trap and release throughout each species' distribution.

- **FWS Permit # TE-802450-6**: Desert Tortoise: Authorized to handle, move, and attach and remove transmitters throughout the species' distribution.

Professional Memberships

American Association for the Advancement of Science
American Society of Mammalogists
American Society of Ichthyologists and Herpetologists
American Ornithologists' Union
Association of Field Ornithologists
Cooper Ornithological Society
Raptor Research Foundation
Wilson Ornithological Society
Copeia

Activities

S Scientific Reviewer: Reviewer of original scientific studies submitted for publication to primary scientific societies, including The Wilson Bulletin, Journal of Field Ornithology, AUK, Condor, Journal of Wildlife Management, and The Journal of Canadian Zoology.

S Presentation of original ornithological research at American Ornithologist and Cooper Ornithological Societies meetings.

S Invited participant on the Science Consistency Review Panel for the USDA EIS Revised

Land Management Plan for Southern California National Forests: October, 2004.

- **S** Solicited for review, opinion, advice and consultation on the San Bernardino Kangaroo Rat, California Gnatcatcher, Southwestern Willow Flycatcher, and other federally listed or sensitive species and ecosystems of the Southwestern United States. Solicitors included U. S. Fish and Wildlife Service, U. S. Bureau of Reclamation, U. S. Bureau of land Management, U. S. Forest Service, U. S. Park Service, California Department of Fish Game, Nevada Department of Game and Fish, County of San Bernardino, Metropolitan Water District, Endangered Habitats League, Center for Biodiversity, Natural Heritage Institute.

- **S** Invited speaker on original research at specialized symposia such as: CalGnat 1994 at University of California Riverside, Coastal Sage Scrub Symposium 1995 at the San Diego Zoo; Puente Hills Wildlife Corridors and Vanishing Habitats Symposium 1995 at California State University Fullerton 1995; 1999 Annual Convention of Environmental Journalist speaking on "Science and Multispecies Habitat Conservation in Coastal Southern California"; Occasional guest lecturers at the Wildlife Ecology Graduate Student Seminar, California State Polytechnic University Pomona.

- **S** Expert Witness on California Gnatcatcher for the U. S. Department of Justice. DJ File Number 90-8-6-04239, United States of America v Granite Homes, INC.

Current Interests

- **S** Pre-post fire comparisons of small vertebrate communities in Alluvial Fan Sage Scrub.
- **S** Affects of water availability on Desert Riparian Communities.
- **S** Tamarisk and mixed native riparian affects on avian diversity in desert riparian systems.
- **S** Habitat/fitness relationships, dispersal, and community associations of organisms, particularly with regards to endangered/threatened species.
- **S** Any studies pertaining to community and/or species responses to habitat fragmentation and patch size in terrestrial ecosystems.
- **S** Alternative Energy Development affects on biological systems.
- **S** International and domestic travel with an emphasis on ecological systems or indigenous and current cultures.

Book Review

Braden, G. T. 1997. Journal of Wildlife Management 83(3):130-131. Monitoring Bird Populations by Point Counts. C. J. Ralph, J. R. Sauer, and S. Droege. (Eds.) General Technical Report PSW-GTR-149. U. S. Department of Agriculture, iv + 181 pages.

Primary Literature Publications

Braden, G. T. 1999. Does nest placement affect the fate or productivity of California Gnatcatcher nests? Auk 116:984-993.

Braden, G. T., R. L. McKernan, and S. M. Powell. 1997. Effects of nest parasitism by the

brown-headed cowbird on nesting success of the California Gnatcatcher. Condor 99(4): 858-865.

Braden, G. T., R. L. McKernan, and S. M. Powell. 1997. Association of within-territory vegetation characteristics and fitness components of California Gnatcatchers. Auk 114(4): 601-609.

Stubblefield, C. and **G. T. Braden**. 1994. Denning Characteristics of black bears in the San Gabriel Mountains of southern California. Cal. Academy of Sciences 93(1)30-37.

Alexander Sokoloff, R. F. Ferrone, J. D. Chaney, **J. Braden**, and R. J. Munoz. 1987. Linkage studies in *Tribolium castaneum* (Herbst). XII. A revision of linkage group II. Genome 29:26-33.

Selected Gray Literature Reports

Braden, G. T., L. Crew, and A. Miller. 2009. Avian diversity, vegetation composition and vegetation structure of the Las Vegas Wash: 2005 to 2009. San Bernardino County Museum, Biological Sciences Division, 2024 Orange Tree Lane Redlands, CA 92374. Prepared for the Las Vegas Wash Coordination Committee. November 2009. 75 pp.

Braden, G. T., M. Rathbun, T. Hoggan, A. Davenport, and K. Carter. 2009. The Status of Yuma Clapper Rail and Yellow-billed Cuckoo along portions of the Virgin River and Muddy River in Southern Nevada, with incidental observations of Southwestern Willow Flycatcher. 2008. Final. Report prepared for the Southern Nevada Water Authority by the Biological Sciences Division, San Bernardino County Museum, 2024 Orange Tree Lane, Redlands, California 92374. February 2009. 58 pp.

Braden, G. T., K. Carter, M. Rathbun, and T Hoggan. 2009. Occurrence, distribution, and abundance of vertebrate species on the Old Woman Mountains Preserve: 2004-2008. Revised Final. Biological Sciences Division, San Bernardino County Museum, 2024 Orange Tree Lane, Redlands CA 92374. Report to the Native American Lands Conservancy and the 29 Palms Band of Mission Indians. January 2009. 158 pp.

Braden, G. T. and R. L. McKernan. 2006. Status, distribution, life-history, and habitat affinities of the Southwestern Willow Flycatcher along the lower Colorado River, Year 7 – 2002 Final Report-Revised. Report submitted to the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service and U. S. Bureau of Land Management. January 2006.

Braden, G. T., L. Crew, and A. Miller. 2005. Changes in avian breeding season diversity, microclimate, and habitat coincident with changes in surface water in a tamarisk dominated riparian habitat along the Virgin River in southern Nevada. Report submitted to Zane L. Marshall, Southern Nevada Water Authority, Las Vegas Nevada by the Biological Sciences Division, San Bernardino County Museum, Redlands, California.

Braden, G. T. and R. L. McKernan. 2000. A data based survey protocol and quantitative

description of suitable habitat for the endangered San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*). Biology Section, San Bernardino County Museum, Redlands, CA. June, 35 pp.

Braden, G. T. and R. L. McKernan. 1999. Possible effect of low level nest parasitism by the Brown-headed Cowbird (*Molothrus ater*) on the nest success of the Southwestern Willow Flycatcher (*Empidonax traillii extimus*) at sites monitored by the San Bernardino County Museum: A data review, progress report, and power's analysis. Report submitted to the U. S. Bureau of Reclamation, Lower Colorado River Region, Boulder City, Nevada, by the San Bernardino County Museum Biological Sciences Section, Redlands, California. December, 21 pp.

Braden, G. T., and R. L. McKernan. 1998. Nest stages, vocalizations, and survey protocols for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Final Report submitted to the U. S. Bureau of Reclamation, Lower Colorado River Region, Boulder City, Nevada, by the San Bernardino County Museum Biological Sciences Section, Redlands, California. October, 36 pp.

Braden, G. T., and R. L. McKernan. 1998. Observations on nest cycles, vocalization rates, the probability of detection, and survey protocols for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Report submitted to the U. S. Bureau of Reclamation, Lower Colorado River Region, Boulder City, Nevada, by the San Bernardino County Museum Biological Sciences Section, Redlands, California. March, 38 pp.

Braden, G. T. and Stacey L. Love. 1994. Dispersal and non-breeding season habitat use by the Coastal California Gnatcatcher (*Polioptila californica californica*) in western Riverside County. USFWS report to the Metropolitan Water District. 25 pp.

Carter. K. J., **G. T. Braden**, M. Rathbun, and T. Hoggan. 2006. Southwestern Willow Flycatcher, habitat suitability, and amphibian survey results for the San Bernardino National Forest: 2004. Final Report. Submitted to the San Bernardino National Forest by the Biological Sciences Division, San Bernardino County Museum, Redlands, California. January 2006.

Rathbun M., **G. T. Braden**, and K. J. Carter. 2004. Results of Southwestern Willow Flycatcher, Mountain Yellow-legged Frog, California Red-legged Frog, and Arroyo Toad surveys in the San Bernardino National Forest: 2003 Final Report. Report submitted to the San Bernardino National Forest by the Biological Sciences Division, San Bernardino County Museum, Redlands, California.

McKernan, R. L. **G. T. Braden**. 2002. Status, distribution, and habitat affinities of the Southwestern Willow Flycatcher along the lower Colorado River, Year 6 - 2001. Report submitted to the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service and U. S. Bureau of Land Management. May 2002.

McKernan, R. L. and **G. T. Braden**. 2001. Status, distribution, and habitat affinities of the Southwestern Willow Flycatcher along the lower Colorado River, Year 5 - 2000. Report submitted to the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service and U. S. Bureau of Land Management. May 2002.

References

Susan Wynn Susan_Wynn@r1.fws.gov
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, CA 92011
(760) 431-9440

Arthur Davenport
Davenport Biological Services
P.O. Box 1692
Barstow, CA 92312
(619)-729-4242

Dr. Anthony Metcalf; ametcalf@csusb.edu
California State University
Biological Sciences Department
5500 University Parkway
San Bernardino, CA 92407
(909) 880-7501

Robin Eliason, District Wildlife Biologist; reliason@fs.fed.us
San Bernardino National Forest, Mountaintop Ranger District
Big Bear Ranger Station
P.O. Box 290 (U.S. Mail)
41397 North Shore Drive (UPS/FedEx)
Fawnskin, CA 92333-0290
(909) 382-2832

Karen J. Carter;
Consulting Biologist
P.O. Box 628
Running Springs, CA 92382-0628

Dan Silver, Executive Director dsilverla@me.com
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267
(213) 804-2750

Résumé

Dan Silver, MD

Education

B.A., History & Western Society, Univ. of California, Berkeley, 1974 (Phi Beta Kappa)
M.D., Columbia University, College of Physicians and Surgeons, 1978
Medical Internship and Residency, Cedars Sinai Medical Center, Los Angeles, 1978-1981
Board Certification, Internal Medicine, 1981

Employment

Practice of internal medicine, Los Angeles, 1981–1991

Hawthorne Community Medical Group
Prairie Medical Group
Kuhn, Crystal and Silver, M.D.s

President, Preserve Our Plateau, 1989 – 1991

Executive Director, Endangered Habitats League, 1991 – present

Accomplishments

- Founding the only regional conservation organization in Southern California and using collaboration and conflict resolution as the primary means of achieving its mission
- Forming effective partnerships with business interests and local governments, and earning the respect of all sectors
- Leading environmentalists toward "smart growth" as a way to comprehensively address conservation, land use, and transportation needs
- Reconciling environmental protection with economic development through comprehensive regional habitat plans in four counties
- Permanently protecting vital natural resources within an interconnected preserve network and working with property owners on project designs and land acquisitions toward this end
- Building consensus with business, environmental, and landowning interests on sustainable transportation and land use principles and incorporating these principles into historic general plan updates in two counties
- Negotiating land use agreements on two of the largest and most iconic properties in California, the Tejon Ranch and the Rancho Mission Viejo

- Working with the Counties of San Diego and Los Angeles on new Wind Energy Ordinances that address biological impacts and streamlines the approval process

- Helping develop and adopt Regional Advanced Mitigation Programs for transportation infrastructure in three counties

Awards

- Metropolitan Water District of Southern California, *Certificate of Appreciation*, 1991
- The Nature Conservancy, *Recognition for Santa Rosa Plateau*, 1991
- Sea and Sage Audubon Society, *Conservation Award,* 1993
- World Wildlife Fund, *Innovation Grant*, 1993
- City of Los Angeles, *Good Earthkeeping Award*, 1994
- Planning and Conservation League, *David Gaines Award,* 1995
- United States Department of the Interior, U.S. Fish and Wildlife Service, *Certificate of Appreciation*, 1998
- County of Riverside, *Recognition of Outstanding Public Service*, 2003
- American Planning Association, California Chapter*, Outstanding Distinguished Leadership: Layperson Award,* 2004
- California Legislature Assembly, *Certificate of Recognition*, 2004
- City of Glendale, *Mayor's Commendation*, 2004
- U.S. Fish and Wildlife Service, *Recovery Champion, 2016*,

Conservation, land use, and transportation planning experience

Current Co-Chair

- County of San Bernardino Vision Process Environment Element

Past Chair

- Finance Subcommittee, San Diego Multiple Species Conservation Program Working Group
- Finance Subcommittee, Riverside County Habitat Conservation Agency Advisory Committee
- San Diego Supervisorial Task Force on Transfer of Development Credits
- Resource Protection and Orderly Development Work Group, State of California

Current Member

- Measure M Environmental Oversight Committee, Orange County Transportation Authority
- Southern California Association of Governments Open Space Conservation Working Group
- California Habitat Conservation Planning Coalition
- Steering Committee, San Diego North County Multiple Species Conservation Program

Past Member

- Steering Committee, California Natural Communities Conservation Planning Program
- Working Group, San Diego Multiple Species Conservation Program
- Advisory Committee, San Diego Assoc. of Governments Multiple Habitat Conservation Program
- County of San Diego Resource Protection Ordinance and Open Space Committee
- Advisory Committee, San Diego Assoc. of Governments Open Space Element
- Working Group, Orange County Central/Coastal Natural Community Conservation Plan
- Working Group, Orange County Southern Natural Community Conservation Plan
- Advisory Committee, Riverside County Habitat Conservation Agency
- Steering Committee, San Bernardino Valley-Wide Multiple Species Program
- Advisory Committee, Santa Margarita River Watershed Management Program
- Advisory Committee, Riverside County Community and Environmental Transportation Acceptability Process
- Advisory Committee, Riverside County Multiple Species Habitat Conservation Plan
- Advisory Committee, Riverside County General Plan Update
- Steering Committee, Riverside County Integrated Project
- Technical Advisory Committee, State Route 94 Major Investment Study
- Interest Group, San Diego County General Plan "2020" Update
- Citizens Advisory Committee, Southern California Assoc. of Governments Compass Growth Vision Project
- CEQA Improvement Advisory Group, State of California
- Advisory Committee, Southern California Assoc. of Governments Open Space Element
- Steering Committee, San Diego County Multiple Species Conservation Program-East
- Advisory Committee, San Diego County Multiple Species Conservation Program-North
- State of California Fish and Game Strategic Vision Stakeholder Advisory Group
- Stakeholders Advisory Committee, Western Riverside County Regional Conservation Authority

Participant

- Southern Calif. Assoc. of Governments "Four Corners" (Orange, Los Angeles, San Bernardino, Riverside Counties) Transportation Study
- San Diego Assoc. of Governments Regional Growth Management Technical Committee
- Southern California Assoc. of Governments Regional Transportation Plan Technical Advisory Committee
- Riverside County General Plan Update
- Los Angeles County 2035 General Plan Update

Member, Board of Directors

- California Futures Network (past)
- Riverside Land Conservancy
- Tejon Ranch Conservancy

- Endangered Habitats Conservancy
- Endangered Habitats League
- Terra Peninsular

Available upon request

References
Speaking engagements and invited testimony

Phillip Brylski

Ph.D. Zoology, 1986, Museum of Vertebrate Zoology, University of California, Berkeley
Master of Forest Science, 1980, Yale University
Bachelor of Science, Forestry, 1977, Berkeley

Ecologist / Conservation biology scientist. Carries out conservation studies over last 30 years on California fauna, including focused surveys for sensitive species, CEQA/NEPA biological impact analyses, status reviews, and genetic studies.

Permits: San Bernardino kangaroo rat (SBKR), Stephens kangaroo rat (SKR), Giant kangaroo rat (GKR), Tipton kangaroo rat (TKR), Fresno kangaroo rat, Pacific pocket mouse (PPM), Mohave ground squirrel (MGS), Amargosa vole, salt marsh harvest mouse, riparian woodrat (FWS TE-148555-2). MOU for most California Mammal Species of Special Concern (small mammals only)

Small Mammals Experience

- Heteromyids and gophers: live-trapping surveys and research on nearly every species of California heteromyid (all kangaroo rats, both species of kangaroo mice, all pocket mice species), and selected gophers.

- Squirrels: live trapping and visual surveys on Mohave ground squirrel, Antelope ground squirrel, Palm Springs ground squirrel, live-trapping for chipmunk species (Sierra Nevada only).

- New World rats and mice: live trapping experience with most species of California cricetids (*Microtus*, *Neotoma, Peromyscus, Reithrodontomys, Onychomys*, and *Sigmodon*).

San Bernardino kangaroo rat (*Dipodomys merriami parvus*, SBKR) experience

SBKR live-trapping survey, Renaissance Specific Plan site in Rialto, San Bernardino County, California. 2017

SBKR survey at the proposed Cucamonga Basin Maintenance Project site in Upland, San Bernardino County, California. 2016

SBKR surveys for the Rancho Cucamonga North Eastern Sphere Annexation Area, San Bernardino County. 2015, 2016

SBKR survey for SoCalGas North-South gas line project, Reche Canyon. 2015

SBKR survey for Devils Canyon area, San Bernardino County Flood Control District. 2014

SBKR survey for Caltrans Interstate 15 Expansion Project, San Bernardino County. 2013, 2014

SBKR survey and relocation effort, State Department of Water Resources EBX II project site, Redlands. 2013

SBKR survey at a proposed SoCalGas gas repair site and access corridor in the North Fontana/Devore area of San Bernardino County. 2013

SBKR survey on the approximately 9.1 Acre Otto Property, Redlands. 2012

SBKR survey for approximately 1 mile Right of Way along Rialto Municipal airport (SCE). 2012

Survey for SBKR and LAPM on APNs 433-150-057 and 433-150-053 in the City of San Jacinto (San Jacinto Flood Control District). 2012

SBKR and LAPM survey for the San Jacinto River Stage 4 levee project area (San Jacinto Flood Control District). 2012

SBKR survey for the Pepper Avenue Road extension project, Rialto. 2012

SBKR survey for the California Department of Water Resources EBX II construction landing site, Redlands. 2012

SBKR survey for the proposed expansion of Highway 210 at City Creek, Plunge Creek, and Santa Ana River, San Bernardino County (CalTrans). 2012

SBKR survey for three Geotechnical Study Sites near Vulcan Materials Company's Muscoy Groin #2 Storm Drain Project Site, San Bernardino County (Vulcan Mining). 2012

SBKR survey along an approximately 0.75-mile proposed AT&T telephone line repair site and access corridor in the Beacon/Devore area of San Bernardino County (ATT). 2012

SBKR survey at site of a proposed transmission tower replacement project along Lytle Creek, San Bernardino County (SCE). 2012

SBKR survey on the Robertson's Ready Mix / Cemex mine expansion and mitigation sites, San Bernardino County. 2011

SBKR percent area occupied (PAO) survey of the Santa Ana River Woolly Star Preserve Area, San Bernardino County. 2007-2011

SBKR survey at the La Rivera Surface Drainage Improvement Project Site, Riverside, Riverside County, California. 2011

SBKR and LAPM survey on the Soboba Horseshoe Grande Fee to Trust project area, Riverside County. 2011

SBKR survey of the Opal Avenue Mitigation Property, San Bernardino County. 2011

SBKR survey of the Mill Creek/Garnet Street and Cone Camp Road Sites, San Bernardino County. 2011

SBKR survey on an approximately 5 Acre Site on the Wooly Star Preserve Area in the City of Redlands. 2010

SBKR live-trapping survey, Arrowhead project (SCE), San Bernardino County. 2009

SBKR survey of the SCE Alder-Declez project site, San Bernardino. 2009

SBKR Survey, Soboba Indian Reservation, Riverside County. 2009

SBKR survey at reference locations in the Woolly Star Preserve area, San Bernardino County 2007-2012

Selected Publications

Brylski, P., W.M. Miller, S. Dodd, and S. Montgomery. 2009. Addendum to the Pilot Monitoring Project for the Pacific Pocket Mouse, Orange County, California. Prepared for the Center for Natural Lands Management.

------. 2008. Pilot Monitoring Project for the Pacific Pocket Mouse CNLM Dana Point Preserve, Orange County, California. Prepared for the Center for Natural Lands Management.

Hedtke, S.M., K.R. Zamudio, C.A. Phillips, J. Losos, and P. Brylski. 2007. Conservation genetics of the endangered Coachella Valley fringe-toed lizard (*Uma inornata*). Herpetologica 63(4): 411-420.

Swei, A. P.V. Brylski, W.D. Spencer, S.C. Dodd, and J.L. Patton. 2003. Hierarchical genetic structure in fragmented populations of the Little Pocket Mouse (*Perognathus longimembris*) in Southern California. Conservation Genetics 4(4):501—514.

Brylski, P., R. Erickson, and D. Laabs. 1994. Pacific pocket mouse In Life on the edge: a guide to California's endangered natural resources: wildlife, C. G. Thelander and M. Crabtree, eds. Biosystems Books, Santa Cruz, California.

Brylski, P., L. Barkley, B. McKernan, S.J. Montgomery, R. Minnich, and M. Price. 1993. Proceedings of the Biology and Management of Rodents in Southern California Symposium. San Bernardino County Museum, Redlands, California, June 26, 1993. Presented by the Southern California Chapter of the Wildlife Society.

State/federal reports

U.S. Fish and Wildlife Service. 1998,. Pacific Pocket Mouse (*Perognathus longimembris pacificus*) Recovery Plan. Portland Oregon, 112 pp. (prepared by P. Brylski, L. Hayes and J. Avery)

Brylski, P. V., P. W. Collins, E. D. Pierson, W. E. Rainey, and T. E. Kucera. 1997. Mammal Species of Special Concern in California. Draft Final Report Prepared for the California Department of Fish and Game, Wildlife Management Division, Bird and Mammal Conservation Program, Sacramento, CA. Contract FG3146WM. 251 pp.

California Department of Fish and Game. 1990. California wildlife habitat relationships system. Volume III: Mammals. Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. California Interagency Wildlife Task Group, Sacramento, California. (prepared species accounts, range maps, and habitat relations data for selected small mammals)

Phillip Brylski, Ph.D.
Projects

Permits: San Bernardino kangaroo rat, Stephens kangaroo rat, Giant kangaroo rat, Tipton kangaroo rat, Fresno kangaroo rat, Pacific pocket mouse, Mohave ground squirrel, Amargosa vole, Mohave ground squirrel, salt marsh harvest mouse, and riparian woodrat. MOU for most California Mammal Species of Special Concern (small mammals only).

Small Mammals Experience

- Heteromyids and gophers: live-trapping surveys and research on nearly every species of California heteromyid (all kangaroo rats, both species of kangaroo mice, all pocket mice species), and selected gophers.

- Squirrels: live trapping and visual surveys on Mohave ground squirrel, Antelope ground squirrel, Palm Springs ground squirrel, live-trapping for chipmunk species (Sierra Nevada only).

- New World rats and mice: live trapping experience with most species of California cricetids (*Microtus*, *Neotoma, Peromyscus, Reithrodontomys, Onychomys*, and *Sigmodon*).

San Bernardino kangaroo rat surveys (SBKR, *Dipodomys merriami parvus*)

SBKR live-trapping survey, Renaissance Specific Plan site in Rialto, San Bernardino County, California. 2017

SBKR survey at the proposed Cucamonga Basin Maintenance Project site in Upland, San Bernardino County, California. 2016

SBKR surveys for the Rancho Cucamonga North Eastern Sphere Annexation Area, San Bernardino County. 2015, 2016

SBKR survey for SoCalGas North-South gas line project, Reche Canyon. 2015

SBKR survey for Devils Canyon area, San Bernardino County Flood Control District. 2014

SBKR survey for Caltrans Interstate 15 Expansion Project, San Bernardino County. 2013, 2014

SBKR survey and relocation effort, State Department of Water Resources EBX II project site, Redlands. 2013

SBKR survey at a proposed SoCalGas gas repair site and access corridor in the North Fontana/Devore area of San Bernardino County. 2013

SBKR survey on the approximately 9.1 Acre Otto Property, Redlands. 2012

SBKR survey for approximately 1 mile Right of Way along Rialto Municipal airport (SCE). 2012

Survey for SBKR and LAPM on APNs 433-150-057 and 433-150-053 in the City of San Jacinto (San Jacinto Flood Control District). 2012

SBKR and LAPM survey for the San Jacinto River Stage 4 levee project area (San Jacinto Flood Control District). 2012

SBKR survey for the Pepper Avenue Road extension project, Rialto. 2012

SBKR survey for the California Department of Water Resources EBX II construction landing site, Redlands. 2012

SBKR survey for the proposed expansion of Highway 210 at City Creek, Plunge Creek, and Santa Ana River, San Bernardino County (CalTrans). 2012

SBKR survey for three Geotechnical Study Sites near Vulcan Materials Company's Muscoy Groin #2 Storm Drain Project Site, San Bernardino County (Vulcan Mining). 2012

SBKR survey along an approximately 0.75-mile proposed AT&T telephone line repair site and access corridor in the Beacon/Devore area of San Bernardino County (ATT). 2012

SBKR survey at site of a proposed transmission tower replacement project along Lytle Creek, San Bernardino County (SCE). 2012

SBKR survey on the Robertson's Ready Mix / Cemex mine expansion and mitigation sites, San Bernardino County. 2011

SBKR percent area occupied (PAO) survey of the Santa Ana River Woolly Star Preserve Area, San Bernardino County. 2007-2011

SBKR survey at the La Rivera Surface Drainage Improvement Project Site, Riverside, Riverside County, California. 2011

SBKR and LAPM survey on the Soboba Horseshoe Grande Fee to Trust project area, Riverside County. 2011

SBKR survey of the Opal Avenue Mitigation Property, San Bernardino County. 2011

SBKR survey of the Mill Creek/Garnet Street and Cone Camp Road Sites, San Bernardino County. 2011

SBKR survey on an approximately 5 Acre Site on the Wooly Star Preserve Area in the City of Redlands. 2010

SBKR live-trapping survey, Arrowhead project (SCE), San Bernardino County. 2009

SBKR survey of the SCE Alder-Declez project site, San Bernardino. 2009

SBKR Survey, Soboba Indian Reservation, Riverside County. 2009

SBKR survey at reference locations in the Woolly Star Preserve area, San Bernardino County 2007-2012

Stephens' kangaroo rat (SKR, *Dipodomys stephensi*)

SKR survey for the Meridian Trunk Sewer, March Air Base, Riverside County. 2018

SKR survey for the Freeway Business Center Project, Moreno Valley, Riverside County. 2018

SKR surveys for the SDG&E TL 686 wood to steel pole replacement project, Warner Springs, San Diego County. 2017, 2018

SKR surveys for the SDG&E Cleveland National Forest Power Line Replacement Projects. 2017

SKR survey at SoCalGas project at the Moreno Compressor Station, Moreno, Riverside County. 2014

SKR survey, Fallbrook Naval Weapons Center, San Diego County. 2013

SKR and LAPM survey, Lake Perris Dam Remediation project, Riverside County. 2009, 2012

SKR and LAPM survey, Alberhill System Project (SCE), Riverside County. 2011

SKR survey for the County Parks Oak Country II Trails Project, San Diego County. 2011

SKR survey for the proposed southern route of the SDGE Sunrise Powerlink project in San Diego County. 2010

SKR survey at the Center for Natural Land Management March SKR Preserve, March Air Force Base Annex, Riverside County. 2009

SKR survey, Portero and LaBorde Canyons, Riverside County. 2008

Pacific pocket mouse (PPM, *Perognathus longimembris pacificus*)

Results of a trapping survey for the federally endangered Pacific pocket mouse (PPM, *Perognathus longimembris pacificus*) at the proposed Caltrans SR-133 Safety Improvement Project at El Toro Road in Laguna Beach, Orange County. 2016

Pacific Pocket Mouse Focused Trapping Results for the Relocation of the 41 Area Landing Zone and MILCON P-1331 Project Actions, Marine Corps Base Camp Pendleton, San Diego County. 2015

PPM survey for 2013 Marine Corps Forces Special Operations Command Expansion Project, Camp Pendleton, San Diego County. 2013.

Monitoring for PPM on the CNLM Dana Point Preserve, Orange County, California. 2012

Addendum to the Pilot Monitoring Project for the PPM, 2009 CNLM Dana Point Preserve, Orange County. 2012

Focused Surveys for the PPM and SKR for the Marine Corps Base Camp Pendleton Basewide Water Infrastructure and Stuart Mesa Bridge Replacement (BWI & SMBR) project, San Diego County, California. 2011.

PPM survey, Exchange Hospital, MCB Camp Pendleton. 2009.

PPM survey for San Mateo North Population, California State Parks. 2010

PPM survey, Combat Marksmanship Range (CMR), Marine Corps Base Camp Pendleton, California. 2010.

PPM survey, 31 Area, Marine Corps Base Camp Pendleton, California. 2010.

PPM survey, Range 501, Marine Corps Base Camp Pendleton, California. 2011.

Los Angeles pocket mouse (LAPM, *Perognathus longimembris brevinasus*)

LAPM survey, Mt. San Jacinto Community College District, San Gorgonio Pass Campus, Banning, Riverside County. 2012

LAPM Survey, Murrieta, SCE Transmission Line Right-of-Way. 2008.

LAPM survey on the Banning Truck Weigh Station, a 5-Acre Property in Banning, Riverside County. 2010.

LAPM survey on APN 459-020-067 (southern part), Riverside County. 2012.

Survey for SKR and LAPM for the Lake Perris Dam Remediation Project, Riverside County.

Giant kangaroo rat (*Dipodomys ingens*)

Live-trapping survey for the giant kangaroo rat (GKR, *Dipodomys ingens*) at the proposed Exxon-Mobil Midway meter site, Kern County, California. 2016

Mojave ground squirrel (*Xerospermophilus mohavensis*, MGS**)**

Mohave ground squirrel surveys, BigBeau solar project, Kern County. 2018

Surveys for Mojave ground squirrel and desert tortoise, Mojave-Rosamond Recycling and Sanitary Landfill, Kern County. 2018.

Mohave Ground Squirrel Habitat Assessment, Sanborn Solar Project, Kern County. 2018

Mohave Ground Squirrel Habitat Assessment and Live-Trapping Survey, Edwards Air Force Base Solar Project. 2018

Mohave Ground Squirrel Survey for the Victor Elementary School No. 20, APN 0394-031-37, Victorville, San Bernardino County. 2017

Mohave Ground Squirrel Survey for the Pathways to College Charter School, APN 0394-031-37 Hesperia, San Bernardino County. 2017

Mohave Ground Squirrel Survey for the North First Avenue - Mojave River Bridge Replacement Project, Barstow, San Bernardino County. 2017

Live-trapping survey for the California-threatened Mohave ground squirrel for the Leadership Academy School, Hesperia, San Bernardino County. 2016

Results of a trapping survey for the California-threatened Mohave ground squirrel on APN 0465-6311-3-0000 in Helendale, San Bernardino County. 2015

MGS live-trapping survey for SoCalGas North-South gas line project in Adelanto. 2015

MGS live-trapping survey for the Adelanto Solar Project. 2013

MGS habitat assessment and live-trapping survey, North First Avenue Grade Separation and Bridge Replacement Project, Barstow. 2013.

MGS habitat assessment for the California Threatened Mohave Ground Squirrel (MGS) on the Fremont Valley System New Well 1-02 Project, APN 470-251-20-8, Kern County. 2012.

MGS live-trapping survey, Amethyst Basin, Victorville, San Bernardino County (San Bernardino County Flood Control District). 2012.

MGS live-trapping survey, CalTrans High Desert Corridor project, San Bernardino County. 2011.

MGS surveys, Edwards Air Force Base, Kern County. 1994, 2009-2011, 2013.

MGS live-trapping Survey, Mohave Element Energy, Assessor's Parcel Number 427-020-45, Mojave, Kern County. 2012

MGS habitat assessment of the SCE Oasis Substation, Palmdale, Los Angeles County. 2010.

MGS live-trapping survey, Snowline Joint Unified School District Support Services Complex, APNs 3098-311-11, Phelan, San Bernardino County. 2008.

MGS live-trapping survey, Snowline Joint Unified School District, High School #2, APNs 3097-391-02 through 3097-391-10, San Bernardino County. 2008.

MGS live-trapping survey, Capital Pacific Homes 80-acre Parcel, Rosamond, Kern County. 2007.

Studies of MGS and other small mammals for baseline assessment of geothermal power development impacts. China Lake Naval Weapons Center and adjoining areas of Owens Valley. (client: China Lake Naval Weapons Center; main biological contractor: Philip Leitner). 1979.

Other Small Mammal Surveys

Small mammal surveys, Imperial Irrigation District. Carried survey for cotton rats (*Sigmodon* spp.) in support of the Imperial Irrigation District's Habitat Conservation Plan.

Surveys for Palm Springs ground squirrel and Palm Springs pocket mouse, Desert Hot Springs, Riverside County. 2009.

Burrrowing owl

Burrowing owl survey for the Falcon Ridge Substation Project, Rancho Cucamonga, Fontana, and Rialto, San Bernardino County. 2014. (protocol survey)

Burrowing owl survey, Mt. San Jacinto Community College District, San Gorgonio Pass Campus, Banning, Riverside County. 2012 (protocol survey)

Burrowing owl survey, Hesperia Crosswalk school site, San Bernardino County. 2012 (protocol survey)

Burrowing owl survey, APN 388-110-008, Menifee Wireless Facility, 29801 Scott Road, Menifee, Riverside County. 2012 (protocol survey)

Burrowing owl survey, SiteMaster Site, APN 532-180-044, Banning, Riverside County. 2013 (protocol survey)

Beaumont High School Overpass, Burrowing Owl Survey, Beaumont, San Bernardino County 2012 (protocol survey)

Habitat Assessment for Sensitive Plants; Burrowing Owl Survey, Perris Middle School and Central Kitchen, Perris (protocol survey)

Habitat Assessment for Sensitive Plants; ; Burrowing Owl Survey; MSHCP Consistency Analysis for APN 436-280-010, San Jacinto, Riverside County (protocol survey)

Desert Tortoise and burrowing owl survey (non-protocol survey) and rare plant assessment, SCE Oasis Substation Project Site, Los Angeles County (2009)

Burrowing owl surveys (non-protocol sweeps), Southern California Edison TRTP project, Los Angeles County, 2010 – 2012.

Regional burrowing survey, San Diego Association of Governments, San Diego County. 2010. (non-protocol survey)

Biological Assessments

Antelope Valley Area Plan Update EIR (program level biological assessment). 2014

Anaheim Canyon Specific Plan EIR (program level biological assessment). 2013

Perris Middle School and Central Kitchen, Habitat Assessment for MSHCP Consistency Analysis, Perris, Riverside County. 2013

MSHCP consistency analysis and habitat assessment for sensitive plants and burrowing owl, APN 436-280-010, San Jacinto, Riverside County. 2013

San Clemente General Plan EIR, Orange County (program level biological assessment). 2013

Two Bunch Palms Elementary School Solar Array, Desert Hot Springs, Riverside County. 2013

Hesperia Crosswalk Charter School, San Bernardino County. 2012

Mt. San Jacinto College San Gorgonio Pass Campus, Banning, Riverside County. 2012

Jurisdictional wetlands permitting, Palm Desert High School. 2011

Beaumont High School Expansion, Riverside County. 2010

Carlsbad High School #2, San Diego County. 2010

Irvine Business Complex EIR, Irvine, Orange County (program level biological assessment). 2009

Palm Springs Unified District Service Center. 2009

Bristol Street Widening At 17th Street NES, Santa Ana. 2009

University High School Stadium Project, Irvine, Orange County. 2008

Tonner Canyon Vegetation Management Area, Los Angeles and San Bernardino counties. 2008

Snowline Joint Unified School District, High School #2, Victorville, San Bernardino County. 2008

Vista Del Mar Elementary School, San Diego. 2008

Rowe School Site Biological Constraints Analysis, San Diego County. 2007

Snowline School District Support Services Complex Development Plan, Phelan, San Bernardino County. 2007

Construction Monitoring

Beacon Solar project, California City (MGS, desert tortoise). 2013-2016 (on-going)

SCE, TRTP construction monitor. 2010-2015

CalTrans construction monitor, Interstate-15 improvement project (SBKR). 2013

Camp Pendleton construction monitor (PPM). 2012

SanBag, Palm Avenue Grade Separation project (SBKR). 2013, 2014

San Diego Gas & Electric Sunrise Power Link Project, construction monitor for bighorn sheep. 2012, 2013

State of California
Department of Fish and Wildlife

Received May 20, 2019
Original with signature on file

Memorandum

Date: May 17, 2019

To: Melissa Miller-Henson
Acting Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Evaluation of a Petition to List San Bernardino Kangaroo Rat as Endangered under the California Endangered Species Act

The California Department of Fish and Wildlife (Department) has completed its evaluation of a Petition to list the San Bernardino Kangaroo rat as an endangered species under the California Endangered Species Act, Fish and Game Code section 2050 et seq. The California Fish and Game Commission (Commission) received the Petition from The Endangered Habitats League on March 15, 2019. Pursuant to Fish and Game Code section 2073, the Commission referred the Petition to the Department on March 22, 2019.

The Department completed the attached Petition Evaluation report pursuant to Fish and Game Code section 2073.5. (See also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).). The Department's evaluation report delineates the categories of information required in a petition, evaluates the sufficiency of the available scientific information regarding each of the Petition components, and incorporates additional relevant information the Department possessed or received during the review period. Based upon information contained in the petition and other relevant information in the Department's possession, the Department has determined there is sufficient scientific information available at this time to indicate the petitioned action may be warranted. The Department recommends the Petition be accepted and considered.

If you have any questions or need additional information, please contact Ms. Kari Lewis, Wildlife Branch Chief, at (916) 445-3789 or by email at Kari.Lewis@wildlife.ca.gov.

Attachment

ec: **California Department of Fish and Wildlife**

Stafford Lehr, Deputy Director
Wildlife and Fisheries Division
Stafford.Lehr@wildlife.ca.gov

Wendy Bogdan, General Counsel
Office of the General Counsel
Wendy.Bogdan@wildlife.ca.gov

David Woodsmall, Attorney
Office of the General Counsel
David.Woodsmall@wildlife.ca.gov

Kari Lewis, Chief
Wildlife Branch
Kari.Lewis@wildlife.ca.gov

State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF A PETITION FROM THE ENDANGERED HABITATS LEAGUE TO LIST THE SAN BERNARDINO KANGAROO RAT AS ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Photo: Thea Wang

Prepared by
California Department of Fish and Wildlife

May 30, 2019

I. Executive Summary

The Endangered Habitats League (Petitioner) submitted a Petition (Petition) to the Fish and Game Commission (Commission) to list the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) as endangered pursuant to the California Endangered Species Act (CESA), Fish and Game Code Section 2050 *et seq*.

The Commission referred the Petition to the Department of Fish and Wildlife (Department) in accordance with Fish and Game Code Section 2073. (Cal. Reg. Notice Register 2019, No. 15-Z, p. 575.) Pursuant to Fish and Game Code Section 2073.5 and Section 670.1 of Title 14 of the California Code of Regulations, the Department prepared this evaluation report (Petition Evaluation) of the Petition. The Petition Evaluation assesses the scientific information discussed and cited in the Petition in relation to other relevant and available scientific information possessed or received by the Department during the evaluation period. The Department's recommendation as to whether to make the San Bernardino kangaroo rat a candidate for listing under CESA is based on an assessment of whether the scientific information in the Petition is sufficient under the criteria prescribed by CESA to consider listing the species as endangered or threatened.

After reviewing the Petition and other relevant information, the Department determined the following:

- Population Trend. The Petition contains sufficient information to suggest the overall population trend for San Bernardino kangaroo rat (which only occurs in California) has declined, and continues to decline, with only three subpopulations remaining.

- Range. The Petition contains a sufficient description of the San Bernardino kangaroo rat's geographic range.

- Distribution. The Petition contains a sufficient description of the historical and recent distribution of San Bernardino kangaroo rat populations and demonstrates a reduction in their distribution due to habitat conversion throughout much of the historical range, habitat degradation from altered hydrological regimes, and other anthropogenic factors.

- Abundance. Although the Petition acknowledges it is difficult to estimate abundance for the San Bernardino kangaroo rat, it provides a sufficient description of abundance by relying on patterns of density in habitat areas of different quality to suggest current population abundance is low.

- Life History. The Petition sufficiently describes the life history characteristics of

the San Bernardino kangaroo rat, including factors related to habitat selection that make it vulnerable to ongoing hydrologic and vegetation changes occurring in its geographic range.

- Kind of Habitat Necessary for Survival. The Petition contains a sufficient description of the habitat types and conditions necessary for the survival of the San Bernardino kangaroo rat.

- Factors Affecting the Ability to Survive and Reproduce. The Petition contains sufficient information to suggest the San Bernardino kangaroo rat has historically been, and continues to be, adversely affected by habitat loss and degradation due to land cover conversion, altered or lost hydrological function in streams, and disconnection of floodplain and upland refugia habitat areas.

- Degree and Immediacy of Threat. The Petition contains sufficient information to indicate threats to the long-term survival of the San Bernardino kangaroo rat will continue or likely worsen in the future. Further, the Petition cites recent genetic information indicating the species has a low effective population size, low genetic diversity, and is at risk of inbreeding depression, all of which are immediate threats to persistence of the species.

- Impact of Existing Management Efforts. The Petition contains sufficient information to suggest that existing regulatory mechanisms and management efforts do not adequately protect the San Bernardino kangaroo rat from impacts that threaten its long-term survival.

- Suggestions for Future Management. The Petition includes sufficient information to indicate there are known and potential management actions that could benefit the San Bernardino kangaroo rat.

- Availability and Sources of Information. The Petition cites more than 50 references and the Petitioner provided pdf copies of these referenced documents to the Commission. The Petition contains sufficient available sources of information to inform whether the petitioned action may be warranted.

- A Detailed Distribution Map. The Petition contains a sufficiently detailed map of the historical distribution of the San Bernardino kangaroo rat.

The Department's Petition Evaluation focuses on analyses of the scientific information provided in the Petition, as well as additional scientific information the Department possesses, or has knowledge of, regarding San Bernardino kangaroo

rat populations.

In completing its Petition Evaluation, the Department has determined the Petition provides sufficient scientific information to indicate the petitioned action may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

II. Introduction

A. Candidacy Evaluation

The Commission has the authority to list certain “species” or “subspecies” as threatened or endangered under CESA. (Fish & G. Code, §§ 2062, 2067, 2070.) The listing process is the same for species and subspecies. (Fish & G. Code, §§ 2070-2079.1.)

CESA sets forth a two-step process for listing a species as threatened or endangered. First, the Commission determines whether to designate a species as a candidate for listing by evaluating whether the petition provides “sufficient information to indicate that the petitioned action may be warranted.” (Fish & G. Code, § 2074.2, subd. (e)(2).) If the petition is accepted for consideration, the second step requires the Department to produce, within 12 months of the Commission’s acceptance of the petition, a peer reviewed report based upon the best scientific information available that advises the Commission whether the petitioned action is warranted. (Fish & G. Code, § 2074.6.) Finally, the Commission, based on that report and other information in the administrative record, then determines whether the petitioned action to list the species as threatened or endangered is warranted. (Fish & G. Code, § 2075.5.)

A petition to list a species under CESA must include “information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant.” (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1).) The range of a species for the Department’s petition evaluation and recommendation is the species’ California range. (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal. App. 4th 1535, 1551.)

Within 10 days of receipt of a petition, the Commission must refer the petition to the Department for evaluation. (Fish & G. Code, § 2073.) The Commission must also publish notice of receipt of the petition in the California Regulatory Notice Register. (Fish & G. Code, § 2073.3.) Within 90 days of receipt of the petition (or 120 days if the

Commission grants an extension), the Department must evaluate the petition on its face and in relation to other relevant information and submit to the Commission a written evaluation report with one of the following recommendations:

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

(Fish & G. Code, § 2073.5, subds. (a)-(b).) The Department's candidacy recommendation to the Commission is based on an evaluation of whether the petition provides sufficient scientific information relevant to the petition components set forth in Fish and Game Code Section 2072.3 and the California Code of Regulations, Title 14, Section 670.1, subdivision (d)(1).

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's determination of whether a petitioned action should be accepted for consideration pursuant to Fish and Game Code Section 2074.2, subdivision (e), resulting in the species being listed as a candidate species. The court began its discussion by describing the standard for accepting a petition for consideration previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104:

> As we explained in *Natural Resources Defense Council*, "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity*, *supra*, 166 Cal.App.4th at pp. 609-10 [internal citations omitted].) The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (*Id.* at p. 611.) However, the court clarified:

> [T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable

> person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under [Fish and Game Code] section 2074.6.

(*Ibid*.)

B. Petition History

The Petitioner is soliciting review for an endangered species determination of San Bernardino kangaroo rat. The San Bernardino kangaroo rat is currently listed as endangered under the Federal Endangered Species Act (ESA) (U.S. Fish and Wildlife Service (USFWS) 1998 Fed. Reg. 63:51005). The listing includes this California endemic species wherever it is found.

On March 15, 2019, the Commission received this Petition to list the San Bernardino kangaroo rat as endangered under CESA. On March 22, 2019, the Commission referred the Petition to the Department for evaluation. The Department submitted this Petition Evaluation report to the Commission on May 30, 2019.

The Department evaluated the scientific information presented in the Petition as well as other relevant information the Department possessed at the time of review. The Commission did not receive new information from the public during the Petition Evaluation period pursuant to Fish and Game Code Section 2073.4. Pursuant to Fish and Game Code Section 2072.3 and Section 670.1, subdivision (d)(1), of Title 14 of the California Code of Regulations, the Department evaluated whether the Petition included sufficient scientific information regarding each of the following petition components to indicate whether the petitioned action may be warranted:

- Population trend;
- Range;
- Distribution;
- Abundance;
- Life history;
- Kind of habitat necessary for survival;
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of threat;
- Impact of existing management efforts;
- Suggestions for future management;

- Availability and sources of information; and
- A detailed distribution map.

C. Overview of San Bernardino Kangaroo Rat Ecology

Kangaroo rats, genus *Dipodomys*, are members of the New World rodent family Heteromyidae, which also includes pocket mice and kangaroo mice. Kangaroo rats are distributed widely in the arid and mesic open habitats of western North America, including northern Mexico. They are notable for their bipedal locomotion, ability to subsist in dry habitats without drinking water, and external fur-lined cheek pouches used to carry seeds from foraging areas to cache locations. Kangaroo rats have relatively large heads, large hind feet, and long tufted tails, which help provide balance and agility while hopping. There are 19 species of kangaroo rat (Wilson and Reeder 2005).

The San Bernardino Merriam's kangaroo rat (more commonly known as and referred to herein as the San Bernardino kangaroo rat) is one of 19 subspecies of *D. merriami* and one of three occurring in southern California (*D. m. merriami* and *D. m. collinus*). The San Bernardino kangaroo rat is endemic to California. It is dusky brown, with tail stripes and foot pads that are dark brown (McKernan 1997). It is highly differentiated from the two other southern California *D. merriami* subspecies by its darker, smaller body.

The San Bernardino kangaroo rat is a solitary, primarily nocturnal rodent that is active year-round. It inhabits alluvial floodplains and adjacent upland habitats. Like other Merriam's kangaroo rats, the San Bernardino kangaroo rat prefers open habitats with low shrub canopy cover and rarely occurs in dense vegetation (McKernan 1997). It prefers sandy loam substrates, which are characteristic of alluvial fans and floodplains, where it is easy to dig shallow burrows and cache food supplies (USFWS 1998 Fed. Reg. 63:51005).

Other subspecies of Merriam's kangaroo rat forage primarily for seeds, often burying small clumps of seeds in numerous shallow holes dug in the soil (Jenkins et al. 1995), and this is likely also true for the San Bernardino kangaroo rat subspecies. Merriam's kangaroo rat is generally known for its ability to live indefinitely without drinking water while subsisting primarily on dry seeds (USFWS 1998 Fed. Reg. 63:51005). It also eats herbaceous vegetation and insects in the spring during the reproductive season. When available, insects may comprise up to half of the diet (USFWS 1998 Fed. Reg. 63:51005). Females increase ingestion of foods with higher water content during lactation (USFWS 2009).

Reproduction appears to be timed to coincide with high food-availability (USFWS 2009). Pregnancy occurs between January through late November, with the peak number of pregnant or lactating females occurring during late June (McKernan 1997). Females can have more than one litter per year, with litter sizes ranging from two to three young

(USFWS 2009). Females care for the young and, at least in another Merriam's kangaroo rat subspecies, may sometimes shift the young between day burrows, possibly to minimize parasite infestations or to avoid attracting predators (Behrends et al. 1986).

Potential predators include owl, fox, coyote, bobcat, weasel, badger, and snakes (USFWS 2002 Fed. Reg. 67:19811). Burrow systems are occupied by a single adult and clustered in a given area (USFWS 2009). In a radio-telemetry study of another Merriam's kangaroo rat subspecies, home range sizes of males and females were similar (about 0.8 acres); occasional long-distance movements of 100 meters (330 feet) or more were observed (Behrends et al. 1986).

III. Sufficiency of Scientific Information to Indicate the Petitioned Action May Be Warranted

The Petition components are evaluated below, with respect to Fish and Game Code section 2072.3 and Section 670.1, subdivision (d)(1), of Title 14 of the California Code of Regulations.

A. Population Trend

1. Scientific Information in the Petition

The Petition discusses population trend for the San Bernardino kangaroo rat on page 5. The Petition acknowledges a lack of population trend data and therefore relies upon information on habitat availability and population density to suggest a population decline. The San Bernardino kangaroo rat historically inhabited alluvial fan scrub in active floodplains in the San Bernardino and San Jacinto/Perris valleys (McKernan 1997). The Petition notes urban and agricultural development and water management projects implemented in this area in the 20th Century have significantly diminished the availability of this habitat, suggesting a San Bernardino kangaroo rat population decline. The Petition cites a USFWS (2009) estimate that less than 5% of the San Bernardino kangaroo rat's historical habitat remains and that much of the remaining habitat is fragmented, degraded, and non-functional (USFWS 2018). The Petition cites studies (e.g., McKernan 1997) indicating higher San Bernardino kangaroo rat population densities in areas with naturally-functioning floodplains to suggest a likely decline in densities throughout much of the species' currently occupied range due to the loss of this type of habitat. According to the Petition, a loss of occupancy combined with a decline in density throughout most of the San Bernardino kangaroo rat's geographic range indicates a negative population trend.

2. Conclusion

The information provided in the Petition indicates San Bernardino kangaroo rat populations have significantly declined since the historical period.

B. Geographic Range

1. Scientific Information in the Petition

Information regarding geographic range appears on pages 5 through 21 of the Petition. The San Bernardino kangaroo rat is endemic to California, historically ranging along alluvial fan habitats in floodplain terraces of the northern San Bernardino Valley and at the northern bases of the San Jacinto Mountains (McKernan 1997). The Petition indicates a substantial decline in the occupied geographic range based on loss of habitat and lack of recent observations of the species throughout most of its historical range.

The Petition presents additional information related to recent trends in habitat suitability on pages 15 through 21. The Petition bases its summary of habitat availability upon a variety of sources, including USFWS documents and reports related to the federal ESA listing as endangered in 1998, designation of Critical Habitat in 2002, a five-year status review in 2009, and an unpublished analysis conducted in 2018. The resulting information appears in Petition Table 1, excerpted below.

Petition Table 1. U.S. Fish and Wildlife Service's estimates of area of SBKR habitat (acres) at time of federal listing (1998), area of Designated Critical Habitat (2002), and functioning habitat remaining in 2018.

Subpopulation Land Unit	Potential Habitat Estimated at Listing (1998[1])	Designated Critical Habitat (2002[2])	Estimated Functioning Habitat (2018[3])
Etiwanda Alluvial Fan	Extant	4,820	Extirpated[3]
Lytle Creek/Cajon Wash	6,967	13,970	6,471
Santa Ana River	5,224	8,935	7,426
San Jacinto River	1,002	5,565	2,403
Bautista Creek	Part of San Jacinto R.	Part of San Jacinto R.	Extirpated[3]
Cable Creek	Part of Lytle/Cajon	Part of Lytle/Cajon	Extirpated[3]
Devil's Canyon	Part of Lytle/Cajon	Part of Lytle/Cajon	Extirpated[3]
City Creek (upstream of Highland Ave.)	Extant	Part of Santa Ana R.	Extirpated[3]
Reche Canyon	Extant	Not designated	Extirpated[4]
South Bloomington	Extant	Not designated	Extirpated[4]
Estimated Totals	**13,193[5]**	**33,295 (10,969[6])**	**16,300[7]**

The Petition concludes the information summarized in Table 1 indicates: 1) the kangaroo rat has been extirpated from several areas occupied at the time of ESA listing, including five areas included in the Critical Habitat designation of 2002, and 2) the USFWS estimates functioning habitat in the three remaining subpopulation areas is limited to about 16,000 acres.

Additionally, the Petitioner used aerial images and unpublished surveys to estimate the change in total suitable San Bernardino kangaroo rat habitat between ESA listing in 1998 and the present (2018). Unlike USFWS's "functioning" habitat outlined in Table 1, the Petitioner's estimate of suitable habitat does not account for functionality or occupancy. Instead, it more broadly estimates the maximum possible potential habitat based solely on land cover. The Petition states this approach documents the magnitude and rate of irreversible loss of potential San Bernardino kangaroo rat habitat since the species was federally listed in 1998. The results of this analysis are excerpted in Petition Table 2, below.

[1] USFWS 1998
[2] USFWS 2002a
[3] USFWS 2018
[4] Extirpated by 2008 (USFWS 2009)
[5] A total of 3,396 acres of the 13,193 acres of the potential habitat was considered to "have too much cover or is otherwise degraded" to support SBKR.
[6] A total of 33,295 acres have been designated as Critical Habitat for SBKR (USFWS 2002a), but the Service (USFWS 2009) considered 10,969 acres of this to be "much of the remaining occupied habitat" at the time.
[7] Habitat considered currently "functioning" may not necessarily be occupied by SBKR.

Petition Table 2.[8] Acreages of potential, suitable and unsuitable SBKR habitat in 1998 and 2018.

Subpopulation Land Unit	1998 Unsuitable	1998 Suitable	2018 Unsuitable	2018 Suitable	% Loss Suitable 1998-2018	% Increase Unsuitable 1998-2018
Inside Critical Habitat						
Etiwanda Alluvial Fan	248	4,570	1,327	3,491	24%	435%
Lytle Creek/Cajon Wash	1,285	12,686	3,693	10,278	19%	187%
Santa Ana River	1,004	7,932	1,764	7,172	10%	76%
San Jacinto River/Bautista Creek	664	4,901	838	4,727	4%	26%
Outside Critical Habitat						
Etiwanda Alluvial Fan	0	1,075	1,075	0	100%	-
Lytle Creek/Cajon Wash	0	3,205	3,205	0	100%	-
Santa Ana River	0	897	897	0	100%	-
San Jacinto River/Bautista Creek	0	1,198	1,198	0	100%	-
Estimated Totals	**3,201**	**36,464**	**13,997**	**25,668**	**30%**	**337%**

Based on the information in Table 2, the Petition suggests during the 20 years since ESA listing: 1) all formerly suitable habitat outside designated Critical Habitat areas (6,375 acres) has been lost, 2) the total area of suitable habitat within the Critical Habitat areas has declined by almost 11,000 acres, 3) the individual Critical Habitat areas have lost between 4% and 24% of their suitable habitat area, and 4) combined across all four habitat areas, about 30% of all suitable habitat for the San Bernardino kangaroo rat has been lost since 1998.

2. Conclusion

The Petition sufficiently demonstrates a decline in the San Bernardino kangaroo rats' geographic range.

[8] In reviewing the Petition, the Department discovered discrepancies between the acreages and percent loss provided in Table 2 of the Petition. The Department contacted Petitioner, and Petitioner acknowledged that they accidently input the incorrect numbers for the 1998 suitable and 2018 unsuitable acreages inside critical habitat, and made one typo for the percent increase in unsuitable habitat. Petitioner provided the Department the correct data, and Table 2 as reproduced here has been updated with the correct numbers. The numbers that were updated are underlined in the table above. The Department has determined that Petitioner's error did not affect the estimated total loss of habitat or impact Petitioner's overall conclusions.

C. Distribution

1. Scientific Information in the Petition

The Petition discusses current and historical distribution on pages 5 through 21. The Petition cites information from USFWS (1998) indicating the current distribution of the San Bernardino kangaroo rat is limited to three disjunct geographic areas: Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River/Bautista Creek (USFWS 1998). The Petition also summarizes subsequent information (USFWS 2018) and the Petitioner's own analyses and concludes the San Bernardino kangaroo rat's distribution within these three areas has contracted since 1998.

The Petition presents mapped locations for all known detections of San Bernardino kangaroo rat in the species' historical range on page 6 (Petition Figure 1, which is reproduced on page 10 of this Petition Evaluation). The Petition suggests the map, which depicts sparse records throughout most of the historical geographic range, indicates much of the species' habitat was lost as the region was settled in the early 20th Century.

2. Other Relevant Scientific Information

The Petition's distribution map closely matches the occurrence information in CDFW's California Natural Diversity Database (CNDDB), though a few additional old records appear on the Petition map that do not appear in CNDDB. Recent records (2008 and later) match exactly.

3. Conclusion

The information provided by the Petition on distribution of the San Bernardino kangaroo rat indicates a decline and appears consistent with other information available to CDFW from occurrence records and information contained in USFWS and gray literature documents. The slight differences between the Petition's distribution map and CDFW's CNDDB occurrence data do not change the depiction of historical and current range and distribution.

D. Abundance

1. Scientific Information in the Petition

The Petition discusses abundance on page 22. The Petition acknowledges limited data exist on abundance of the San Bernardino kangaroo rat, citing studies (McKernan 1997, Root 2008, Root 2010) that estimate densities of 1 to 30 individuals per occupied hectare (2.5 acres). The Petition indicates studies have shown local habitat conditions affect abundance, with hydrologically functional habitat areas supporting greater

population densities than degraded or hydrologically disconnected areas. The Petition suggests habitat degradation and fragmentation in the San Bernardino kangaroo rat's range have therefore likely negatively impacted abundance.

2. Conclusion

The Petition sufficiently addresses what little is known about the abundance of the San Bernardino kangaroo rat.

E. Life History

1. Scientific Information in the Petition

The Petition addresses life history on pages 22 through 24. The Petition describes the San Bernardino kangaroo rat in relation to the other two Merriam's kangaroo rat subspecies in California, including its morphological, geographic, and likely genetic differentiation, suggesting the San Bernardino kangaroo rat may be a distinct species instead of merely a subspecies (Lidicker 1960). The petition briefly presents information about home range, reproductive biology, foraging ecology and diet, energetics physiology, and causes of mortality.

2. Conclusion

The Petition presents sufficient information on the life history and ecology of the San Bernardino kangaroo rat.

F. Kind of Habitat Necessary for Survival

1. Scientific Information in the Petition

The Petition addresses the San Bernardino kangaroo rat's habitat requirements on pages 24 and 25. The Petition cites USFWS's Critical Habitat designation notice and other sources that describe habitat characteristics as including "sandy or gravelly soils and substrates, generally supporting open-structured alluvial fan scrub vegetation, in floodplains with active fluvial processes and nearby upland and/or less frequently inundated terraces" (USFWS 2002). The Petition highlights the importance of active hydrologic conditions (with periodic flood events within the floodplain) to maintain the relatively open vegetation preferred by the kangaroo rat (McKernan 1977, Smith 1980). Connectivity of floodplain to adjacent naturally-vegetated terraces is necessary as flood refugia (USFWS 2002). Large undisturbed blocks of habitat are necessary to minimize edge effects of artificial lighting (Wang and Shier 2017).

2. Conclusion

The Petition presents sufficient information regarding the kind of habitat necessary for the San Bernardino kangaroo rat's survival.

G. Factors Affecting the Ability to Survive and Reproduce

1. Scientific Information in the Petition

The Petition discusses factors affecting the San Bernardino kangaroo rat's ability to survive and reproduce on pages 25 through 28. The Petition states the primary threat to the San Bernardino kangaroo rat is the direct impact of past and present habitat modification and destruction. McKernan (1997) documented the loss of more than 95% of the species' historically available habitat, as well as fragmentation and degradation of the remaining habitat. This work led to the emergency listing of the species in 1998 under the federal Endangered Species Act. The Petition provides information indicating the loss of an estimated 11,000 acres of San Bernardino kangaroo rat habitat since the species was federally listed in 1998, with additional impacts occurring due to habitat fragmentation and degradation. In addition to direct impacts of habitat loss and degradation, the Petition states the hydrologic function of the major stream systems in the species' range has been impaired. The Petition describes adverse impacts to the species from channelization, flood control, and water management operations, and indicates disconnection of upland stream terraces from floodplains has adversely impacted the ecology of the species through effects on movement between and within foraging areas, dispersal of young, access to flood refugia, and predator avoidance.

As described in the Petition, recent range-wide genetic information indicates low genetic variability and effective population size in remaining San Bernardino kangaroo rat populations. Effective population sizes are an order of magnitude lower than recommendations for maintenance of genetic diversity in populations (Shier et al. 2018). Two of the three extant subpopulations (Santa Ana River and San Jacinto River) fall below the levels necessary to prevent inbreeding depression (Shier et al. 2018).

As outlined in the Petition, unnaturally long succession periods between flood events now occur due to water management in some of the stream systems occupied by the San Bernardino kangaroo rat. According to the Petition, long flood intervals have resulted in a preponderance of late-mature vegetation stages in the floodplain scrub habitat. In addition, non-native grasses and other plants have invaded much of the available habitat. The Petition concludes these impacts to the natural vegetation composition of habitat for the San Bernardino kangaroo rat reduces the number of individuals the habitat can support.

Other factors identified in the Petition affecting San Bernardino kangaroo rat survival and reproduction include “edge effects” from development, such as artificial lighting that depresses foraging activity (Wang and Shier 2017) and may increase predation risk (Beier 2006), and exposure to rodenticides.

As stated in the Petition, climate change would likely interact with and amplify many of the above-described factors by impacting native plant species distribution, altering precipitation rates and timing, facilitating invasion of non-native plant species, and increasing predation risk and competition with other species for resources.

2. Conclusion

The Petition sufficiently describes factors affecting the San Bernardino kangaroo rat’s ability to survive and reproduce.

H. Degree and Immediacy of Threat

1. Scientific Information in the Petition

The Petition discusses the degree and immediacy of threats to the San Bernardino kangaroo rat on pages 28 through 32. Threats include substantial reductions in the area, quality, and functionality of habitat due to land cover conversion and modification of hydrologic conditions of streams, both historically (McKernan 1997, USFWS 1998 Fed. Reg. 63:51005) and since the species was listed as endangered under the federal ESA (USFWS 2018). The remaining San Bernardino kangaroo rat populations are small, isolated, and have low genetic diversity, posing additional threats to the species’ persistence (Shier et al. 2018).

The Petition outlines several development projects, currently in the planning, permitting, or implementation stage, that it describes as posing imminent threats to the San Bernardino kangaroo rat. As described in the Petition, these include:

- The Lytle Creek North Master Planning Community, for which the USFWS approved a Biological Opinion (BO), would include approximately 1 mile of revetment on Lytle Creek’s north bank and the loss of 296 acres of suitable habitat. Mitigation included the conservation of 160 acres of floodplain habitat, including a 57-acre higher elevation area proposed as a flood refugium and about 6 acres of upland terrace. Vegetation management of the refugium was intended to maintain the open structure needed by the kangaroo rat. According to the Petition, the refugium island has not functioned as intended in relatively modest floods to date and recent analysis has shown it will likely be inundated and further eroded in larger flood events (USFWS 2017, Chang 2016,

CBEC 2018). According to the Petition, the target San Bernardino kangaroo rat population numbers for the mitigation outlined in the BO have not been achieved.

- The Lytle Creek Ranch Development is advanced in the permitting phase and could be approved for construction in 2019. This project would encompass 2,447 acres, including 1,920 acres within San Bernardino kangaroo rat Critical Habitat, of which an estimated 1,190 acres would be adversely modified (USFWS, as cited in the Petition). According to the Petition, proposed mitigation includes protection of 489 acres of occupied habitat and restoration of an additional 40 acres. Assuming the protected and restored habitat is occupied by the kangaroo rat, a net loss of 171 acres of occupied habitat in the project area would result. The Petition also expresses concern the project would impact fluvial processes and connectivity in the protected habitat areas by placement of revetment, which would constrict the stream channel and increase scour, channelization, and inundation of the floodplain habitat. Upland terrace refugium habitat would be developed and no longer available to the kangaroo rat.

- The CEMEX aggregate mining project in Lytle Creek is in the permitting phase. According to the Petition, the exact configuration of the mining project has not been finalized but would include repair of a levee breached in 2005. The Petition indicates natural processes since the breach have improved habitat conditions, and that the proposed project would reverse these improvements.

- The Seven Oaks Dam on the Santa Ana River, completed in 2000, is operated to reduce the potential for downstream flood damage. According to the Petition, the dam was designed to allow releases that would mimic non-destructive flood events that would maintain floodplain characteristics suitable for the San Bernardino kangaroo rat, among other species. To date, such high-flow releases have not been planned or implemented. Additionally, vegetation management of floodplain habitat has not been successful in maintaining San Bernardino kangaroo rat populations in the area, according to the Petition.

- Two Habitat Conservation Plans (HCPs) in the Santa Ana River portion of the San Bernardino kangaroo rat's range are currently in development. According to the Petition, these HCPs contemplate development of 680 acres of San Bernardino kangaroo rat habitat, to be mitigated by protection of 1,655 acres of medium- to high-suitability habitat.

- The Petition describes the precarious condition of the San Bernardino kangaroo rat population in the San Jacinto River/Bautista Creek area. USFWS considers

the species extirpated from the Bautista Creek drainage and monitoring indicates low levels of occupancy in other areas inhabited by this subpopulation (Biological Monitoring Program 2016). Although the area is included in the Western Riverside Multiple Species Habitat Conservation Plan, which includes the San Bernardino kangaroo rat as a covered species, according to the Petition, conservation goals for the species have consistently not been met during implementation.

- The Petition lists three additional projects in the planning stages that could impact the San Bernardino kangaroo rat subpopulation in the San Jacinto drainage.

2. Conclusion

The Petition presents sufficient information to suggest the threat to the San Bernardino kangaroo rat's continued existence may be both severe and immediate.

I. Impact of Existing Management Efforts

1. Scientific Information in the Petition

The Petition discusses the impact of existing management efforts on pages 32 through 35. As outlined in the Petition, management of San Bernardino kangaroo rat and its habitat is subject to review and approval by the USFWS because the species is listed as endangered under the federal ESA. The USFWS may grant incidental take authorization under either ESA Section 7 (for projects carried out, funded, or permitted by federal agencies) or ESA Section 10 (for non-federal projects, including private landowner projects and local jurisdiction projects). The Petitioner reviewed 45 projects with USFWS incidental take authorization for San Bernardino kangaroo rat, including 40 BOs for federal projects (Section 7) and five HCPs (Section 10). As summarized in the Petition, mitigation for impacts to San Bernardino kangaroo rats of these projects consisted of one or more of three strategies:

- Relocation of kangaroo rats from project impact areas to other sites;
- Habitat restoration; and
- Purchase of mitigation credits from mitigation banks, primarily in the Lytle Creek and Cajon Wash banks.

The Petition states all three strategies have been ineffective in conserving or recovering the San Bernardino kangaroo rat. Relocation has been the most common requirement in the 40 Section 7 projects, but it has only been partially successful in one case according to the Petition. HCPs and BOs commonly include habitat restoration. However, according to the Petition, persistent occupancy of kangaroo rat has not been

confirmed in any restored habitat areas. The Petition states no monitoring of relocation or restoration project success is typically required. As a result, the ultimate outcome of these strategies does not inform subsequent project requirements.

The Petition indicates the third conservation strategy, purchase of mitigation credits, has resulted in protection of some habitat in the mitigation banks. According to the Petition, while such habitat is protected in perpetuity through purchase of credits, it is only protected as mitigation because other habitat is lost during project implementation, leading to a net loss of habitat in many cases. Given the limited amount of habitat available to the species, the Petition suggests that, despite the long-term protection of some habitat, the overall net loss of habitat resulting from this strategy has made the conservation status of the species more precarious. The Petition further notes that the two primary mitigation banks are both in the Lytle Creek/Cajon Wash population area and only encompass some 1,482 acres. Thus, according to the Petition, the banks do not provide insurance against stochastic events (such as disease) that may impact that subpopulation. The Petition also suggests insufficient area exists within the banks to support a viable population.

2. Conclusion

The Petition suggests management efforts implemented since the San Bernardino kangaroo rat was federally listed have been inadequate to stop or reverse the loss of habitat area and habitat quality for the species. The Petition presents sufficient evidence to indicate additional management actions may be necessary to conserve and recover the species.

J. Suggestions for Future Management

1. Scientific Information in the Petition

The Petition suggests future management actions on pages 35 through 38. Suggested management falls into four broad categories: (1) protecting existing suitable habitat, (2) expanding occupied areas, (3) monitoring the status of San Bernardino kangaroo rat throughout its range, and (4) designating the species as endangered under CESA.

Regarding habitat protection and expansion of occupied areas, the Petition recommends the following specific actions:

- Prevent the additional loss of suitable and/or occupied habitat through land cover conversion;
- Revise management requirements for floodplains to reduce stream channelization;

- Develop management actions to reduce habitat degradation caused by altered hydrologic processes, invasion of nonnative plants, habitat fragmentation, and edge effects; and
- Encourage conservation banking of suitable and/or occupied habitat.

The Petition also recommends exploration of other, untested actions that could be used in the future to aid in the species recovery. The Petitioner suggests these actions should not be considered for project mitigation unless or until experimental practice proves their effectiveness. These actions include:

- Actions to enhance habitat quality, such as soil restoration;
- Enhancement of sediment transport during high-water events through installation or modification of crossing structures (large culverts, bridges) that allow downstream passage of sediment;
- Active vegetation management to control non-native plants and to encourage native species;
- Scientifically-based translocation or reintroduction of San Bernardino kangaroo rats into unoccupied or sparsely occupied suitable habitat areas;
- Captive propagation of San Bernardino kangaroo rat to provide a source population for reintroductions, if translocation proves effective; and
- Restoration of more natural hydrological processes in the Santa Ana River and San Jacinto-Bautista Creek systems.

2. Conclusion

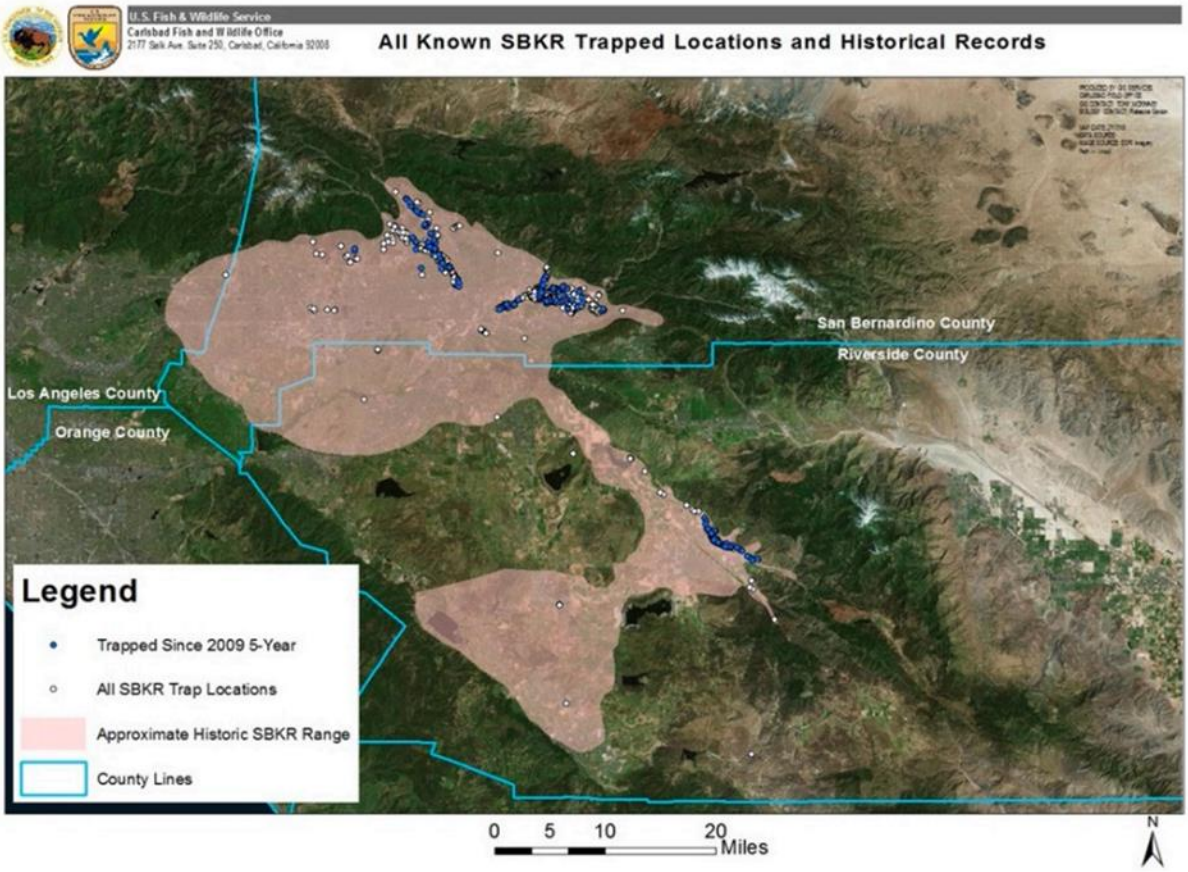
The Petition indicates additional, known management actions may aid in conserving the San Bernardino kangaroo rat. Exploration of additional experimental options may identify possible future conservation tools.

K. Detailed Distribution Map

1. Scientific Information in the Petition

The Petition provides the following map (Figure 1) prepared by USFWS (2018) showing the historical geographic range of San Bernardino kangaroo rat, as well as historical and recent live-trapping locations.

Figure 1. Historical range of San Bernardino kangaroo rat, all known trap locations, and trap locations from 2008-2018 (from USFWS 2018).



2. Other Relevant Scientific Information

The distribution of locations plotted in Figure 1 closely matches occurrences of the San Bernardino kangaroo rat as recorded in the California Natural Diversity Database.

3. Conclusion

The distribution map illustrates the San Bernardino kangaroo rat's historical distribution and highlights the current limited distribution of the species.

L. Sources and Availability of Information

1. Scientific Information in the Petition

The Petition cited more than 50 scientific and administrative documents related to the San Bernardino kangaroo rat. The Petitioner provided electronic copies of these documents, as well as additional, uncited documents, to the Commission.

2. Other Relevant Scientific Information

The Department used additional sources of scientific information cited in this Petition Evaluation document.

3. Conclusion

The Petition contains sufficient available sources of information to inform whether the petitioned action may be warranted.

V. Recommendation to the Commission

In completing its Petition Evaluation, the Department has determined the Petition provides sufficient scientific information to indicate that the petitioned action may be warranted for the San Bernardino kangaroo rat. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

VI. Literature Cited

Behrends, P., M. Daly, and M.I. Wilson. 1986. Range use patterns and spatial relationships of Merriam's kangaroo rats (*Dipodomys merriami*). Behaviour 96:187-209.

Beier, P. 2006. Effects of artificial night lighting on terrestrial mammals. Pgs. 19-42 *In* C. Rich, and T. Longcore (eds.) Ecological Consequences of Artificial Night Lighting. Island Press.

Biological Monitoring Program. 2016. Western Riverside County MSHCP Biological Monitoring Program 2015 San Bernardino Kangaroo Rat Survey Report. Prepared for the Western Riverside County Multiple Species Habitat Conservation Plan. Riverside, CA. Available online: http://wrc-rca.org/about-rca/monitoring/monitoring-survey

Cbec Eco Engineering (cbec). 2018. Technical Memorandum on the Potential Impacts to San Bernardino Kangaroo Rat Habitat. Project: 16-1011-2 Lytle Creek Sediment Transport and Hydrodynamic Modeling. From: Gavin Downs, Chris Campbell, To: Dan Silver. November 29, 2018.

Chang, Wayne (Chang Consultants). 2016. Hydraulic Sediment Transport Analysis for CEMEX Lytle Creek Quarry. March 15.

Jenkins, S.H., A. Rothstein, and W.C.H. Green. 1995. Food hoarding by Merriam's kangaroo rats: a test of alternative hypotheses. Ecology 76(8):2470-2481.

Lidicker, W.Z., Jr. 1960. An analysis of intraspecific variation in the kangaroo rat *Dipodomys merriami*. University of California Publications in Zoology 67:125-218.

McKernan, R.L. 1997. The status and known distribution of the San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*): field surveys conducted between 1987 and 1996. Prepared for U. S. Fish and Wildlife Service.

Root, B. 2008. 2006-2007 San Bernardino Kangaroo Rat Occupancy Survey Analyses from the Woolly Star Preserve Area, San Bernardino County, California. Prepared for the U.S. Army Corps of Engineers. U.S. Fish and Wildlife Service. December.

Root, B. 2010. 2005-2009 San Bernardino Kangaroo Rat Survey Analyses from the Woolly Star Preserve Area, San Bernardino County, California. Prepared for the U.S. Army Corps of Engineers. U.S. Fish and Wildlife Service. September.

Shier, D.M., A. Navarro, E. Gray, and T. Wang. 2018. Range-wide genetics of the endangered San Bernardino kangaroo rat (*Dipodomys merriami parvus*). Final Report for the period September 2014-September 2018, Federal Permit Number TE-142435-5; State SC-002508.

Smith, R.L. 1980. Alluvial scrub vegetation of the San Gabriel River floodplain, California. Madrono 27(3):126-138.

U.S. Fish and Wildlife Service (USFWS). 1998. Endangered and Threatened Wildlife and Plants; Final Rule to List the San Bernardino Kangaroo Rat as Endangered (63 FR 51005).

USFWS. 2002. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the San Bernardino Kangaroo Rat; Final Rule (67 FR 19812).

USFWS. 2009. San Bernardino kangaroo rat (*Dipodomys merriami parvus*), 5-Year Review: Summary and Evaluation. Carlsbad Fish and Wildlife Office, August 14.

USFWS. 2017. Lytle Creek Rainfall Analysis. Memo from Mark Gard, Fish and Wildlife Biologist to File. March 21.

USFWS. 2018. Lytle Creek consultation briefing.

Wang, T. and D.M. Shier. 2017. Effects of anthropogenic lighting on San Bernardino kangaroo rat (*Dipodomys merriami parvus*) foraging behavior, persistence and fitness. Final Report to USFWS.

Wilson, D.E. and D.M. Reeder (editors). 2005. Mammal Species of the World: A Taxonomic and Geographic Reference, Third Edition. Johns Hopkins University Press. 2,142 pp.

From: Dan Silver <dsilverla@me.com>
Sent: Tuesday, July 23, 2019 4:29 PM
To: FGC
Subject: Item 10, San Bernardino kangaroo rat petition, Hearing date of Aug. 7, 2019 – Inadequacy of alternative regulatory mechanisms
Attachments: EHL-CFGC-Item10-8.7.19-SBKR.pdf; Scanned from a Xerox Multifunction Printer (2).pdf; HQ elevated_Fwd_ BP request_ Lytle Creek Ranch - COB Monday....pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

July 23, 2019

VIA ELECTRONIC MAIL

Eric Sklar, President
California Fish and Game Commission
1416 Ninth St, Suite 1320
Sacramento CA 95814

RE: Item 10, San Bernardino kangaroo rat petition, Hearing date of Aug. 7, 2019 – *Inadequacy of alternative regulatory mechanisms*

Dear President Sklar and Members of the Commission:

For inclusion in the agenda packet, please find a comment letter from Endangered Habitats League providing additional information on the lack of alternate regulatory mechanisms to State listing. Two supporting documents are also enclosed. Specifically, the letter addresses political interference at the federal level.

Confirmation of receipt of all three files in good order is respectfully requested from Commission staff.

Thank you

Dan Silver

Enclosures

• Comment letter from EHL to CFGC dated July 23, 2019
• Memo from Ron Pharris to Ian Foley, Lytle Creek Ranch Briefing Paper, July 12, 2018, "Scanned from a Xerox Multifunction Printer (2)"
• Email, Paul Souza to Mike Fris, July 26, 2018, HQ elevated_Fwd_ "BP request_ Lytle Creek Ranch - COB Monday..."

Dan Silver, Executive Director
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267

213-804-2750

ENDANGERED HABITATS LEAGUE
DEDICATED TO ECOSYSTEM PROTECTION AND SUSTAINABLE LAND USE

July 23, 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090
fgc@fgc.ca.gov

RE: Item 10, Petition to list the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) as an endangered species under the California Endangered Species Act, Hearing Date, Aug. 7, 2019 – *Inadequacy of alternative regulatory mechanisms*

Dear President Sklar and Members of the Commission:

Endangered Habitats League (EHL) would like to provide additional information on one aspect of the need to grant candidate status – the *inadequacy* of current regulatory mechanisms at the federal level, which might otherwise be viewed as an alternative to candidacy status. In the petition, we noted,

> . . . strong and ample evidence of the politicization of federal regulatory agencies under the current Executive Administration and the ascent of an anti-science and anti-regulatory agenda. Scientific panels have been disbanded and there is open hostility to objective science, such as in the realm of climate change. State listing is a necessary backstop to the disregard of law and science by federal environmental agencies under the current Administration.

Attached to this letter are documents obtained under the Freedom of Information Act (FOIA) that provide evidence of politicization of the US Fish and Wildlife Service decision-making process for the Lytle Creek development project, which now threatens the San Bernardino kangaroo rat (SBKR). This information further demonstrates the need for additional protection of this highly imperiled species under the California Endangered Species Act.

On July 12, 2018, the project applicant sent correspondence to Ian Foley, who we surmise is the Ian Foley who serves as Legislative Director for Congressman Devin Nunes.[1] Mr. Nunes is one of the closest political allies of the Trump Administration in Congress. The memo states that the applicant has not been able to overcome Fish and Wildlife Service staff objections to the project on fundamental biological questions, such as proposed take of SBKR and adequacy of upland refugia. Specifically, the applicant

[1] See memo from Ron Pharris to Ian Foley, Lytle Creek Ranch Briefing Paper, July 12, 2018

cites a *wholly anticipated yet unwanted* outcome of the ongoing Section 7 consultation – a jeopardy opinion or adverse modification determination – that would require a reduction in the scale of development proposed within the 100-yr floodplain.

The correspondence requests an in-person meeting with Assistant Interior Department Secretary Susan Combs, an appointee of the Trump Administration, to garner her "assistance." The explicit goal of the meeting is for her to *intervene* with the Regional Office of the US Fish and Wildlife Service to override the Carlsbad Fish and Wildlife Office biologists and allow the project as proposed to "move forward."

Susan Combs is a logical person to contact. During a political career in Texas, she worked to remove Endangered Species Act protections, such as for the golden-cheeked warbler. *The Washington Post* termed her "a fierce opponent of the Endangered Species Act" and she has called endangered species listings "incoming Scud missiles," showing overt hostility to these regulations.[2]

The applicant's strategy was indeed effective in "elevating" the Lytle Creek project above the heads of regional Service personnel. On July 26, 2018, Paul Souza, Regional Director of US Fish and Wildlife Service, wrote in an email to staff, "Please also be sure to make it clear that the regional office was just briefed and that the developer didn't reach out to the regional office before elevating the concern to HQ."[3] Regional Director Souza concluded his email by making it evident that the developer's tactic was having an effect, when he emphasized that "the regional office is prepared to work with the developer and find a fair and reasonable solution." But as the developer has made plain, the only solution they are interested in is a reversal of the biologists' conclusion that this project will jeopardize the continued existence of this species and will require a reduction in the scale of the proposed development in the floodplain. Unfortunately, such a reversal will lead to inadequate protections for this species under federal law.

As described above and documented, political interference from the Trump Administration appointees poses a real and serious threat to the scientific and legal integrity of crucial federal decision-making on the SBKR. Objective scientific judgements by California Department of Fish and Wildlife are essential to ensure an adequate regulatory mechanism for this imperiled species.

---

[2] See "Fierce Endangered Species Act is picked to oversee Interior's wildlife policy, *The Washington Post*, April 4, 2018, <https://www.washingtonpost.com/news/energy-environment/wp/2018/04/04/a-fierce-opponent-of-the-endangered-species-act-is-picked-to-oversee-interiors-wildlife-policy/>; <https://departmentofinfluence.org/person/susan-combs/>

[3] See email, "HQ elevated_Fwd_ BP request_ Lytle Creek Ranch - COB Monday..." from Paul Souza to Mike Fris, July 26, 2018.

Yours truly,

Dan Silver
Executive Director

Enclosures

Memo from Ron Pharris to Ian Foley, Lytle Creek Ranch Briefing Paper, July 12, 2018, "Scanned from a Xerox Multifunction Printer (2)"

Email, Paul Souza to Mike Fris, July 26, 2018, HQ elevated_Fwd_ "BP request_ Lytle Creek Ranch - COB Monday..."

Foley, Ian

From: Ron Pharris <ronpharris@LytleDC.com>
Sent: Thursday, July 12, 2018 5:49 PM
To: Foley, Ian
Subject: Lytle Creek Ranch Briefing Paper
Attachments: DOCS-#181249-v1-Lytle_Creek_Ranch_Briefing_Paper.PDF

Hello Ian,

As we discussed, I am enclosing a briefing paper written to explain why we feel the need to have D.C. folks at Interior engage at this time with the FWS Regional Office in Sacramento, and to identify some of the key issues on which we are seeking Assistant Secretary Combs' assistance to enable this important project to move forward.

Also, I would like to emphasize how important it is for me to be able to meet with the Assistant Secretary to explain to her, with some graphics and maps, the history of our working with Service staff in the Carlsbad Office, our perspective on what really is at issue, the work that we have done gathering the best biological information available and conducting extensive, thorough and sound analysis (biological, hydrologic, etc.) of the biological issues and facts relative to our site, the San Bernardino kangaroo rat, and the status of the SBKR in the Lytle/Cajon wash system.

The visuals and information which I would like to present in person to the Assistant Secretary would be very helpful to provide greater context for, and augment, the information in the enclosed briefing paper. I believe such a meeting with that additional information and context would help her to better understand the key issues which we have been unable to satisfactorily resolve with the Carlsbad Office, despite Carlsbad's discussion with the Regional Office to date.

Many thanks,

Ron

Ron Pharris
Chairman
Lytle Development
2050 Main Street Suite 250
Irvine, CA 92614
(949) 313-5808 Office
(949)313-5818 Fax

Lytle Creek Ranch Project
2,400-acre master-planned residential/commercial project
located in City of Rialto and unincorporated San Bernardino County, California

City approved Project and Environmental Impact Report in 2012. Provides up to 8,407 dwelling units and 850,000 sq. feet of commercial, office, business park, and light industrial/manufacturing uses. Project fulfills a great unmet need for housing in the Inland Empire area of California.

Applicant has not discussed these issues yet with FWS Region 8. The Regional Office (Mike Fris and Paul Souza) has been briefed by the Carlsbad Office on its staff's work on, and analysis of, the Project from time to time over the past seven (7) years, including recent updates.

The key species at issue: **San Bernardino kangaroo rat** (SBKR). Project would have direct and indirect impacts to SBKR and impacts to **SBKR critical habitat** (CH).

Short Background: LDC has been working with FWS on this project since 2012 – seven years now. LDC has "resolved" the "easier" species issues with Carlsbad Staff. For example, LDC has agreed to a seeding program within the Project's proposed SBKR Conservation Area for a plant (woollystar) which LDC does not believe to be the listed subspecies to begin with, based on thorough and extensive biological research on this issue. LDC believes FWS agrees with LDC on this identification, but is reluctant to publicly admit it for other agency reasons.

However, although LDC has been working with FWS on the Project's SBKR avoidance and conservation measures program for these 7 years, LDC believes it has reached as much "common ground" as possible with Carlsbad Office Staff on this issue, and Staff are beginning to write their draft Biological Opinion (BO) for this Project. Carlsbad Staff and LDC appear at odds over roughly 300 acres of land important for the Project's development, but which Staff seem to want LDC to add to the Project's proposed roughly 725-acre SBKR Conservation Area to avoid Staff writing a "Jeopardy" or "Adverse Modification" BO.

Reason for briefing: LDC anticipates that the Carlsbad Office will likely draft a BO that either finds (1) "Jeopardy" to the SBKR, or (2) "Adverse Modification" of SBKR Critical Habitat (CH), or (3) both. We believe that either finding would be made for the purpose of further reducing the project's development footprint by a significant amount. Either finding likely would result in FWS Staff seeking to impose one or more "Reasonable and Prudent Alternatives" (RPAs) on the Project **which would remove substantial acreage (as much as an additional 300 acres)** from the proposed development project, and thereby render the Project financially infeasible – resulting in a large and adverse economic, jobs, and housing impact to the Inland Empire region. We believe it is important for the D.C. and Regional offices to be involved in this decision-making process before a draft BO is completed.

Additional project history with FWS: Carlsbad FWS entered into the Section 7 Consultation with a preconceived position and viewpoint about which habitat on the Project site Staff wanted (or, from its perspective, "needed") for the SBKR. Prior to any meaningful

review of biological information and materials about the Project site,[1] Staff set their sights on taking roughly 700 acres of additional land from the Project development footprint – in addition to the roughly 600 acres of land which the Project was already proposing to donate for SBKR conservation and recovery.[2] Staff early on indicated a desire for the project to avoid developing approximately some 70% of the Neighborhood 3 development area and more than 75% of the Neighborhood 2 development area. In total, Staff seem to currently want the project to avoid an additional 300 acres of land, **in addition to** the roughly 900 acres the Project has agreed to provide for biological conservation.

Staff appear to be working backwards to try to find a way to select what they want to call the relevant "biological information" and the appropriate "biological analysis" to justify their preconceived position that large amounts of these two areas of the Project's development site are "necessary" to be added to the Project's Conservation Area to avoid "Jeopardy" to the SBKR and to avoid the "Adverse Modification" of SBKR Critical Habitat. They have been doing this despite, and in response to, the Applicant's provision of the best available science and information to FWS during the **past seven years** demonstrating why the additional project acreage "in dispute" is not required to avoid "jeopardy" and "adverse modification" of critical habitat. At Staff's request, LDC performed numerous hydrological and biological studies. These studies show that the Project's proposed development has very limited impact to SBKR habitat which can be expected to remain viable over the long-term under current (and expected future) conditions. Still, Staff search for new rationales to justify sticking to their demands for significant amounts of the Project's development area. Staff continue to shift their rationales for demanding these large amounts of the development footprint (and continue to turn facts on their head), when confronted with information and analysis provided to them which refute their previous rationales for essentially the same unreasonable and unnecessary land grab.

Of note: LDC has demonstrated through ***extensive*** hydraulic analyses, studies and modeling that the Project's revetment location and design in the vicinity of Lytle Creek will not produce any significant adverse effects on habitat conditions in Lytle and Cajon creeks. ***And LDC believes FWS Carlsbad Staff essentially agree with LDC on this conclusion***. So the location of the Project's revetment has been demonstrated to not have adverse effects on the existing and proposed SBKR conservation areas for the Lytle and Cajon creek areas.

Despite appearing to acknowledge from time to time that LDC has provided the best information on one topic or the other, Staff generally seem to ignore or substantially undervalue the conservation and recovery contributions provided by the proposed project for the SBKR and overstate the potential Staff-perceived "shortcomings" of the proposal.

Subsequent to the City's approval of the Project in 2012, LDC reduced the Project's development footprint acreage to further lessen environmental impacts and create more acreage in the proposed SBKR Conservation Area. In 2013, LDC reduced the development footprint in Neighborhood 4 by approximately 60%, reducing developable acres by roughly 32 acres. Over

[1] approximately June 2013.

[2] These acreage amounts do not even include other biological conservation open space the Project proposes to avoid and set aside, which other areas amount to another roughly 170 acres.

the course of many years of discussions with FWS Staff, LDC further reduced the development footprint acreage in Neighborhoods 2 and 3 (combined) by another roughly 65 acres and placed those areas into the proposed SBKR Conservation Area.

Staff are Not using the best available science and information gathered about this Project; rather, they seek ways to view the Project through the lens of their preconceived belief of what biological conditions on the site "should" be. They consistently rely on past, generalized statements about the SBKR by a person Staff characterize as a "recognized local SBKR authority" who has never conducted field work on the Project Site, while consistently discounting the statements and work of a much more widely-recognized and experienced SBKR authority, Michael O'Farrell, Ph.D., who has conducted 16 years of field work on this project site. In fact, FWS Staff specifically encouraged LDC to use Dr. O'Farrell when developing the prior Lytle Creek North/Rosena Ranch project. LDC's biological team is thoroughly confident that Dr. O'Farrell's qualifications and expertise in regards to the SBKR and small mammals in general far surpass the "recognized local authority."

LDC believes its proposed SBKR Conservation Area and Program is sufficient in its current form. LDC is proposing to conserve and manage (with funding) **roughly 725 acres** of contiguous SBKR habitat in perpetuity in the Lytle Creek system. (This area includes ± 555 acres of the most suitable habitat for the SBKR on-site and ± 170 acres of habitat for the SBKR immediately adjacent but off-site.) This 725-acre area is in addition to other conservation habitat set asides by the Project to benefit other biological resources (± another 170 acres). LDC would provide assured funding for habitat maintenance and management in perpetuity.

-The Project includes an adaptive management program to manage SBKR habitat for the species' benefit and respond to any significant drop in SBKR population distribution within the Conservation Area.

-The Project includes a second adaptive management program to ensure that 56 acres of restored SBKR refugia habitat within the Conservation Area located on a large 120-acre Island will persist over time and not be adversely impacted by any potential erosive forces.

-Additionally, LDC's project proposes to allow and facilitate a change in the CEMEX Mining south pit levee to improve and increase habitat for the SBKR in Lytle Creek. This LDC contribution significantly improves the quality and increases the amount of SBKR critical habitat in SBKR Critical Habitat Unit #2 (Lytle/Cajon Creeks)—but LDC is not really getting proper credit for these improvements from FWS Staff.

The Project's more than 700-acre SBKR Conservation Area will be immediately contiguous with another 2,150 plus acres of habitat in Lytle and Cajon creeks dedicated to SBKR conservation and management. With the proposed Project, there would be roughly 2,900 acres of connected SBKR habitat managed and conserved to promote the recovery of the species.

In sum, the Project's **proposed SBKR Conservation Program** contributes to the **recovery** of the SBKR, and with LDC's proposed development footprint and SBKR Conservation Program, FWS Staff should be able to find that the Project: (1) avoids Jeopardizing the Continued Existence of the SBKR, and (2) avoids Adversely Modifying its Critical Habitat.

Significantly, Staff's desire for the additional 300 acres of the development is putting the notion of the **best suitable SBKR** habitat **on its "head."** Staff are **undervaluing** the Project's proposed Conservation Lands and **overvaluing** the additional lands within the development footprint which they want the Project to avoid and conserve. This upside-down view is likely leading Staff to conclude: (1) that LDC's proposed SBKR Conservation Area, which contains the primary and best habitat for the SBKR, is not of sufficient size to support a "No Jeopardy" and "No Adverse Modification" finding, and/or (2) that LDC's proposed SBKR Conservation Area is not providing enough acreage of SBKR "refugia" habitat to support a "No Jeopardy" and "No Adverse Modification" finding.

Likely Key Issues:

(1) Staff overstating the amount of SBKR habitat necessary to be conserved on and adjacent to the Project site in the Project's proposed SBKR Conservation Area to obtain a "No Jeopardy" and "No Adverse Modification" (of critical habitat) determination in the BO.
(2) Staff overstating the amount of SBKR "Refugia Habitat" the Project must provide to obtain a "No Jeopardy" and "No Adverse Modification" determination in the BO.
(3) Staff may be having difficulty understanding that LDC has demonstrated that it has met the final success criterion for the adjacent SBKR conservation area in Lytle Creek.

1) Staff are: (a) exaggerating the quality and amount of SBKR habitat within the development footprint, (b) largely ignoring the limited amount of actually occupied habitat within the development footprint, and (c) downplaying the amount, quality, and value of the SBKR habitat within the proposed SBKR Conservation Area.

Four (4) years of specific SBKR surveying by qualified biologists within the proposed development footprint demonstrate that only about 91 acres of the Project's revised, reduced development footprint are occupied by the SBKR. LDC proposes to offset that impact by permanently conserving and managing some 725 acres of the best quality SBKR habitat within and immediately adjacent to Lytle Creek. Yet, Staff desire the Project to avoid **another 300** acres of the development area and conserve that area for the SBKR.

When discussing the general area of the Project's development footprint in 2003, before LDC had proposed a project for this area, Carlsbad FWS Staff stated: ". . . it is unknown whether SBKR occur within the adjacent upland and terrace areas between Lytle Creek and Riverside Drive," in reference to the areas which constitute the Neighborhood 2 and 3 development footprint areas. Staff had also said in that same Biological Opinion, "the south bank of Lytle Creek downstream of I-15 and upstream of the Cemex mining area also has been significantly altered by groin levees that isolate large blocks of Riversidean alluvial sage scrub habitat behind them from fluvial processes. This and the existing downcutting of Lytle Creek have allowed the Riversidean alluvial sage scrub vegetation on the south bank of Lytle Creek to mature to the extent that the habitat conditions have likely become less suitable for SBKR over time." U.S. Fish & Wildlife Service, FWS Biological Opinion for Lytle Creek North Planned Development Community (FWS-SB-1640.11), November 4, 2003, pgs. 29 and 30. Thus, Carlsbad Staff had previously acknowledged skepticism as to whether the area of the Neighborhood 2 and 3 development footprints could support SBKR in any meaningful way.

Moreover, the Carlsbad FWS Staff are on record as to the characteristics of the habitat most suitable for SBKR. Staff's description of the most suitable habitat for the SBKR includes: "the appropriate mix of sandy soils and low density shrub cover most frequently occurs in scalebroom scrub [which we have formerly called Riversidean alluvial fan sage scrub, or RAFSS]. This vegetation community is found in braided channels (alluvial fans) that are created by sediment transport and scour from mountain drainages . . . . The three described phases (pioneer, intermediate, and mature) of scalebroom scrub correlate with flood intervals and overbank flows as determined by elevation and distance from the main river channel . . . . **SBKR density is highest in areas with low to moderate (30 to 50 percent) perennial vegetative cover and greater than 40 percent bare ground** although this subspecies can occur within areas supporting higher or lower shrub cover. Areas with a dense cover (greater than 60 percent) of nonnative annual plants and/or litter are typically either unoccupied by SBKR or occupied at low densities . . . . **High densities of SBKR have been documented in pioneer and intermediate scalebroom scrub, which generally correlate with areas that have been more-recently disturbed by floods (within the last 40 to 70 years)**. . . . The pioneer phase is subject to frequent disturbance, and vegetation is characterized by sparse shrub and forb cover . . . . The intermediate phase, which has an intermediate density of shrubs and sparse forb cover, is typically found between the active river channel and mature floodplain terraces at higher elevations." U.S. Fish & Wildlife Service, Reinitiated Biological Opinion for the Hemet-San Jacinto Integrated Recharge & Recovery Program (FWS-WRIV-08B0106-10F0045), Dec. 23, 2011, pgs. 12-13 (emphasis added).

LDC's proposed SBKR Conservation Area would preserve and manage in perpetuity most all of the pioneer and intermediate scalebroom scrub (RAFSS habitat) within the Project Site.

2) Staff are exaggerating the amount of Refugia habitat necessary for the Project to avoid/provide to qualify for a No-Jeopardy/No-Adverse Modification determination.

"Refugia" habitat, in this context, is generally defined as habitat above larger flood events (ex. above 100-year flood events). Frequently, such habitat is densely vegetated, and where it does contain SBKR, the animal typically exists there in only low densities. Refugia habitat's value is generally seen as its potential to provide a source for individuals to recolonize the primary SBKR habitat after large flood events which could result in large SBKR mortality within the primary habitat.

LDC has offered ± 91 acres of restored/enhanced and managed habitat which can serve as Refugia habitat within the Project's proposed Conservation Area. This acreage includes the best Refugia habitat within the entire Project area, inasmuch as it has the greatest amount of biological connectivity to the SBKR primary habitat in Lytle Creek to enable SBKR to physically and naturally access that habitat. LDC believes the best available science and information indicates that this Refugia habitat will persist over the long-term. Staff are requesting that LDC avoid and conserve **another** ±200 acres within the Project's proposed development footprint to serve primarily as Refugia habitat. These areas desired by Staff are substantially physically disconnected from the primary SBKR habitat (which is located in Lytle Creek) and thus have less ability to function as Refugia. Staff have not provided a compelling

analysis demonstrating that the amount and location of the Refugia habitat they want from the Project is necessary to avoid Jeopardy to the continued existence of the species and Adverse Modification of the designated SBKR "critical habitat." Nor have Staff likely properly considered the amount of other Refugia habitat located outside the Conservation Area but which will nevertheless provide Refugia habitat for the SBKR in Lytle and Cajon Creeks. Additionally, the amount and location of Refugia habitat desired by FWS would render the Project economically unviable and be disproportionate to the Project's level of impact to the SBKR and Critical Habitat.

Furthermore, Staff seem to be ignoring the best available data and modeling when it comes to the **long-term stability of the SBKR Island Upland Refugia area in Lytle Creek** proposed by the Project. LDC engaged highly qualified hydrologists and geomorphologists/engineers to examine the likelihood that the SBKR Island will persist long-term in Lytle Creek. Applying several different analytical techniques and considerations, their conclusion is that the SBKR Island can be expected to persist in Lytle Creek long-term.

Also, Staff are ignoring that LDC spent considerable money, conducted considerable research and took important actions in 2006-2009 to protect and further ensure the long-term stability of the SBKR Refugia Island.

In addition, LDC has developed an Erosion Control Adaptive Management Plan (EAMP) to provide further guarantees that the large SBKR Refugia Island within its SBKR Conservation Area will persist in perpetuity and be able to provide adequate amounts of Refugia habitat for the SBKR within the Conservation Area long-term.

3) Modified Methodology for Demonstrating Success Criterion.

The existing 2003 Biological Opinion for the Lytle Creek North Planned Development Project (Rosena Ranch residential development) contained several success criteria to be met prior to the transition of the initial habitat management plan to the implementation of the long-term management plan for a 216-acre conservation area immediately adjacent to LDC's proposed SBKR Conservation Area. All of the success criteria for that BO have been demonstrated to Carlsbad Staff's satisfaction, except for one: the demonstration that a target population level of SBKR occupy a restored 40-acre Refugia area within the conservation area for a several year period at numbers at or above the target population size.

LDC demonstrated the target level to have been exceeded by some 17% in 2004. For a number of subsequent years, the number of trapped SBKR was below the target threshold. LDC's biologists ultimately concluded that coyote activity in the area was materially suppressing the number of SBKR which would be trapped and counted using the original trapping methodology developed for the BO. In 2013, LDC requested the Carlsbad Staff work with LDC to agree upon an acceptable alternative means of assessing whether the population size target number had been met or exceeded on those particular 40 acres. LDC was not able to get FWS Carlsbad Staff to agree on a mutually-acceptable sampling/trapping method until the summer of 2017 (a 4-year process). However, agreement was reached on a mutually-acceptable methodology at that time,

and was implemented in August 2017. The results were submitted to the Carlsbad Office in September 2017, and the report showed that the target number was exceeded in that year.

In May of 2018, Carlsbad Staff informed LDC that, based on the input of one of its staff members (who had not previously been involved in the discussions among FWS and LDC), Staff were unsure of whether to accept the use of the agreed-upon methodology, thereby potentially extending indefinitely the bringing of closure to this issue of the remaining success criterion.

Bottom Line: LDC is convinced that nothing that it shows or demonstrates to FWS Carlsbad at this point will change Staff's views. FWS should treat this Project fairly in its analysis of the Project's effects on both the SBKR and its Critical Habitat. Staff ought to recognize the credibility of, and give the proper weight to, the Applicant's data and analyses, use the best available data, and apply reasonable and fair analyses of that data (which data and analyses we believe are generally that provided by the Applicant). LDC needs to be able to develop the additional 300 acres which Carlsbad Staff want to remove from the development project (roughly185 acres in Neighborhood 2 & 125 acres in Neighborhood 3) to be able to fund this important SBKR conservation and recovery program and to make the development project viable. If FWS does not want this Section 7 Consultation to effectively kill this important project for the City and County, appropriate review and dialogue within the Service needs to occur immediately to quickly and fairly determine whether the Applicant's SBKR Conservation Area and program - in particular the size and configuration of its boundaries and the amount and location of its proposed Refugia habitat - meet the "No Jeopardy" and "No Adverse Modification" standards.

Next Steps: For discussion.

From:	Souza, Paul
To:	Fris, Michael
Cc:	Jody Holzworth; Mendel Stewart; Karin Cleary-Rose; Ken Corey
Subject:	Fwd: BP request: Lytle Creek Ranch - COB Monday, 30 July please
Date:	Thursday, July 26, 2018 3:38:17 PM
Attachments:	Scanned from a Xerox Multifunction Printer (2).pdf Template BP DOI Senior Advisor to the Secretary, Exercising the Authority of the Secretary for Fish and Wildlife and Parks (SATSEAFWP).docx

---

Mike,

The Lytle Creek issue has been elevated to HQ.

Sorry for the quick turnaround, but I'll need to see a draft briefing paper by tomorrow. Please be sure to follow the attached format. Please also be sure to make it clear that the regional office was just briefed and that the developer didn't reach out to the regional office before elevating the concern to HQ. Please make the point that the regional office is prepared to work with the developer and find a fair and reasonable solution.

Thanks,

Paul Souza
Regional Director
Pacific Southwest
U.S. Fish and Wildlife Service
2800 Cottage Way, Suite W-2606
Sacramento, CA 95825
916-414-6469
916-208-2457 Cell
https://www.fws.gov/cno/

---------- Forwarded message ----------
From: **Kashyap Patel** <kashyap_patel@fws.gov>
Date: Thu, Jul 26, 2018 at 1:34 PM
Subject: BP request: Lytle Creek Ranch - COB Monday, 30 July please
To: Paul Souza <paul_souza@fws.gov>, Jody Holzworth <jody_holzworth@fws.gov>
Cc: Wanda Cantrell <wanda_cantrell@fws.gov>, "Morris, Charisa" <charisa_morris@fws.gov>

Hi Paul & Jody,

Susan received and fully read the attached "BP" from Ron Pharris and would like our BP on the issue.

Greg suggests we not prepare a matching 7-page rebuttal, but a BP that frames a phone call discussion that we'll schedule for next week.

Can you prepare a BP (template attached) to tee up that discussion?

Thanks,
Kashyap

--
Kashyap_Patel@fws.gov | acting Deputy Chief of Staff, Office of the Director | U.S. Fish & Wildlife Service | 1849 C Street NW, Room 3348 | Washington, DC 20240 | (202) 208-4923 | Txt/Cell: 703-638-4640

Tiemann, Sheri@FGC

From: Dan Silver <dsilverla@me.com>
Sent: Tuesday, July 23, 2019 9:19 AM
To: FGC
Subject: Item 10, San Bernardino kangaroo rat petition, Hearing date Aug. 7, 2019 - Biological comment letters
Attachments: Braden-SBKR petition-7.19.20.pdf; Montgomery-SBKR-FGC-7.20.19.pdf; Spencer - support of SBKR petition 7-18-19.pdf; Braden 2014CV v2.pdf; CV_Spencer_18.pdf; Montgomery CV.pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

July 23, 2019

VIA ELECTRONIC MAIL

Eric Sklar, President
California Fish and Game Commission
1416 Ninth St, Suite 1320
Sacramento CA 95814

RE: Item 10, San Bernardino kangaroo rat petition, Hearing date of Aug. 7, 2019 – *Biological comment letters*

Dear President Sklar and Members of the Commission:

For inclusion in the agenda packet, please find three comment letters from expert biologists recommending advancement of the San Bernardino kangaroo rat to candidate status. CV's for each author are also enclosed.

Confirmation of receipt in good order for all six enclosures is respectfully requested from Commission staff.

Thank you for your consideration of these comments.

Dan Silver

Enclosures

- Letter of July 20, 2019 from Steve Montgomery
- Letter of July 18, 2019 from Wayne Spencer, PhD
- Letter of July 19, 2019 from Gerald Braden

- CV Montgomery
- CV Spencer
- CV Braden

Dan Silver, Executive Director
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267

213-804-2750
dsilverla@me.com
www.ehleague.org

20 July 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

SUBJECT: Comments in support of the listing of the San Bernardino kangaroo rat (SBKR; *Dipodomys merriami parvus*) as a California endangered species

Dear President Sklar and Members of the Commission:

This letter provides scientific information, based upon my own knowledge and experience, which supports steps to list the San Bernardino kangaroo rat. I have worked on many field projects involving the SBKR for over 20 years, including work in the three major remaining occupied habitat areas harboring this species: Santa Ana River, Cajon/Lytle Creeks, San Jacinto River. I have conducted many field studies of SBKR in and near the Santa Ana River Woolly Star Preserve (WSPA), in and adjacent to the Cajon/Lytle Creek drainages, and in the different historically occupied sections of the San Jacinto River. A list of several noteworthy longer-term field studies in these areas is presented below. However, numerous additional field studies of this species also have been conducted over the years in these three drainages.

Santa Ana River (SAR) Ecosystem

Santa Ana River Woolly Star Preserve (WSPA) – intensive field studies in 1999-2014, which were the basis of Brian Root's intensive analysis of this species in the SAR (Root 2010).

East Branch Extension (EBX) project SBKR intensive presence/absence studies in 2010-2013 (Montgomery 2019)

MWD - Inland Feeder water line project intensive field studies in 1998-2002 (with monitoring visits to 2009)

Cajon/Lytle Creek (CLC) Ecosystem

Trapping and habitat use study for SBKR at 28 locations in the Cajon Creek Habitat Management Conservation Area – 2017

Translocation of 365 SBKR from the Judson Ranch project site in Redlands, California to a release site in the Cajon Creek Habitat Management Conservation Area, Muscoy, California, with annual monitoring – in 2015-2019 (continuing)

Trapping for the SoCal Gas 65-mile project in Cajon Wash above the I215-I15 Interchange - 2015

Trapping for the I215-I15 Interchange project – 2013

San Jacinto River (SJR) Ecosystem

Field trapping studies for the San Jacinto River Stage 4 Levee project – 2012-2013 (Montgomery 2013) Trapping in the Horseshow Grande project area upstream and downstream from the Lake Park Drive Bridge near San Jacinto. – 2010 (Montgomery 2010)

The following comments pertain to my observations and experiences in working in these three different parts of the species' range.

Santa Ana River Ecosystem

Broad areas in this drainage are occupied by SBKR. However, as most are aware, the construction of 7 Oaks Dam created a situation where future renewals of the more open habitat conditions required for SBKR to flourish will be greatly reduced. This reduction or termination of larger flooding events will allow the progressive succession of more open sandy habitat areas into denser stands that are increasingly less suitable for SBKR. Flooding from Mill Creek should provide some periodic habitat renewal, but it will likely be insufficient to substantially prevent the widespread gradual succession of scrub habitats to dense conditions across much of the SAR alluvial system, which will result in conditions that are fundamentally unsuitable for SBKR. This gradual process can be expected to limit SBKR to smaller more isolated open habitat patches that continue to be suitable for the species.

I am aware of areas in the Santa Ana River system that appear to be generally suitable habitat for SBKR but where I have been unable to capture the species. This situation shows how habitat type distributions can result in a false picture of the status of SBKR populations, when visually suitable habitat areas actually are not occupied by the species. This also points to the need for field studies designed to determine all factors that can be contributing to the absence of the species in generally suitable alluvial fan sage scrub habitat areas. In addition, the information gained from such studies should be used to implement habitat modification studies in an attempt to encourage the species to occupy presently unoccupied areas of the floodplain. The ultimate goal could be to expand and interconnect the distribution of the species across the overall SAR system, including areas of higher elevation that are safe from expected periodic large flood events that may occur in this ecosystem.

Cajon/Lytle Creek Ecosystem

Broad areas in this drainage are occupied by SBKR. Substantial parts of the Vulcan Cajon Creek Habitat Management Conservation Area were confirmed as occupied by this species in 2017 (Montgomery 2018). Noteworthy parts of the area are too open (frequently flooded) to support the species, and other areas away from the flood zone are too high and exhibit dense shrub cover accompanied by dense grass cover that are not occupied by the species. In addition, some parcels lying eastward of the railroad berm are not occupied by SBKR, presumably due to long-term isolation from the main flood zone and local extirpation of populations of the species from disturbance and other unknown factors.

Sizable parts of the Cajon/Lytle alluvial systems have been developed as sand-gravel extraction areas and housing developments, and new developments are currently proposed for this ecosystem. These developments not only eliminate occupied and potentially usable habitats but also often create islands of habitat separated from each other. Although islands of habitat often can sustain populations over time, they also limit the sharing of genetic information and can become completely disconnected by

poorly planned development projects. Finally, small populations exhibit well known problems of reduced genetic diversity and vulnerability to stochastic events, both of which can result in the periodic elimination of scattered populations of the species. Over time this classic general process is what can lead to the elimination of local and broader populations of a species.

San Jacinto River (SJR) Ecosystem

Populations of SBKR occur in portions of the upper reaches of the San Jacinto River alluvial system, from approximately the Lake Park Bridge upstream to the approximate area of Valle Vista. Portions of the SJR downstream from the Lake Park Drive Bridge are largely devoid of this species. Also, a portion of the SJR system upstream from the Bridge, which harbored a sizable population of SBKR, was recently converted to water detention ponds that no longer exhibit occupied habitat for the species. I have conducted extensive trapping from westward of Sanderson Avenue upstream to nearby and downstream from the Lake Park Drive Bridge and captured no SBKR.

Nocturnal and diurnal off-road vehicle activity is common in several sections of the San Jacinto River floodplain, and the effect of this activity is to eliminate SBKR presence. This can result in occasional scattered small islands of undisturbed habitat, or the lateral portions of the drainage, as potential habitat for the species. Where the river is particularly narrow, and/or the edge of the river system consists of steep vertical walls and or a cement berm, lateral habitats either do not exist or are unsuitable for the species, or are so narrow as to be extremely vulnerable to disturbance. Several areas immediately outside of the main flood channel were trapped and SBKR were not captured. Lands outside of the floodplain are generally limited in area or are heavily disturbed, and these cannot be expected to provide habitat for SBKR over the longer term. Development in recent years has eliminated areas of occupied habitat in this drainage, and future developments are very likely to continue to require more acreage in the floodplain that is occupied by or could be occupied by SBKR.

Related Information of Importance

The three populations of SBKR mentioned above are isolated from each other by topography and development. Thus, each now exists as an independent population that is naturally smaller than the overall species population; each is, therefore, more vulnerable to extirpation than if they were connected as a whole. This species inhabits low-lying alluvial systems that are generally vulnerable to the effects of flooding. During drier periods the animal can recolonize flooded sandy habitat areas and expand its distribution. However, animals inhabiting such low-lying habitat areas are then vulnerable to being eliminated during floods. This dynamic cycle of flooding, recolonization and extirpation of the species in the main lower floodplains creates a vulnerable condition for the long-term survival of local populations and potentially the species in general. To offset this vulnerability, it is important to ensure that sufficient areas are preserved that will encompass the entirety of the dynamic cycle of flooding/colonization/extirpation described above. Thus, when combined with the negative effects of various types of development in and adjacent to floodplains, the animal is at long-term risk of population declines and potential local extirpations, as well as a worst-case scenario of eventual species extinction in one or more alluvial systems.

Statistics contained in the CDFW report to the Fish and Game Commission (2019) summarize well the serious declining situation for SBKR. The areas of suitable habitat for this species have declined, the

areas of unsuitable habitat have increased, and there can be no doubt that the area of habitat occupied by SBKR has correspondingly declined. In addition, development is proposed for portions of the remaining habitat areas. The reduction and fragmentation of remaining occupied and suitable habitat areas, and the potential advent of unexpected catastrophic environmental effects, are the most likely factors that will lead to the demise of this species. Clearly, the actions of the USFWS have failed to create a positive outlook for this species since the listing of the species 20 years ago, and continuing to follow the existing path of the gradual loss of higher quality occupied and suitable habitats in the three remaining habitat areas harboring this species threatens the long-term survival of SBKR.

As stated in the CDFW document (2019), "the state's "fully mitigate" standard for species protection is much stronger than the operative standards of federal Section 7 consultations". And this stronger stance for project mitigation is clearly needed to promote and institute protections and actions that can lead to a more secure future for this endangered kangaroo rat. We cannot allow continued development within and adjacent to our major floodplains that harbor SBKR, without some method of preserving lands that are ultimately critical to the survival of the species. Listing SBKR as a California endangered species should facilitate the strengthening of public policy toward this end, as well as contribute to a united federal and state range-wide approach to (a) evaluating the effects of proposed development projects on this species, (b) preserving occupied and potentially important habitats critical to its long-term survival, and (c) developing conservation strategies designed to better understand the habitat use patterns and potentials for expanding the distribution of SBKR across areas of apparently suitable but unoccupied habitat areas.

A recent translocation project that moved 366 SBKR from a site in Redland (Riverside County) into an unoccupied release site in the southwest portion of Muscoy (San Bernardino County) has proven to be partially successful over a period of 2 years (Montgomery 2019). This location was not occupied by SBKR prior to the translocation effort. A trapping-confirmed population of 127 individuals (39%) was present after two months post-release, 66 individuals (20%) were present after 10 months, 59 individuals (18%) were present after 17 months, and 35 individuals were present 24 months after the release time. Nonetheless, the numbers of individuals of the species remaining at the release site have progressively declined and the ultimate longer-term fate of this translocation effort remains to be determined. The release site for this study is on a bench high above the main floodplain where the typical periodic flooding that can rejuvenate alluvial scrub habitat conditions will never occur. Nonetheless, habitat conditions in a portion of this release area continue to be generally suitable for the species, and it will be interesting to see if the presently established population of SBKR persists over time.

Another SBKR translocation study by Wang and Shier (2017) translocated a total of 60 individuals to an apparently suitable habitat area outside of the San Jacinto River floodplain near Valle Vista, Riverside County. This translocation effort resulted in the short-term (approximately 3-month) survival rate of 25% of the released individuals after 3 months, a 1.7% survival rate after one year and no post-release survivals in years 2-5. The conclusions of this study suggested that habitat conditions at the release site may have been the primary reason for the failure of that translocation effort.

These studies suggest that the use of translocation remains investigational. As a standard method of offsetting or compensating for habitat loss, it may be unwise, and in some cases of little or no ultimate value to the species, while simply allowing for or justifying the loss of currently occupied habitat to development projects. Determining the fine details of the reasons why translocation efforts fail or succeed will be important to clarify, if this methodology is to be used more broadly to save animals from being eliminated at approved development sites. It will be equally important to refine our knowledge of

the subtleties of habitat use and preference by SBKR, so that projects designed to expand the distribution of the species into presently unused habitats are successful. Otherwise, unsuccessful translocation efforts and the preservation of habitat areas that are ultimately unsuitable for the species will continue the gradual decrease of occupied habitat for SBKR over time.

Conclusion

Based on my decades of experience with and study of the SBKR, advancement to candidacy and ultimate listing is clearly warranted for this species. This is due to the already perilous status of the species, ongoing threats, and the many challenges, as described above, to be surmounted if it is to stabilize and recover.

I appreciate the opportunity to comment, and please let me know if you have any questions about the information presented above.

Sincerely,

Stephen J. Montgomery

2128 N. Cobblestone Circle
Flagstaff, AZ 86001
(858) 232–9602
steve@sjmbio.com

Literature Cited

California Department of Fish and Wildlife. 2019. Evaluation of a petition from the Endangered Habitats League to list the San Bernardino kangaroo rat as endangered under the California Endangered Species Act.

Montgomery, S.J. 2019. Results of a translocation project for the Diversified Pacific Judson Ranch project in Redlands, California. Prepared for Diversified Pacific Development Co. Rancho Cucamonga, California.

Montgomery, S.J. 2018. Report of a 2017 trapping survey for San Bernardino kangaroo rats at 28 study plots located in the Cajon Creek Conservation management Area, San Bernardino, California. Prepared for Vulcan Materials, Glendale, California.

Montgomery, S.J. 2013. Results of a 2012 small mammal live-trapping survey for San Bernardino kangaroo rats and Los Angeles pocket mice in the proposed San Jacinto River Stage 4 Levee Project Area, Riverside County, California. Prepared for the City of San Jacinto and Best Best & Krieger, Ontario, California.

Montgomery, S.J. 2010. Results of trapping surveys for San Bernardino kangaroo rats and Los Angeles pocket mice at the Horseshow Grande Fee to Trust Project Area, Riverside County, California. Prepared for ENTRIX, Inc. Portland, Oregon.

Montgomery, S.J. 2019. Results of 2008 live-trapping studies for the federally endangered San Bernardino kangaroo rat (*Dipodomys merriami parvus*) for the Department of Water Resources East Branch Extension Project. Prepared for ESA, Los Angeles, California.

Root, B. 2010. 2005-2009 San Bernardino kangaroo rat survey analyses from the Woolly Star Preserve Area, San Bernardino County, California. Prepared for U.S. Army Corp of Engineers, Los Angeles, California. Prepared by U.S. Fish and Wildlife Service, Carlsbad Office.

Wang, T. and D. Shier. 2017. Translocation of the endangered San Bernardino kangaroo rat (Dipodomys merriami parvus). San Diego Zoo Institute for Conservation Research and Recovery Ecology, Zoological Society of San Diego.

Stephen Montgomery

Principal Biologist

Mr. Montgomery is a wildlife biologist with more than 40 years of experience conducting field habitat assessment and trapping surveys for numerous wildlife species in the Western United States. During that time he has completed over 1000 field studies and associated reports with a diverse mixture of methodologies, objectives and requirements. He specializes in designing, coordinating/directing and conducting large and complex field surveys for sensitive small mammal species, including the federally listed (endangered) Stephens' and San Bernardino kangaroo rats (SKR/SBKR), Pacific pocket mice, and Amargosa vole. He is considered a primary expert on the ecology of the SKR and SBKR, and has a strong working relationship with USFWS biologists overseeing the conservation of these species. He also has conducted numerous field studies of various California listed sensitive species, including: Mohave ground squirrels, Palm Springs round-tailed ground squirrels, Palm Springs and Los Angeles little pocket mice, San Diego pocket mice, southern California salt marsh shrew, and others. He is permitted to conduct field surveys of the federally listed (threatened) California gnatcatcher and endangered Yuma Ridgway's rail (YRR). He has conducted numerous breeding bird censuses and protocol surveys for burrowing owls and raptors, as well as foraging surveys for the listed federally listed (endangered) least tern in San Diego Bay. He conducted long-term field telemetry studies of the Ridgway's rail at the California Department of Fish and Wildlife Imperial Wildlife Area (IWA) at the Salton Sea in southeastern California, which were designed to assess the potential impacts of geothermal drilling activities on this species. During the same period he conducted long-term periodic censuses of water birds in the extensive ponds at the IWA. He also has conducted YRR surveys in numerous locations throughout southeast California. Mr. Montgomery's experience includes numerous translocation studies for Stephens' and San Bernardino kangaroo rats, and a status review of the Amargosa vole for CDFW. He also has extensive experience in biological monitoring and working with construction crews to avoid project-related impacts to sensitive biological resources. Throughout his career, he has worked with a variety of government, resource agency, university, and private and public clients.

Education

Utah State University, M.S., Biology/Ecology
Utah State University, B.S., Wildlife Biology

Registrations, Certifications, Permits and Affiliations

U.S. Fish and Wildlife Service Permit to trap, tag and handle:

- Pacific Pocket Mouse (TE745541-10)
- Stephens' Kangaroo Rat (TE745541-10)
- San Bernardino Kangaroo Rat (TE745541-10) $
- Yuma Clapper (Ridgway's) Rail (TE745541-10)
- Amargosa Vole (TE745541-10)

California Department of Fish and Wildlife Memorandum of Understanding to trap, handle and relocate: $

- Stephens' Kangaroo Rat
- Pacific Pocket Mouse
- San Bernardino Kangaroo Rat
- Mohave Ground Squirrel
- Palm Springs Little Pocket Mouse
- Hispid Cotton Rat
- Palm Springs Round-tailed Ground Squirrel

Representative Experience

San Bernardino Kangaroo Rat Translocation Project for the Judson Ranch project in Redlands – Diversified Pacific Development Company. Included trapping, housing of a population of SBKR residing in Redlands, California, and the relocation of the population to a system of artificial burrows in alluvial fan sage scrub habitats in the Cajon Creek Habitat Conservation Management Area, San Bernardino County

Habitat Assessments and Trapping Surveys for the federally listed (endangered) San Bernardino and Stephens' kangaroo rat, Los Angeles pocket mouse and California threatened Mohave ground squirrel for the 65-mile-long Southern California Gas Company North-South Project, Riverside and San Bernardino Counties.

Principal consultant and primary field biologist for SBKR field studies (translocation, presence/absence/density), habitat analyses, and monitoring tasks for SBKR for the Department of Water Resources (DWR) East Branch Extension (EBX II) project in the Santa Ana River and Mill Creek areas

Team Member in Developing Methodology and Principal Investigator for live-trapping studies for Long-term Monitoring, as well as Habitat Modification studies, of the federally listed (endangered) San Bernardino kangaroo rat in the Santa Ana River Woolly Star Preserve (Part of Multi-Species Habitat Conservation Plan), including flood-based and mechanical-based treatments along Plunge Creek.

Conducted habitat assessment and trapping surveys for the federally listed (endangered) San Bernardino kangaroo rat at the San Bernardino County Flood Control District groundwater recharge basins at Day Creek and Devil's Canyon, San Bernardino County.

Conducted field habitat assessments and trapping surveys for the federally listed (endangered) San Bernardino kangaroo rat and California Sensitive Los Angeles pocket mouse for the Southern California Edison (SCE) Falcon Ridge project in San Bernardino County.

Conducted SBKR and LAPM field studies and analyses of conservation issues associated with the City of San Jacinto/Riverside County Flood Control San Jacinto River Stage 4 Levee project in San Jacinto – City of San Jacinto, Albert Webb Associates and Best, Best, and Krieger.

Conducted long-term monitoring for Mohave ground squirrels at the Los Angeles Department of Water and Power Beacon Compliance Project Site in California City – AECOM (2013-2016).

Conducted Stephens' kangaroo rat habitat and trapping surveys at the 2525-acre Warner Springs Ranch Resort Property (WSR) in eastern San Diego County – Merkel and Associates (2013).

Conducted field studies and conservation issues analyses for SKR and LAPM for the proposed Department of Water Resources (DWR) Lake Perris Dam repair project. Also conducted SKR translocation program for the Dam Repair Implementation Project.

Developed and Conducted Station-wide Stephens' kangaroo rat annual monitoring and habitat mapping studies at Fallbrook Naval Weapons Station.

Wayne D. Spencer, Ph.D.

136 SW Washington Ave.,
Suite 202
Corvallis, OR 97333
541-757-0687
wdspencer@consbio.org

Local contact:

815 Madison Ave.
San Diego, CA 92116
619-296-0164

July 18, 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

RE: Support for Petition to list the San Bernardino kangaroo rat as Endangered in California

Dear President Sklar and Members of the Commission:

I am a wildlife conservation biologist with over 30 years of professional experience in biological research and conservation planning. I specialize in the practical application of science to resources management, design of nature reserves, and recovery of endangered species, with particular focus on rare and endangered mammals, including rare forest carnivores (e.g., martens and fishers) and endangered rodents (e.g., Pacific pocket mouse and Stephens' kangaroo rat). I have prepared numerous large-scale conservation efforts throughout California, including habitat conservation plans (HCPs), habitat management plans (HMPs), and natural community conservation plans (NCCPs). I have also led various state-wide conservation planning efforts for the State of California, including the California Essential Habitat Connectivity Project. Because I have both research and real-world conservation planning experience, I am often asked to lead science advisory processes for regional conservation and recovery plans, such as the California Desert Renewable Energy Conservation Plan, the Sacramento-San Joaquin Bay Delta Conservation Plan, and various county-wide NCCP/HCPs.

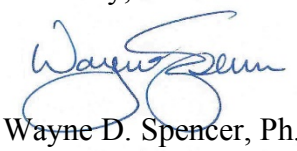
I am writing to reiterate my support for the petition to list the San Bernardino kangaroo rat (Dipodomys merriami parvus; SBKR) as a California Endangered Species. The following important points are further described in the petition:

- SBKR has experienced dramatic habitat loss. Once estimated to range across 325,000 acres of Southern California, the U.S. Fish and Wildlife Service (USFWS) estimated in 2018 that only 16,300 acres of habitat, not all of it occupied, still functioned for SBKR. The petitioners independently estimated the loss of 11,000 acres or 30% of potential habitat (based on land cover characteristics) since listing by the USFWS in 1998.

- The USFWS estimates six known populations of SBKR have been extirpated since federal listing in 1998, leaving only three remaining populations: Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River. Thus, SBKR has already been extirpated from the vast majority of its historical range.
- Each of the three remaining populations is genetically unique, reflecting their relatively recent isolation from each other. In addition, recent genetic studies show that each population has an Effective Population Size an order of magnitude below targets for maintaining genetic diversity.
- SBKR is restricted to alluvial fan sage scrub habitat, which requires periodic fluvial disturbance (sediment deposition, movement, and erosion by water flows and flooding) to maintain suitability for the species. However, fluvial processes have been lost or modified in much of the remaining SBKR habitat, including the entire Santa Ana River habitat block, which has been altered by construction of Seven Oaks Dam. The USFWS has failed under its consultative process to implement remedial measures, and State oversight is urgently needed.
- Lytle Creek/Cajon Wash has the largest area of remaining habitat of the three remaining populations, and given the higher effective population size of the Lytle Creek/Cajon Wash population and the long-term effects of Seven Oaks Dam on the Santa Ana River population, its conservation and management are critical to the species' recovery. Yet, the Lytle Creek/Cajon Wash population is threatened by proposed development that would further eliminate occupied SBKR habitat and critical genetic resources. Essential upland refugia would be eliminated, without viable replacement.
- Federal regulation continues to repeat past mistakes by allowing ongoing and severe habitat loss of SBKR habitat with the empty justification of mitigation measures that have failed (e.g., translocation), or are unproven (e.g., restoration). Each federal regulatory project approval has allowed additional SBKR habitat to be lost, thereby enabling the continued downward trend in its status.
- Federal Endangered Species Act (ESA) protections have not halted the decline of SBKR, and the tools currently available to the State to conserve and manage the species (Streambed Alteration Agreements, advisory comments during the CEQA process, and Section 401 Clean Water Act permits) are limited in scope or have proven ineffective. California Endangered Species Act protections are well-suited to aid in the conservation and recovery of SBKR.

In closing, the status of San Bernardino kangaroo rat, a taxon endemic to California, is clearly poor and has continued to decline since receiving ESA protections over 20 years ago. California Endangered Species Act protection would provide the California Department of Fish and Wildlife an essential tool for conserving and recovering this taxon. I strongly support the petition recommendation to list San Bernardino kangaroo rat as an Endangered Species in California.

Sincerely,



Wayne D. Spencer, Ph.D.
Chief Scientist, Conservation Biology Institute

Wayne D. Spencer, Ph.D.

Conservation Biology Institute
136 SW Washington Ave., Suite 202
Corvallis, OR 97333
Ph. 541-757-0687
consbio.org
wdspencer@consbio.org

Local Contact:
815 Madison Ave
San Diego, CA 92116
Ph. 619-296-0164

Dr. Spencer is a wildlife conservation biologist with over 30 years of professional experience in biological research and conservation planning. He specializes in the practical application of science to resources management, design of nature reserves, and recovery of endangered species. He has conducted numerous studies on rare and sensitive mammals, with particular focus on forest carnivores (e.g., martens and fishers) and endangered rodents (e.g., Pacific pocket mouse and Stephens' kangaroo rat). He also provides scientific guidance for efforts to conserve habitat connectivity, such as the South Coast Missing Linkages Project and the California Essential Habitat Connectivity Project. In the past Dr. Spencer prepared habitat conservation plans (HCPs), habitat management plans (HMPs), and natural community conservation plans (NCCPs) for numerous sensitive species in California, including the first NCCP plan ever permitted (Poway Subarea NCCP/HCP). Because he has both research and real-world conservation planning experience, Dr. Spencer is often asked to lead science advisory processes for regional conservation and recovery plans, such as the California Desert Renewable Energy Conservation Plan and the Sacramento-San Joaquin Bay Delta Conservation Plan.

EDUCATION

Ph.D., Ecology and Evolutionary Biology, University of Arizona. 1992. Highest Honors.

M.S., Forestry and Resource Management/Wildlife Ecology. University of California, Berkeley. 1981. Honors.

B.S., Biology and Wildlife Management (double major). University of Wisconsin, Stevens Point. 1978. Highest Honors.

RECENT AWARDS

2011 Special Recognition Award, Desert Tortoise Council
2011 Special Contributions Award, Desert Tortoise Preserve Committee

2008 Conservationist of the Year Award, Western Section of The Wildlife Society

SELECT PROJECT EXPERIENCE

Southern Sierra Nevada Fisher Conservation Strategy - Sierra Nevada Conservancy, US Forest Service, and US Fish and Wildlife Service. Dr. Spencer serves as Chair of the Fisher Technical Team (FTT), a multi-agency group of experts that guides conservation and management actions for the isolated population of the fisher (Pekania pennanit) in the southern Sierra Nevada. He also served as first author and editor of the fisher Conservation Assessment (Spencer et al. 2015b) and Conservation Strategy (Spencer et al. 2016) for the population, with a focus on restoring more resilient habitat conditions. Dr. Spencer coordinated and managed a wide array of analytical tasks, including habitat quality and connectivity modeling, population modeling, and vegetation change modeling.

Science Facilitator and Lead Advisor for Regional Conservation Plans- Numerous Agencies. Dr. Spencer has served as science facilitator and lead science advisor for a wide variety of large-scale HCPs and NCCPs throughout California, including the Desert Renewable Energy Conservation Plan, the Sacramento-San Joaquin Bay Delta Conservation Plan, the Altamont Pass Wind Resource Area Conservation Plan, and NCCP/HCP plans for the counties of Butte, Santa Clara, San Diego, Merced, Yuba, Sutter, and Yolo, and the city of Santa Cruz. These plans cover hundreds of listed and sensitive species in diverse habitats and ecological communities, usually under severe pressures from human development or other threats to biological integrity. The process includes selecting and leading groups of independent science advisors to reach consensus on scientific principles and solutions, reviewing extensive technical information, organizing questions and issues for advisors to address, compiling and editing inputs from the advisors, and usually serving as first author and editor of a science advisory report. The advisory reports serve as foundations for planning ecological reserve systems and developing adaptive management and monitoring plans to sustain biological diversity, native habitats, and the species inhabiting them.

Principle Investigator for California Mammal Species of Special Concern – California Department of Fish and Wildlife. Led a Technical Advisory Committee and other contributors in a comprehensive update of the Mammal Species of Special Concern (MSSC) in California. The team developed and applied a systematic scoring procedure to rank mammal species, subspecies, or distinct

population segments for their relative degree of conservation concern within California. They compiled mammal locality data and other pertinent information concerning the status and distribution of nominee taxa, and prepared species accounts for most species on the final list of MSSC. The results are to be used to update the California Department of Fish and Wildlife list of sensitive taxa.

Principle Investigator for California Essential Habitat Connectivity Project California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration. This project was a highly collaborative effort to identify and characterize areas important to maintaining a functional network of connected wildlands throughout the state of California (Spencer et al. 2010). The project produced three primary products: (1) a statewide Essential Habitat Connectivity Map, (2) a database characterizing areas delineated on the map, and (3) guidance for mitigating the fragmenting effects of roads and for developing and implementing local and regional connectivity plans. The essential connectivity network consists of 850 relatively intact and well-conserved natural landscape blocks larger than 2,000 acres and 192 essential connectivity areas for maintaining wildlife movement and other ecological flows among them. The final report provides detailed guidance for considering ecological connectivity in transportation and land management planning, preparing finer-resolution regional and local connectivity plans and linkage designs, and siting and creating road-crossing improvements for wildlife to improve ecological connectivity and reduce vehicle-wildlife collisions. All products were produced using cutting-edge GIS modeling methods in a highly collaborative, transparent, and repeatable process that could be emulated by other states. The project received the 2011 Exemplary Ecosystem Initiative Award from the Federal Highways Administration.

Lead Scientist for Pacific Fisher Baseline Assessment and Cumulative Effects Analysis in the Sierra Nevada, California – US Forest Service, Region 5. Led a comprehensive compilation and analysis of data on the Pacific fisher (Martes [Pekania} pennanti)—which was found to be "warranted but precluded" for endangered species listing in 2004—to assess the species' historic, current, and future habitat and population status in the Sierra Nevada, and especially to assess the cumulative effects of wildfires, fuels management, timber harvest, and other threats to this isolated population. The project included extensive coordination with state, federal, and local agencies and stakeholder groups (e.g., conservation organizations and timber industry representatives), and facilitation of an

independent science advisory body to ensure application of best available science. Cutting-edge spatial-analytical tools were used to forecast changes in fisher habitat and population size under various forest management and fire scenarios, and to forecast resulting effects on population viability. This involved coupling landscape-level models of fire and vegetation dynamics with fisher habitat suitability models and spatially explicit population dynamic models (Spencer et al. 2008, 2011; Syphard et al. 2011, Scheller et al. 2011).

Project Manager/Lead Biologist for Habitat Conservation Plans and Natural Community Conservation Plans – Numerous Agencies. Managed the design, analysis documentation, public involvement, and permitting processes for a variety of regional HCP/NCCPs in California pursuant to the Endangered Species Act and the California NCCP Act, including the following:

- *Poway Subarea HCP/NCCP – City of Poway, California.* The first plan successfully permitted under the NCCP Act of 1991, this wildlife conservation plan was designed to sustain populations of 42 sensitive species in an interconnected habitat network within a 25,000 acre planning area.
- *Multiple Habitat Conservation Program (MHCP) – San Diego Association of Governments (SANDAG).* Managed design and documentation of this HCP/NCCP covering 7 incorporated cities and over 186 square miles in north San Diego County. Oversaw development and use of a comprehensive GIS database to design a biologically defensible plan that balances conservation and economic concerns. Included a public policy development and coordination component to ensure consensus between all pertinent organizations and agencies, as well as economic and financing analyses for plan implementation.
- *City of Carlsbad Habitat Management Plan (HMP).* Helped the City of Carlsbad complete a citywide HMP that also serves as a multiple species HCP/NCCP. Met with affected property owners and agencies to negotiate preserve areas within the 25,000-acre planning area; managed biological surveys, GIS analyses, and document preparation. The plan covered nearly 100 sensitive plant and animal species, while preserving reasonable economic growth and private property rights throughout the city.
- *City of Oceanside HCP/NCCP.* Managed preparation of the City's subarea HCP/NCCP, which covered 27,000-acres. Tasks included managing field

surveys, GIS database development and analyses, public outreach, and plan documentation.

Framework Monitoring Plan for the Channel Island Fox – US Navy and The Nature Conservancy. Served as project manager, science facilitator, and lead author on a project to review existing monitoring data and methods across all populations of the endangered Channel Island fox (*Urocyon littoralis*) and develop statistically robust monitoring methods to address population status, trends, and threats. Working closely with a panel of experts on fox biology, wildlife monitoring, and statistics, the team developed a statistically robust approach to monitoring population status and threats to the San Clemente Island fox (*U. l. clemente*) that met diverse operational and biological goals of the US Navy, which owns and operates San Clemente Island as a live-fire and special-operations training area. Based on this model, we developed a framework monitoring plan that could also be used on the other 5 islands supporting island fox populations (each island supports a unique subspecies and has different ownerships, management issues, and environmental conditions).

Research on Effects of Fire Severity and Distance from Unburned Edge on Mammalian Community Post-fire Recovery- U.S. Forest Service, Joint Fire Science Program, Riverside Fire Lab. Served as Principle Investigator for a 4-year study of how mammal species and communities recovered following the largest wildfire in California in over 100 years (the October 2003 Cedar Fire in San Diego County). Oversaw a crew of field biologists from the San Diego Natural History Museum that sampled mammal communities and vegetation at numerous plots inside and outside the fire perimeter, at varying distances from the edge and in areas of differing fire intensity (Diffendorfer et al. 2012, Schuette et al. 2014).

Pacific Pocket Mouse Studies Program – Transportation Corridor Agencies, U.S. Fish and Wildlife Service, and California Department of Fish and Game. Served as Principal Investigator for studies designed to further recovery of the critically endangered Pacific pocket mouse (*Perognathus longimembris pacificus*). Tasks included studying dispersal characteristics and other pertinent biological information on the species; performing detailed field studies of a surrogate subspecies to perfect field methods and design monitoring programs; determining the feasibility of a translocation or reintroduction program for the species, determining baseline measures of genetic diversity within and between extant

(using live-captured specimens) and historic (using museum specimens) populations and developing genetic goals for the recovery program; and coordinating ongoing monitoring studies at extant population sites to maximize the value of the monitoring data for both scientific and preserve management goals (Spencer 2005).

Stephens' Kangaroo Rat Studies at the Ramona Airport, San Diego County, California – KEA Environmental. Verified a new population of the endangered Stephens' kangaroo rat in the Santa Maria Valley, Ramona California, by trapping and reconnaissance surveys. Mapped the density and extent of this new, southern-most population, and performed GIS habitat modeling to predict other potential habitat throughout the Santa Maria Valley. Prepared a biological technical report and sections of the Biological Assessment for the Ramona Airport expansion project. Participated in a Section 7 consultation and prepared a Habitat Management Plan for the Stephens' kangaroo rat on the airport property. Prepared and oversaw implementation of a translocation program to salvage kangaroo rats prior to construction, house them in captivity, release them to release sites in improved habitat areas, and monitor success of the translocated population and the overall population in the area for several years.

Basewide Survey for Pacific Pocket Mouse – U.S. Marine Corps Base Camp Pendleton. Managed an intensive field survey to determine the distribution of the endangered Pacific pocket mouse on base. Developed detailed survey protocols in consultation with other mammalogists and the USFWS. Coordinated a team of 15 biologists performing reconnaissance and trapping surveys over all previously unsurveyed habitat for the species on base (over 6,000 acres). Managed development of a GIS database that summarizes all data for the species on base, including results of previous surveys. Analyzed habitat relationships of PPM using GIS and statistical models.

Studies on the Community Ecology of the Chihuahuan Desert – National Science Foundation. Studied the community ecology of desert rodents with Dr. James H. Brown, University of Arizona. Captured, identified, measured, and marked individuals of 15 species of rodents, including three species of kangaroo rats and three species of pocket mice, in over 20,000 trapnights in the Chihuahuan and Sonoran deserts. Trapped, marked, measured, and radio-tracked various species of kangaroo rats with Dr. Peter Waser, Purdue University, for a study of kangaroo rat

behavior and ecology. Studied effects of foraging by javelina on native plant species. Performed microhabitat analyses and censuses and intensive foraging studies on wintering sparrow flocks while studying ecological interactions between desert rodents, birds, and ants in the Chihuahuan Desert (Thompson et al. 1991).

Pine Marten Ecology Studies in the Pacific States – U.S. Forest Service. Studied the ecology and behavior of pine martens in the Sierra Nevada and Cascade mountain ranges using trapping, radio-tracking, snow-tracking, smoked track-plate plots, and intensive habitat analyses (Spencer 1981; Spencer 1982; Spencer et al. 1983; Spencer and Zielinski 1983; Zielinski et al. 1983; Spencer 1987).

Studies of Space-use Patterns, Behavior, and Brain Evolution in Heteromyid Rodents – National Science Foundation and National Institute of Health. Researched space use patterns, memory, navigation, and spatial cognition in various species of kangaroo rats, pocket mice, and grasshopper mice (Spencer 1992). Collaborated with Dr. Lucia Jacobs on the evolution of spatial cognition and the hippocampus of the brain in kangaroo rats and pocket mice (Jacobs and Spencer 1991, 1994).

Mount Baker Geothermal Energy Development Biological Resources Assessment – Seattle City Light and Power Company. Led a team that studied the impacts of geothermal energy development on sensitive wildlife in old-growth forests on Mount Baker, Washington. Radio-tracked pine martens and performed trapping and other surveys for various rare carnivore species, including lynx, fisher, and wolverine. Coordinated with biologists studying northern spotted owls and mountain goats.

Assessment of Impacts of Free-roaming House Cats on Native Wildlife Populations at Saguaro National Monument and Tucson Mountain Parks – National Park Service, Western Region. Performed a study involving the impacts of free-roaming house cats on wildlife populations for the design of buffers around nature preserves in Arizona. Radio-tracked 14 free-roaming house cats and analyzed their movements, food habits, home ranges, and behaviors.

PROFESSIONAL MEMBERSHIPS AND CERTIFICATES

Society for Conservation Biology
Association for Fire Ecology

American Institute of Biological Sciences
The Wildlife Society
American Society of Mammalogists
Society of American Naturalists
Sigma Xi Honor Society

PUBLICATIONS

Tremor, S., D. Stokes, W. Spencer, J. Diffendorfer, H. Thomas, S. Chivers, and P. Unitt, editors. 2017. San Diego County Mammal Atlas. Proceedings of the San Diego Society of Natural History 46.

Powell, R. A., Facka, A. N., Gabriel, M. W., Gilbert, J. H., Higley, J. M., LaPoint, S., McCann, N. P., Spencer, W., and Thompson, C. M. In Press. The fisher as a model organism. Chapter 11 In: Biology and Conservation of Musteloids. Edited by D.W. Macdonald, C. Newman, and L.A. Harrington. Oxford University Press (2017). © Oxford University Press. DOI 10.1093/oso/9780198759805.003.0011

Spencer, W.D., S.C. Sawyer, H.L. Romsos, W.J. Zielinski, C.M. Thompson, and S.A. Britting. 2016. Southern Sierra Nevada fisher conservation strategy. Version 1.0. Unpublished report produced by Conservation Biology Institute.

Spencer, W.D, H. Rustigian-Romsos, K. Ferschweiler, and D. Bachelet. 2015a. Simulating effects of climate and vegetation change on distributions of martens and fishers in the Sierra Nevada, California, using Maxent and MC1. Pp. 135-149 In: D. Bachelet and D. Turner, eds. Global vegetation dynamics: concepts and applications in the MCI model. Geographical Monograph 214, First Edition. John Wiley & Sons.

Spencer, W.D., S.C. Sawyer, H.L. Romsos, W.J. Zielinski, R.A. Sweitzer, C.M. Thompson, K.L. Purcell, D.L. Clifford, L. Cline, H.D. Safford, S.A. Britting, and J.M. Tucker. 2015b. Southern Sierra Nevada fisher conservation assessment. Unpublished report produced by Conservation Biology Institute.

Zielinski, W.J., K.M. Moriarty, J. Baldwin, T.A. Kirk, K.M. Slauson, H.L. Rustigian-Romsos, and W.D. Spencer. 2015. Effects of season on occupancy and implications for habitat modeling: the Pacific marten *Martes caurina*. Wildlife Biology 21:56-67.

Schuette, P.A., J.E. Diffendorfer, D.H. Deutschman, S. Tremor, and W. Spencer. 2014. Carnivore distributions across chaparral habitats exposed to wildfire

and rural housing in southern California. International Journal of Wildland Fire 23:591-600.

Spencer, W.D. 2012. Home ranges and the value of spatial information. Journal of Mammalogy 93:929-947.

Scheller, R.M., W.D. Spencer, H. Rustigian-Romsos, A.D. Syphard, B.C. Ward, and J.R. Strittholt. 2011. Using stochastic simulation to evaluate competing risks of wildfires and fuels management on an isolated forest carnivore. Landscape Ecology 26:1491-1504.

Beier, P., W. Spencer, R. Baldwin, and B. McRae. 2011. Toward best practices for developing regional connectivity maps. Conservation Biology 25:879-892.

Diffendorfer, J., G.M. Fleming, S. Tremor, W. Spencer, and J.L. Beyers. 2012. The role of fire severity, distance from fire perimeter and vegetation on post-fire recovery of small-mammal communities in chaparral. International Journal of Wildland Fire. http://dx.doi.org/10.1071/WF10060.

Carroll, C., W. Spencer, and J. Lewis. 2012. Use of habitat and viability models in Martes conservation and restoration. Pages 429-450 In: K. Aubry, W. Zielinski, M. Raphael, G. Proulx, and S. Buskirk, eds. Biology and Conservation of Martens, Sables, and Fishers: A New Synthesis. Cornell University Press.

Syphard, A.D., R.M. Scheller, B.C. Ward, W.D. Spencer, and J.R. Strittholt. 2011. Simulating landscape-scale effects of fuels treatments in the Sierra Nevada, California, USA. International Journal of Wildland Fire 20:364-383.

Spencer, W., H. Rustigian-Romsos, J. Strittholt, R. Scheller, W. Zielinski, and R. Truex. 2011. Using occupancy and population models to assess habitat conservation opportunities for an isolated carnivore population. Biological Conservation 144:788-803. DOI 10.1016/j.biocon.2010.10.027.

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration. February 2010.

Spencer, W.D., H.L. Rustigian, R.M. Scheller, A. Syphard, J. Strittholt, and B. Ward. 2008. Baseline evaluation of fisher habitat and population status, and effects of fires and fuels management on fishers in the southern Sierra Nevada.

Unpublished report prepared for USDA Forest Service, Pacific Southwest Region. June 2008. 133 pp + appendices.

Beier, P., D.R. Majka, and W.D. Spencer. 2008. Forks in the road: Choices in GIS procedures for designing wildland linkages. Conservation Biology 22:836-851.

Beier, P., K. Penrod, C. Luke, W. Spencer, and C. Cabanero. 2006. South Coast Missing Linkages: restoring connectivity to wildlands in the largest metropolitan area in the United States. Pages 555-586 in: K. Crooks and M. Sanjayan, eds. Connectivity Conservation. Cambridge University Press.

Penrod, K., C.R. Cabanero, P. Beier, C. Luke, W. Spencer, E. Rubin, and C. Paulman. 2008. A linkage design for the Joshua Tree-Twentynone Palms connection. South Coast Wildlands, Fair Oaks, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, E. Rubin, R. Sauvajot, S. Riley, and D. Kamradt. 2006. South Coast Missing Linkages Project: A Linkage Design for the Santa Monica-Sierra Madre Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2006. South Coast Missing Linkages Project: A Linkage Design for the San Bernardino-San Jacinto Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2006. South Coast Missing Linkages Project: A Linkage Design for the Palomar-San Jacinto/Santa Rosa Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2006. South Coast Missing Linkages Project: A Linkage Design for the Peninsular-Borrego Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Spencer, W.D. 2005. Recovery research for the endangered Pacific pocket mouse: An overview of collaborative studies. In B.E. Kus and J.L. Beyers, technical coordinators. Planning for Biodiversity: Bringing Research and Management Together: Proceedings of a Symposium for the South Coast Ecoregion. Gen. Tech. Rep. PSW-GTR-195. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, Albany, CA: 274pp.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2005. South Coast Missing Linkages Project: A Linkage Design for the San Bernardino-Granite Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2005. South Coast Missing Linkages Project: A Linkage Design for the San Bernardino-Little San Bernardino Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2005. South Coast Missing Linkages Project: A Linkage Design for the Sierra Madre-Castaic Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, E. Rubin, S. Loe, and K. Meyer. 2004. South Coast Missing Linkages Project: A Linkage Design for the San Gabriel-San Bernardino Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2004. South Coast Missing Linkages Project: A Linkage Design for the San Gabriel-Castaic Connection. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org.

Luke, C., K. Penrod, C.R. Cabanero, P. Beier, and W. Spencer. 2004. A Linkage Design for the Santa Ana – Palomar Mountain Connection: one of the South Coast's 15 Missing Linkages. Unpublished report. San Diego State University Field Station Programs, San Diego, California. www.fs.sdsu.edu

Penrod, K., C. Cabanero, C. Luke, P. Beier, W. Spencer, and E. Rubin. 2003. South Coast Missing Linkages Project: A Linkage Design for the Tehachapi Connection. South Coast Wildlands Project, Idyllwild, CA. www.scwildlands.org.

Swei, A., P.V. Brylski, W.D. Spencer, S.C. Dodd, and J.L. Patton. 2003. Hierarchical genetic structure in fragmented populations of the little pocket mouse (*Perognathus longimembris*). Conservation Genetics 4:501-514.

Spencer, W.D., M.D. White, and J.A. Stallcup. 2001. On the global and regional ecological significance of southern Orange County: conservation priorities for a biodiversity hotspot. Unpublished peer-reviewed report. Prepared for Endangered Habitats League. 44pp.

Jacobs, L.F., and W.D. Spencer. 1994. Space-use patterns and the evolution of hippocampal size in rodents. Brain, Behavior, and Evolution 44:125-132.

Spencer, W.D. 1992. Space in the lives of vertebrates: On the ecology and psychology of space use. Ph.D. dissertation. University of Arizona. 131pp.

Thompson, D.D., J.H. Brown, and W.D. Spencer. 1991. Indirect facilitation of granivorous birds by desert rodents: Experimental evidence from foraging patterns. Ecology 72:852-863.

Jacobs, L.F., and W.D. Spencer. 1991. Patterns of natural spatial behavior predict hippocampal size in kangaroo rats. Soc. Neurosci. Abstr.

Spencer, W.D. 1987. Seasonal rest-site preferences of pine martens in the northern Sierra Nevada. J. Wildl. Manage. 51:616-621.

Spencer, W.D., and R.H. Barrett. 1985. An evaluation of the harmonic mean measure for defining carnivore activity areas. Acta Zool. Fennica 171:255-259.

Spencer, W.D., R.H. Barrett, and W.J. Zielinski. 1983. Marten habitat preferences in the northern Sierra Nevada. J. Wildl. Manage. 47:1181-1186.

Spencer, W.D., and W.J. Zielinski. 1983. Predatory behavior of pine martens. J. Mammal. 64:715-717.

Zielinski, W.J., W.D. Spencer, and R.H. Barrett. 1983. Relationship between food habits and activity patterns of pine martens. J. Mammal. 64:387-396.

Spencer, W.D. 1982. A test of a pine marten habitat suitability index model for the northern Sierra Nevada. U.S. Dep. Agric. For. Serv. Supp. Rep. RO-33. 43pp.

Spencer, W.D. 1981. Pine marten habitat preferences at Sagehen Creek, California. M.S. Thesis, Univ. California, Berkeley. 121pp.

Spencer, W.D. 1978. Habitat changes on easement properties in the Lower Wisconsin River Wildlife Area. Interdep. Rep., Wisconsin Dep. Nat. Resource. 76pp

SELECT PRESENTATIONS

Reconciling habitat quality – resilience "conflicts" for dense forest species. Invited Keynote Address, Western Section of The Wildlife Society Conference, February 2016.

California's Desert Renewable Energy Conservation Plan: A case study in use of independent science advice. Invited Keynote Address at annual conference of Northern California Conservation Planning Partners: Habitat Conservation Planning from Tahoe to the Bay. November 2012.

Planning for ecological connectivity from statewide to local scales. Invited Presentation, Caltrans Biologist Connectivity Training Workshop, Los Angeles, California. October 2011.

Potential effects of large-scale algal biofuels production on wildlife. Invited Presentation to National Academy of Sciences Committee on Sustainable Biofuels Production. August 2011.

Independent science advice for the California Desert Renewable Energy Conservation Plan: Background, Recommendations, and Future Directions. Invited Keynote Address at annual conference of the Desert Tortoise Council, Las Vegas, Nevada. February 2011.

Trends in independent science advice for NCCP/HCPs. Invited presentation at annual conference of the Western Section of The Wildlife Society, Riverside, California. February 2011.

Why mammals use home ranges: The value of spatial information. Invited Special Symposium Presentation, American Society of Mammalogists, Fairbanks, Alaska. June 2009.

Roles for science-based NGOs in wildlife management and conservation. Invited Plenary Talk at annual conference of the Western Section of The Wildlife Society, Redding, California. February 2008.

Managing landscape linkages to conserve desert wildlife during climate change. Invited presentation and panel discussion. The Climate & Deserts Workshop: Adaptive Management of Desert Ecosystems in a Changing Climate. Laughlin, NV, April 2008.

Improving science delivery for regional conservation plans: Lessons from science advisory processes in California. Invited presentation. Society for Conservation Biology, San Jose California, June 2006.

The science advisory process for regional NCCPs and HCPs. Invited presentation, Continuing Legal Education (CLE) workshop on regional conservation planning. San Francisco, California. December 2005.

Bioethical meanderings of a fur trapper to game biologist to ivory tower ecologist to bioslut to NGO conservation scientist convert. Invited talk at Special Session on Ethics in Wildlife Biology, Western Section of The Wildlife Society, February 2003.

Salvage translocation of endangered Stephens' kangaroo rats in a small, satellite population. Society for Conservation Biology, Duluth, Minnesota. 2003.

The role of consultants in conservation science delivery. Invited presentation at Regional Conservation Planning (NCCP/HCP) Workshop. Western Section of the Wildlife Society. Sacramento, California. 2001.

The science component of regional conservation plans. Invited presentation at Regional Conservation Planning (NCCP/HCP) Workshop. Western Section of the Wildlife Society. Sacramento, California. 2001.

Designing a translocation program to recover the critically endangered Pacific pocket mouse (*Perognathus longimembris pacificus*). American Society of Mammalogists. Missoula, Montana. 2001.

Status of mammals in near coastal habitats, with emphasis on the endangered Pacific pocket mouse. Invited Symposium Presentation. Planning for Biodiversity: Bringing Research and Management Together. Pamona, California. 2000.

U.S.-Mexican cooperation in the conservation of rare mammals: Workshop Introduction. International Theriological Congress IV. Acapulco, Mexico. 1997.

Does the extremely endangered pacific little pocket mouse exist in Baja, California, Mexico? International Theriological Congress IV. Acapulco, Mexico. 1997.

Linkage planning under severe constraints: gnatcatchers and the Oceanside stepping-stone hypothesis. Interface Between Ecology and Land Development in California. J.E. Keeley, ed. Southern Calif. Acad. Sci., Los Angeles. 1997.

Threatened and endangered species of California: a regional overview. CLE International Conference on the Endangered Species Act. San Diego, California. 1995.

Impacts of free-ranging house cats on wildlife at a suburban-desert interface. Society for Conservation Biology. Guadalajara, Mexico. 1994.

Resource dispersion, information, and space-use patterns of vertebrates. Animal Behavior Society. Binghamton, New York. 1990.

Statistical moments for analyses of two-dimensional distributions in ecology. Southwest Association of Biologists. Portal, Arizona. 1988.

Spatial learning and models of foraging movements. Southwestern Association of Biologists. Flagstaff, Arizona. 1987.

Multiple central-place foraging in small carnivores. American Society of Mammalogists. Albuquerque, New Mexico. 1987.

On cognitive maps and the optimal use of home range. Animal Behavior Society. Tucson, Arizona. 1986.

An evaluation of the harmonic mean measure for defining carnivore activity areas. Invited Paper: International Theriological Congress. Helsinki, Finland. 1982.

Selection of resting and foraging sites by *Martes americana*. International Theriological Congress. Helsinki, Finland. 1982.

Rest-site selection by pine martens at Sagehen Creek, California. Western Section of The Wildlife Society. Reno, Nevada. 1981.

Gerald T. Braden
3725 Fallen Oak Dr
Modesto, CA 95355
909.522.0113
gtbraden@verizon.net

19 July 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

RE: Petition to list the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) (SBKR) as an endangered species under the California Endangered Species Act

Dear Mr. Sklar,

On the basis of my long experience as a biologist with first-hand knowledge and expertise regarding this species, I respectfully submit the following comments, which support advancement to candidate status. As background, I have worked with SBKR from prelisting to the present, first for three years as a US Fish and Wildlife Service (USFWS) biologist, next for sixteen years as the research biologist at the San Bernardino County Museum, the remainder as a consultant. In addition to multiple presence absence surveys, I designed and implement a long-term study of SBKR involving three years of repeated multi-year sampling using fifteen 10x10 grids (100 traps) to quantify life history traits as well as edaphic and vegetative characteristics across the full range of occupied SBKR habitat. I've authored several gray literature reports. At their request, I was regularly asked by USFWS, CDFW, San Bernardino County and local jurisdictions to provide expert data base information and advice on SBKR and SBKR habitats. On the basis of my experience I respectfully submit the following comments.

The most recent USFWS evaluation of SBKR reports that since its listing SBKR has been eliminated from seven of ten subpopulation land units leaving three remaining population: Lytle Creek/Cajon Wash, Santa Ana River and San Jacinto River.

Based on recent genetic studies all three remaining subpopulation, now isolated from each other, have distinct genetic signatures but are well below population sizes critical to maintaining genetic diversity and avoiding deleterious inbreeding.

The Santa Ana has been deprived of high flow rejuvenating flood events necessary to maintain SBKR by the construction of the Seven Oaks Dam (SOD) by the Army Corp of Engineers (ACE). Studies by the ACE to-date have been unsuccessful at engineering sustainably occupied SBKR habitat. There have been no rejuvenating flows from the SOD as anticipated in the SOD ACE Biological Assessment, and subsequent USFW Biological Opinion, to mitigate SBKR impacts from the SOD. Recent independent third-party hydrological studies indicate even

with maximum water releases from the SOD the resulting flooding will only be small fraction of high flows needed to renew SBKR habitat.

SBKR populations on the San Jacinto is small and resides almost exclusively between concrete flood control levees leaving no refuge for SBKR during major flood events and little to no chance for recolonization following major flood events.

The Lytle Creek SBKR population is threatened by aggregate mining, borrow pits, past constriction of the channel margins for flood control, and recent modifications of the channel for flood control. As a result, there are increased velocities and sediment scour compared to deposition of SBKR substrate. Recent hydrologic studies indicate refugia in the channel – areas above the 100-yr flood plain necessary for population survival – are currently eroding, even absent a major flood event. The proposed Lytle Creek Ranch development will further invade occupied SBKR habitat and further exacerbate the current hydrology deleterious to this SBKR population.

Large portions of the Cajon Wash are mitigation banks. Management of the banks is progressing slowly but large portions of the mitigation banks are unsuitable for SBKR. Converting unsuitable/unoccupied habitat to suitable and occupied SBKR habitat remains experimental despite the animal being listed since 1998. Despite the established mitigation banks, off-road vehicle use, non-native grass invasions, and occasional flood control activities continue to degrade SBKR habitat both within and outside of the mitigation banks.

USFWS efforts to address the threats to the three remaining subpopulations above have been slow, unorganized, and ineffective. USFWS regularly approves relocation/translocation for mitigation. Translocation/relocation attempts have been largely ineffective and cannot justifiably be used to compensate for the loss of high quality SBKR habitats. USFWS has yet to produce either a recovery plan for SBKR or a comprehensive mitigation/conservation/recovery strategy despite the animal being listed for twenty-two years.

USFWS estimated SBKR once ranged across 325,000 acres. As of 2018, USFWS estimated SBKR to range over 16,300, not all of it suitable. Based upon detailed aerial photography, petitioners estimate the loss of SBKR habitat since the time of listing to be 30% or 11,000 acres. Clearly, USFWS efforts under the Federal Endangered Species Act have not succeeded in stopping the depletion of SBKR habitat.

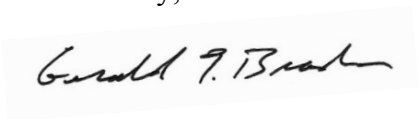
Tools available by the State via CEQA comments, Streambed Alteration Agreements, and Section 401 Clean Water Act permits, are limited in scope and have so far proven ineffective in halting the decline of SBKR and SBKR habitats.

The California Endangered Species Act (CESA) is the best suited avenue to stop the eminent extinction of SBKR. Unlike the USFWS failed attempts to use Section 7 consultations to mitigate and remediate SBKR loss and declines, the CESA standard to fully mitigate protection of SBKR is much stronger and likely to be more successful in conserving the species.

For all the reasons listed above, and based upon my own many decades of personal field experience, SBKR meets the standard for advancement to candidate status and I strongly encourage the Commission to do so.

This concludes my comments on the proposed listing of SBKR. Do not hesitate to contact me with about questions or clarifications. Thank you for your time.

Sincerely,



Gerald T. Braden
Wildlife Ecologist

CURRICULUM VITAE

Gerald T. Braden
P.O. Box 64
5900 Robinoak Drive
Angelus Oaks, California 92305-0064
email-gtbraden@verizon.net (cell 909-522-0113/ hm 909-794-8381)

Education

Bachelors of Arts - Environmental Studies. California State University San Bernardino, California. Graduated with Honors - 10 December, 1981
Bachelors of Arts - Physical Geography. California State University San Bernardino, California. Graduated with Honors - 10 December, 1981
Masters of Science - Biological Sciences. California State Polytechnic University, Pomona, California (CSPUP). Graduated with High Honors - 15 March 1991

Relevant Professional Work Experience

Position: Self employed: Independent Biological Consultant
From: January 2010 **To:** Present

Activities: Surveys of land, shore and water birds, reptiles, amphibians and small mammal communities. Also Desert Tortoise, California Gnatcatcher, Peninsular Bighorn Sheep, San Bernardino Kangaroo Rat, Vireo (Least and Arizona), Clapper Rail (Yuma, Light-footed, Black), Southwestern Willow Flycatcher and Yellow-billed Cuckoo surveys, monitoring, and habitat assessments. Bat surveys and habitat assessments. Fox trapping/relocation. Consultation and document review on threatened/endangered and sensitive species. Project and construction monitoring.

Research Biologist/ Interim Curator; San Bernardino County Museum Biological Sciences Division
From: October 1994 **To:** January 2010

Responsibilities: My primary responsibilities as a research biologist and interim curator were characterized by a high level of independence to design, perform, interpret, publish, and review original, professional, and scientific research using statistical, problem solving, personnel management, budget management, inter-agency coordination, and supervisory skills on a daily basis.

As Research Biologist (1994-2010) I was responsible for the development, implementation and supervision of Contract Field Studies program. The Contract Field Studies Program involved the conception, design, development, implementation, analysis, and reporting on original long-term field studies. Studies pertained to varied aspects of the distribution, life history, biology, and/or ecology of vertebrate taxa of the Southwestern United States and Northern Mexico. The studies involved the application of standard biological survey and sampling methodologies (for all plants and animals), development of new methodologies when warranted, and a strong capacity for independent problem solving and original thought. The studies required a working knowledge of contemporary scientific biological theories and

paradigms.

Many of the contract field studies involve federal and state threatened or endangered species, therefore the studies required a working knowledge, understanding, and application of state and federal environmental laws such as the Endangered Species Act, Clean Water Act, National Environmental Policy Act, Federal Coordination Act, and California Environmental Quality Act.

Contract field studies I was responsible for hiring, training, supervising and evaluating four permanent staff and up to forty-seven seasonal staff in standard scientific survey and data collection techniques, and a variety of population sampling, estimation, area use and persistence models. Duties required the application and interpretation of a broad array of univariate, multivariate, probabilistic and ecological statistics, and the ability to effectively use statistical packages and scientific plotting software, such as SASS, BMDP, SigmaStat, and SigmPlot, in addition to the commonly used spreadsheet and database software.

As interim curator (2003-2010) I was accountable for matters pertaining to the Biological Sciences Division. Responsibilities entail overseeing, augmenting, and maintaining regionally significant research collections of the herpetofauna, small mammals, avifauna, botanical, and invertebrate taxa of the Southwestern United States and northern Mexico. Duties included the collection, preparation, and preservation of specimens and tissues to modern museum standards and practices. Duties also entail developing and maintaining research collaboration and strong working relationships with local universities and museum scientists. Duties also included responding to requests and dissemination of collections information to professional and amateur biologists, resource managers, educators, and the general public.

Duties also included generating and managing a $500,000 annual budget (variable by year). Budget revenue was generated by contract solicitations and grant sources. Duties included hiring and supervising staff, assigning work details, scheduling, and performance evaluations. How many people?

Duties also included interfacing with museum visitors via tours, lectures, exhibit and web module conception, design, and creation. Consultation with other county departments, regulatory agencies, other museums, and academia pertaining to expertise, advice, environmental compliance, and general networking were likewise part of daily activities.

Wildlife Biologist; U. S. Fish and Wildlife Service/Ecological Services
From: May 1991 **To:** October 1994

Responsibilities: The federal wildlife biologist position was characterized by a high level of independence to provide guidance to federal, state, local, and private jurisdictions to facilitate compliance with the Endangered Species Act (ESA), Federal Coordination Act, National Environmental Policy Act, and Clean Water Act. The position was also characterized by a high level of independence to design and implement studies on threatened and endangered species to provide a scientific basis for endangered and threatened species survey protocols as well as management and recovery plans.

Foremost among these studies of threatened and endangered species were long-term life history, habitat/fitness, nest placement, parasitism, detection, and dispersal studies of the

threatened California Gnatcatcher. The results of these studies included three primary literature publications, multiple gray literature reports and the development of the present day U. S. Fish and Wildlife California Gnatcatcher Survey Protocol. Other field studies involved protocol surveys for other listed species including Stephens' Kangaroo Rat, Light-footed Clapper Rail, Southwestern Willow Flycatcher, and Least Bell's Vireo.

In addition to the skills necessary to conceive, implement, and successfully complete scientific research, responsibilities involved developing and maintaining partnerships among the FWS, University of California Riverside, San Bernardino County Museum, Riverside County Parks Department, Metropolitan Water District, and the private sector.

Other duties involving ESA guidance entailed working with jurisdictions to assure project compliance with the ESA and related environmental laws. Most often this involved providing guidance toward obtaining Threatened and Endangers Species take permits (Sections 10(a)1a, 10(a)1b, and 7) and advice on possible non-compliance (Section 9, illegal take) or other potential ESA and Clean Water Act violations. Not infrequently, these duties were performed in a highly charged emotional, often combative arena, which required substantial amounts of tact, diplomacy, creativity, and patience to arrive at constructive resolutions.

Graduate Student; Biological Sciences Department, California State Polytechnic University Pomona.
From: Oct. 1987 **To:** Oct. 1991

Responsibilities: My thesis worked consisted of four years of study on the territory size, habitat use, den characteristics, and seasonal ranges of Black Bears (*Ursus americanus*) in the San Gabriel Mountains of Southern California. The work involved trapping bears by culvert traps and leg snares, administering tranquilizers, attaching radio collars, determining locations and den sites through telemetry, converting telemetry locations to territory and seasonal use-areas using multiple home range algorithms, data analysis, report writing, and professional presentations to scientific organizations and the general public. The work involved long hours alone in remote locations of the San Gabriel Mountains in all types of weather conditions. Because the bear project was on going, duties also included training subsequent graduate students in proper use of traps, snares, and telemetry, sedating wild bears, and home range analyses.

I also trained and assisted graduate students studying habitat use and territory utilization of coyote, raccoon, and opossums along urban-rural interfaces. Duties included the live capture of coyote, raccoons, and opossums and home range/territory delineation for the same taxa using standard home-range algorithms. Independent of my graduate career I also studied age and growth patterns of California Walnut (*Juglans californica*) by analysis of tree ring growth data.

Hydrologist; U.S. Geological Survey
From: ca. March 1981 **To:** October 1987

Responsibilities: The hydrologist position involved the collection, analysis, and reporting of surface flow and ground water data. Duties involved constructing, maintaining, and monitoring surface water gage stations and measuring surface water discharges at remote locations in the deserts, mountains, and coastal valleys of Southern California. These duties required a practical knowledge of standard construction techniques and equipment, surface water flow

characteristics, hydrologic dynamics of current and historic flood events, the effects of varied geologic formations, soil types, and substrates on surface and subsurface flows, and the ability to work effectively under remote, hazardous, and unsupervised conditions under all extremes of weather. Analysis of surface and ground water data required a working knowledge of basic hydrological mathematics and principals. The position was a permanent federal government position with full benefits.

Miscellaneous Work Experience

In no particular order - fire fighter, bookstore clerk, drywall hanger, motorcycle/auto mechanic, water safety instructor, life guard, Iranian house parent, janitor, nightclub (rock and roll) worker, wood cutter, fish hatchery worker, construction worker, finish carpenter, college tutor (science, math, english, philosophy), graduate/teaching assistant, part-time college instructor.

Endangered/threatened species experience

- California Gnatcatcher (*Polioptila californica californica*): Principal investigator on an eight-year study of the life history, habitat affinities, fitness, detection, nest monitoring and dispersal of CAGN in western Riverside. Developed the current FWS CAGN survey protocol. Two years of protocol surveys for the San Bernardino Valley Multi-species Plan. Multiple gray literature reports and three peer reviewed publications in primary ornithological journals. Invited review of FWS population modeling, protocols and policies pertaining to the sub-species.

- Least Bell's Vireo (*Vireo bellii pusillus*): Five years of protocol surveys on the Santa Ana and Mojave Rivers and associated tributaries.

- Arizona Bell's Vireo (*Vireo bellii arizonae*): Five-years of surveys in the Lower Grand Canyon. Three years of surveys, nest monitoring, and habitat study on the Virgin River in Southern Nevada.

- Southwestern Willow Flycatcher (*Empidonax traillii extimus*): Nine years of study of the life history, distribution, habitat affinities, fitness, nest success, detection and dispersal of SWWF along the lower Colorado River and its tributaries. Six years of protocol surveys for the U. S. Forest Service. Multiple gray literature reports. Invited reviewer of FWS regulations, protocols and policies pertaining to the species.

- Yuma Clapper Rail (*Rallus longirostris yumanensis*): Nine years of Yuma Clapper Rail surveys along the Virgin River and its tributaries in Southern Nevada. Multiple gray literature reports. FWS invited reviewer of current YCRA/BLRA survey protocol.

- Light-footed Clapper Rail (*Rallus longirostris levipes*): Two years of presence/absence protocol surveys at the Southern California estuaries.

- Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*): Nine years of Yellow-billed Cuckoo surveys along the Virgin River and associated tributaries in Southern Nevada. Incidental observations on the lower Colorado River (Virgin River south to the Mexican

border, two years). Multiple gray literature reports.

- Stephens' Kangaroo (*Dipodomys stephensi*): Two years of protocol surveys in western Riverside County and Camp Pendleton.

- San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*): Five years of protocol trapping for SBKR for the San Bernardino Valley Multi-species Plan and the U.S. Forest Service. Multiple gray literature reports. FWS invited reviewer of current SBKR survey protocol. FWS invited reviewer of Seven Oaks Dam BA as it pertains to SBKR impacts and mitigation.

- Desert Tortoise *(Gopherus agassizii*): Relocation and radio telemetry study of Desert Tortoise in the west Mojave Desert in the late 1980's. A combined four years of Desert Tortoise surveys in the upper Coachella Valley and the eastern Mojave Desert.

- **FWS Permit # TE-43668A-0**: Authorization for-
  CAGN, SWWF, LBV, LFCL, YCLR; Includes surveys, nest searching, nest monitoring, cowbird egg removal, mist netting, and banding throughout each species' distribution.

  SKR, SBKR; Includes surveys, assessments, live trap and release throughout each species' distribution.

- **FWS Permit # TE-802450-6**: Desert Tortoise: Authorized to handle, move, and attach and remove transmitters throughout the species' distribution.

Professional Memberships

American Association for the Advancement of Science
American Society of Mammalogists
American Society of Ichthyologists and Herpetologists
American Ornithologists' Union
Association of Field Ornithologists
Cooper Ornithological Society
Raptor Research Foundation
Wilson Ornithological Society
Copeia

Activities

S Scientific Reviewer: Reviewer of original scientific studies submitted for publication to primary scientific societies, including The Wilson Bulletin, Journal of Field Ornithology, AUK, Condor, Journal of Wildlife Management, and The Journal of Canadian Zoology.

S Presentation of original ornithological research at American Ornithologist and Cooper Ornithological Societies meetings.

S Invited participant on the Science Consistency Review Panel for the USDA EIS Revised

Land Management Plan for Southern California National Forests: October, 2004.

- **S** Solicited for review, opinion, advice and consultation on the San Bernardino Kangaroo Rat, California Gnatcatcher, Southwestern Willow Flycatcher, and other federally listed or sensitive species and ecosystems of the Southwestern United States. Solicitors included U. S. Fish and Wildlife Service, U. S. Bureau of Reclamation, U. S. Bureau of land Management, U. S. Forest Service, U. S. Park Service, California Department of Fish Game, Nevada Department of Game and Fish, County of San Bernardino, Metropolitan Water District, Endangered Habitats League, Center for Biodiversity, Natural Heritage Institute.

- **S** Invited speaker on original research at specialized symposia such as: CalGnat 1994 at University of California Riverside, Coastal Sage Scrub Symposium 1995 at the San Diego Zoo; Puente Hills Wildlife Corridors and Vanishing Habitats Symposium 1995 at California State University Fullerton 1995; 1999 Annual Convention of Environmental Journalist speaking on "Science and Multispecies Habitat Conservation in Coastal Southern California"; Occasional guest lecturers at the Wildlife Ecology Graduate Student Seminar, California State Polytechnic University Pomona.

- **S** Expert Witness on California Gnatcatcher for the U. S. Department of Justice. DJ File Number 90-8-6-04239, United States of America v Granite Homes, INC.

Current Interests

- **S** Pre-post fire comparisons of small vertebrate communities in Alluvial Fan Sage Scrub.
- **S** Affects of water availability on Desert Riparian Communities.
- **S** Tamarisk and mixed native riparian affects on avian diversity in desert riparian systems.
- **S** Habitat/fitness relationships, dispersal, and community associations of organisms, particularly with regards to endangered/threatened species.
- **S** Any studies pertaining to community and/or species responses to habitat fragmentation and patch size in terrestrial ecosystems.
- **S** Alternative Energy Development affects on biological systems.
- **S** International and domestic travel with an emphasis on ecological systems or indigenous and current cultures.

Book Review

Braden, G. T. 1997. Journal of Wildlife Management 83(3):130-131. Monitoring Bird Populations by Point Counts. C. J. Ralph, J. R. Sauer, and S. Droege. (Eds.) General Technical Report PSW-GTR-149. U. S. Department of Agriculture, iv + 181 pages.

Primary Literature Publications

Braden, G. T. 1999. Does nest placement affect the fate or productivity of California Gnatcatcher nests? Auk 116:984-993.

Braden, G. T., R. L. McKernan, and S. M. Powell. 1997. Effects of nest parasitism by the

brown-headed cowbird on nesting success of the California Gnatcatcher. Condor 99(4): 858-865.

Braden, G. T., R. L. McKernan, and S. M. Powell. 1997. Association of within-territory vegetation characteristics and fitness components of California Gnatcatchers. Auk 114(4): 601-609.

Stubblefield, C. and **G. T. Braden**. 1994. Denning Characteristics of black bears in the San Gabriel Mountains of southern California. Cal. Academy of Sciences 93(1)30-37.

Alexander Sokoloff, R. F. Ferrone, J. D. Chaney, **J. Braden**, and R. J. Munoz. 1987. Linkage studies in *Tribolium castaneum* (Herbst). XII. A revision of linkage group II. Genome 29:26-33.

Selected Gray Literature Reports

Braden, G. T., L. Crew, and A. Miller. 2009. Avian diversity, vegetation composition and vegetation structure of the Las Vegas Wash: 2005 to 2009. San Bernardino County Museum, Biological Sciences Division, 2024 Orange Tree Lane Redlands, CA 92374. Prepared for the Las Vegas Wash Coordination Committee. November 2009. 75 pp.

Braden, G. T., M. Rathbun, T. Hoggan, A. Davenport, and K. Carter. 2009. The Status of Yuma Clapper Rail and Yellow-billed Cuckoo along portions of the Virgin River and Muddy River in Southern Nevada, with incidental observations of Southwestern Willow Flycatcher. 2008. Final. Report prepared for the Southern Nevada Water Authority by the Biological Sciences Division, San Bernardino County Museum, 2024 Orange Tree Lane, Redlands, California 92374. February 2009. 58 pp.

Braden, G. T., K. Carter, M. Rathbun, and T Hoggan. 2009. Occurrence, distribution, and abundance of vertebrate species on the Old Woman Mountains Preserve: 2004-2008. Revised Final. Biological Sciences Division, San Bernardino County Museum, 2024 Orange Tree Lane, Redlands CA 92374. Report to the Native American Lands Conservancy and the 29 Palms Band of Mission Indians. January 2009. 158 pp.

Braden, G. T. and R. L. McKernan. 2006. Status, distribution, life-history, and habitat affinities of the Southwestern Willow Flycatcher along the lower Colorado River, Year 7 – 2002 Final Report-Revised. Report submitted to the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service and U. S. Bureau of Land Management. January 2006.

Braden, G. T., L. Crew, and A. Miller. 2005. Changes in avian breeding season diversity, microclimate, and habitat coincident with changes in surface water in a tamarisk dominated riparian habitat along the Virgin River in southern Nevada. Report submitted to Zane L. Marshall, Southern Nevada Water Authority, Las Vegas Nevada by the Biological Sciences Division, San Bernardino County Museum, Redlands, California.

Braden, G. T. and R. L. McKernan. 2000. A data based survey protocol and quantitative

description of suitable habitat for the endangered San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*). Biology Section, San Bernardino County Museum, Redlands, CA. June, 35 pp.

Braden, G. T. and R. L. McKernan. 1999. Possible effect of low level nest parasitism by the Brown-headed Cowbird (*Molothrus ater*) on the nest success of the Southwestern Willow Flycatcher (*Empidonax traillii extimus*) at sites monitored by the San Bernardino County Museum: A data review, progress report, and power's analysis. Report submitted to the U. S. Bureau of Reclamation, Lower Colorado River Region, Boulder City, Nevada, by the San Bernardino County Museum Biological Sciences Section, Redlands, California. December, 21 pp.

Braden, G. T., and R. L. McKernan. 1998. Nest stages, vocalizations, and survey protocols for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Final Report submitted to the U. S. Bureau of Reclamation, Lower Colorado River Region, Boulder City, Nevada, by the San Bernardino County Museum Biological Sciences Section, Redlands, California. October, 36 pp.

Braden, G. T., and R. L. McKernan. 1998. Observations on nest cycles, vocalization rates, the probability of detection, and survey protocols for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Report submitted to the U. S. Bureau of Reclamation, Lower Colorado River Region, Boulder City, Nevada, by the San Bernardino County Museum Biological Sciences Section, Redlands, California. March, 38 pp.

Braden, G. T. and Stacey L. Love. 1994. Dispersal and non-breeding season habitat use by the Coastal California Gnatcatcher (*Polioptila californica californica*) in western Riverside County. USFWS report to the Metropolitan Water District. 25 pp.

Carter. K. J., **G. T. Braden**, M. Rathbun, and T. Hoggan. 2006. Southwestern Willow Flycatcher, habitat suitability, and amphibian survey results for the San Bernardino National Forest: 2004. Final Report. Submitted to the San Bernardino National Forest by the Biological Sciences Division, San Bernardino County Museum, Redlands, California. January 2006.

Rathbun M., **G. T. Braden**, and K. J. Carter. 2004. Results of Southwestern Willow Flycatcher, Mountain Yellow-legged Frog, California Red-legged Frog, and Arroyo Toad surveys in the San Bernardino National Forest: 2003 Final Report. Report submitted to the San Bernardino National Forest by the Biological Sciences Division, San Bernardino County Museum, Redlands, California.

McKernan, R. L. **G. T. Braden**. 2002. Status, distribution, and habitat affinities of the Southwestern Willow Flycatcher along the lower Colorado River, Year 6 - 2001. Report submitted to the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service and U. S. Bureau of Land Management. May 2002.

McKernan, R. L. and **G. T. Braden**. 2001. Status, distribution, and habitat affinities of the Southwestern Willow Flycatcher along the lower Colorado River, Year 5 - 2000. Report submitted to the U. S. Bureau of Reclamation, U. S. Fish and Wildlife Service and U. S. Bureau of Land Management. May 2002.

References

Susan Wynn Susan_Wynn@r1.fws.gov
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, CA 92011
(760) 431-9440

Arthur Davenport mailto:davenportbio@gmail.com
Davenport Biological Services
P.O. Box 1692
Barstow, CA 92312
(619)-729-4242

Dr. Anthony Metcalf; ametcalf@csusb.edu
California State University
Biological Sciences Department
5500 University Parkway
San Bernardino, CA 92407
(909) 880-7501

Robin Eliason, District Wildlife Biologist; reliason@fs.fed.us
San Bernardino National Forest, Mountaintop Ranger District
Big Bear Ranger Station
P.O. Box 290 (U.S. Mail)
41397 North Shore Drive (UPS/FedEx)
Fawnskin, CA 92333-0290
(909) 382-2832

Karen J. Carter; kcarter999@gmail.com
Consulting Biologist
P.O. Box 628
Running Springs, CA 92382-0628

Dan Silver, Executive Director dsilverla@me.com
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267
(213) 804-2750

Tiemann, Sheri@FGC

From: Dan Silver <dsilverla@me.com>
Sent: Tuesday, July 23, 2019 9:24 AM
To: FGC
Subject: Item 10, San Bernardino kangaroo rat petition, Hearing date of Aug. 7, 2019 – Legal comment letter
Attachments: Letter in Support of SBKR Petition FNL.pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

July 23, 2019

VIA ELECTRONIC MAIL

Eric Sklar, President
California Fish and Game Commission
1416 Ninth St, Suite 1320
Sacramento CA 95814

RE: Item 10, San Bernardino kangaroo rat petition, Hearing date of Aug. 7, 2019 – *Legal comment letter*

Dear President Sklar and Members of the Commission:

For inclusion in the agenda packet, please find a comment letter from Chatten-Brown, Carstens & Minteer discussing the legal standards for advancement to candidate status, and recommending such on that basis. Thank you for your consideration.

Confirmation of receipt of the enclosure in good order is respectfully requested from Commission staff.

Thank you

Dan Silver

Enclosure

• Letter from Chatten-Brown, Carstens & Minteer to CFGC, July 23, 2019

Dan Silver, Executive Director
Endangered Habitats League
8424 Santa Monica Blvd., Suite A 592
Los Angeles, CA 90069-4267

213-804-2750
dsilverla@me.com
www.ehleague.org

Hermosa Beach Office
Phone: (310) 798-2400
Fax: (310) 798-2402

San Diego Office
Phone: (858) 999-0070
Phone: (619) 940-4522

Chatten-Brown, Carstens & Minteer LLP

2200 Pacific Coast Highway, Suite 318
Hermosa Beach, CA 90254
www.cbcearthlaw.com

Amy Minteer
Email Address:
acm@cbcearthlaw.com

Direct Dial:
310-798-2400 Ext. 3

July 23, 2019

Via email: fgc@fgc.ca.gov
Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Re: Petition for listing San Bernardino kangaroo rat under the California Endangered Species Act

Dear President Sklar and Members of the Commission:

On behalf of Endangered Habitats League (EHL), we submit these comments in support of the petition for listing the San Bernardino kangaroo rat (SBKR) as endangered under the California Endangered Species Act (CESA) and in support of the Department of Fish and Wildlife's evaluation of that petition. This letter also addresses several comments raised by Briscoe Ivester & Bazel LLP on behalf of unnamed landowners.

EHL submitted the petition to list the SBKR as endangered due to the significantly declining status of the species; it has been extirpated from all but three fragmented habitat blocks and development pressures on the remaining habitat could push the SBKR to extinction. Chatten-Brown, Carstens & Minteer is uniquely qualified to comment upon the legal requirements for acceptance of a petition for listing under CESA as we were lead counsel for the petitioner in *Center for Biological Diversity v. Fish and Game Commission* (2008)166 Cal.App.4th 597, wherein the Court of Appeal established such standard and overturned the Commission's rejection of a petition to list the California tiger salamander under CESA. For similar reasons, EHL's petition must be accepted and the SBKR must be advanced to candidacy.

I. The Department Complied with Notice Requirements.

On April 12, 2019, "Notice of Receipt of San Bernardino Kangaroo Rat Petition" was published in the California Regulatory Notice Register, in compliance with Fish and Game Code section 2073.3. This notice is code compliant because it includes the scientific and common name of the species, the habitat type for the species and the location where interested person can submit information to the Department relating to the petitioned species. This notice was published more than 45 days prior to the Department's completion of the evaluation of the petition.

The Department's evaluation of the petition was publicly released on May 30, 2019, more than 60 days prior to the August 7-8, 2019 Commission meeting at which the SBKR petition will be considered. This complies with the requirement of Fish and Game Code section 2074 that the Commission schedule the petition for consideration no sooner than 30 days after the public release of the evaluation.

The Department is not required to provide individual notice to all potentially impacted landowners under CESA when a petition for listing is submitted or when the evaluation of the petition is publicly released. The notification of landowners under Fish and Game Code section 2074.4 only becomes applicable if the Commission accepts the petition for consideration, advancing a species to candidacy.

II. Under the Applicable Standard of Review, the SBKR Must Be Advanced to Candidacy.

In *Center for Biological Diversity v. Fish and Game Commission* (2008) 166 Cal.App.4th 597, the Court of Appeal set forth the standard the Commission must rely upon when determining whether to accept a petition for listing a species and advancing that species to candidacy. A petition is not required to show that listing is more likely than not, but only that there is a substantial possibility listing may be warranted. A prima facie showing that the species is threatened or endangered within the meaning of CESA is

made if the information provided in the petition would lead a reasonable person to conclude there is a substantial possibility listing could occur. (*Id.* at 611.)

Under this standard, the Commission is not free to choose between conflicting inferences from the information provided regarding the species. Rationally based doubt about the listing is an inadequate basis to reject consideration of the petition. (*Ibid*.) Once the petitioner has provided a prima facie showing, the petition must be accepted unless countervailing information wholly undercuts that prima facie showing. (*Id*. at 612.)

Here, EHL's petition has provided the required prima facie showing that the SBKR is threatened or endangered within the meaning of CESA. The petition includes all information required under the Fish and Game Code section 2072.3. This information, which includes scientific data, expert studies, and surveys performed by experts, clearly demonstrates that the SBKR is "in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat…" (Fish & G. Code, § 2062.) The petition also makes use of data developed by US Fish and Wildlife Service biologists currently assessing the animal's status, which is the best available data. There is no countervailing information that wholly undercuts this prima facie showing.

Additionally, *Center for Biological Diversity* held that range-wide population abundance data was not required; the loss of a majority of the habitat necessary for the species' survival and the fragmentation of the remaining habitat "afford a strong inference of threat or endangerment." (*Id*. at 611.) Here, EHL's petition provides expert studies detailing the SBKR's historic range, that the species is now restricted to a mere five percent of its historical range and that the remaining habitat is fragmented and degraded. Of the three remaining populations, two are deprived of the flood regimes necessary to sustain the population over time. This includes the largest remaining population, which lost its water flows subsequent to federal regulation through listing. The remaining habitat is also under pressure for development and is impacted by

aggregate mining. Climate change will exacerbate droughts and alter hydrologic regimes and vegetation, further reducing the extent of suitable habitat. The petition and the Department's evaluation both find that habitat is a reliable proxy for population data. Based on the 95 percent loss in SBKR habitat, as well as the continuing loss of habitat, a reasonable person would conclude there is a substantial possibility listing of the SBKR as endangered or threatened could occur.

In addition to the overwhelming habitat loss for SBKR, genetic studies conducted by the San Diego Zoo show depletion of genetic resources and low effective population sizes in all three populations, which are isolated from one another. This genetic depletion hinders the ability of the SBKR populations to survive over the long term. Genetic depletion provides reliable evidence of extinction risk independent of habitat considerations.

III. Federal Listing of SBKR Does Not Preclude State Listing.

The "bare fact" that SBKR is listed as endangered under the Federal Endangered Species Act (FESA) "does not strongly counter the prima facie showing." (*Center for Biological Diversity*, *supra*, 166 Cal.App.4th at 613.) As of 2008, there were 177 instances of dual CESA and federal listing of species, which alone "belies a conclusion that federal listing alone would significantly diminish a substantial possibility that listing could occur." (*Ibid*.) Moreover, the Court of Appeal has recognized that joint listing under CESA and FESA ensures protection of the species. (*California Forestry Ass'n v. California Fish & Game Comm'n* (2007) 156 Cal. App. 4th 1535.)

Here, SBKR has been federally listed since 1998 and continues to decline. Since the federal listing, 11,000 acres of potential SBKR habitat have been lost and the species has been extirpated from seven locations. The habitat restoration and translocation included in habitat conservation plans have yet to be effective in compensating for the overwhelming loss of SBKR habitat, either failing outright or not meeting performance standards. EHL's petition provides detailed reasoning, supported by expert scientific

reports and surveys, to support the conclusion that FESA listing is inadequate to protect the SBKR from becoming extinct in all or a significant portion of its range.

Additionally, CESA provides for protection of habitat in ways that FESA listing does not, for instance by prohibiting state agencies from approving projects,

> which would jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available...

(Fish & G. Code § 2053.) CESA further provides that "it is the intent of the Legislature…to acquire lands for habitat for [listed] species." (Fish & G. Code § 2052.) State listing of SBKR could also make more funding available for the protection of the species.

Conclusion

For all of the reasons set forth herein, the detailed and scientifically supported information contained in EHL's petition clearly provides a prima facie showing that there is a substantial possibility listing of the SBKR may be warranted. The Department's affirmative evaluation of that petition further supports this showing. Thus, the Commission is required to accept the petition and advance the highly imperiled SBKR to candidacy.

Thank you for your time and consideration in this matter.

Sincerely,

Amy Minteer

From: Debra Shier <dshier@sandiegozoo.org>
Sent: Wednesday, July 24, 2019 3:04 PM
To: FGC; david.j.castanon@usace.army.mil; paul_souza@fws.gov; scott_sobiech@fws.gov; 'Cleary-Rose, Karin'; Brandt, Jeff@Wildlife; Gibson, Joanna@Wildlife; 'Palenscar, Kai'
Cc: Jeff Opdycke; Allison Alberts; Ron Swaisgood
Subject: San Diego Zoo Letter of Support for Petition to List SBKR
Attachments: San Diego Zoo Letter of Support for Petition to Grant Candidacy Status to SBKR.pdf

Dear President Sklar and Members of the Commission,

Please find attached our letter of support for the Petition to Grant Candidacy Status to the San Bernardino Kangaroo Rat under the California Endangered Species Act.

Please let me know if you have any questions.

Best,
Debra

Debra M. Shier, Ph.D.
Brown Endowed Associate Director of Recovery Ecology
Institute for Conservation Research, San Diego Zoo Global
15600 San Pasqual Valley Road
Escondido, CA 92027-7000 USA
Tel: 760-796-5692
institute.sandiegozoo.org
Saving plants and animals worldwide

Assistant Adjunct Professor
Ecology and Evolutionary Biology
University of California Los Angeles
621 Charles E. Young Dr. South
Los Angeles, CA 90095

SAN DIEGO ZOO
INSTITUTE FOR
CONSERVATION
RESEARCH

July 25, 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

RE: Support for Petition to grant State Candidacy Status to the San Bernardino kangaroo rat under the California Endangered Species Act

Dear President Sklar and Members of the Commission:

We represent a group of conservation biologists at the San Diego Zoo Institute for Conservation Research with over 187 years of cumulative experience in biological research across a wide range of taxa. Our research expertise focuses on endangered species recovery through translocation and captive breeding reintroduction, genetics, behavioral ecology, anthropogenic effects, and habitat suitability modeling. We have 72 years of cumulative research and recovery experience which has been conducted with 7 species in the family Heteromyidae that includes kangaroo rats, kangaroo mice and pocket mice. One of us (DMS) is recognized as a species expert for 4 local Heteromyids endemic to southern California including the San Bernardino kangaroo rat and has served as an expert consultant for the San Bernardino Municipal Valley Water District in evaluating potential mitigation measures associated with impacts on this species as a result of construction of the Seven Oaks Dam.

As scientists focusing on species recovery who have conducted research on this species over the last 8 years, we are highly qualified to evaluate the petition to grant candidate species status to the San Bernardino kangaroo rat (SBKR) pending a final decision to provide it protection under the California Endangered Species Act (CESA).

Here we focus on several key points that are articulated in the petition and, where relevant, supplement these points with new results that we have generated over the last year:

1. Despite apparent efforts under the Federal Endangered Species Act to address the critical habitat needs of the SBKR, the species has continued to experience dramatic and unmitigated habitat loss. This southern California endemic species was historically estimated to occupy 326,467 acres. As of the 1998 listing by the USFWS (Service), the species was estimated to have lost 95% of its historic

range. The Service designated 33,295 acres as critical habitat in 2002 of which only 16,300 acres were considered to be functioning in 2018. Meanwhile, habitat losses have continued and the SBKR has been extirpated from many areas it once occupied. Two of our research projects are relevant here. We conducted a range-wide Habitat Suitability Model for SBKR in 2018-2019 that shows there is little to no moderate to high quality habitat that exists for SBKR outside of the currently designated critical habitat. Our results agree with the petitioner's assessment that much of the remaining suitable habitat is now located in highly active and flood-prone channels. Without access to terrace refugia, SBKR is even more likely to be extirpated. Further, our research on the impacts of artificial night lighting on SBKR indicates that night lighting significantly reduces SBKR foraging up to 35 meters from the light source, affecting the species energetics and reducing habitat suitability along habitat edges.

2. The Service estimates seven known populations of SBKR have been extirpated since federal listing in 1998, leaving only three extant populations: Lytle/Cajon Creek, Santa Ana River, and San Jacinto River. Thus, SBKR has already been extirpated from the vast majority of its historical range. No population viability analyses have been conducted on the 3 remaining populations of SBKR to date. Thus, in 2019 we assembled demographic data for SBKR and closely related species and undertook an effort to model population viability with and without development in the Lytle/Cajon Creek population. Our results are preliminary but strongly suggest a high probability of extinction within 100 years even in the absence of further development. These models utilize a range of values, from conservative to optimistic, for each demographic parameter. Since exact values for each population are not known, we encompassed the range of biologically relevant possibilities. Our baseline model that examined 300 population scenarios, each run 1000 times showed that 68.67% of the scenarios (206/300) predict extinction in 100 years. Our model with only development impacting suitable habitat acreage shows that 75.5% of the scenarios (151/200) go to extinction in 100 years. And our 3rd model that examines current conditions with development affecting suitable habitat acreage and an initial 30% reduction in the Lytle/Cajon Creek population expected as a result of development has 81% (162/200) scenarios going to extinction in 100 years. Thus, our preliminary results suggest that unless the population trends are reversed, this species is likely to become extinct in the next 100 years, and that if development at the Lytle/Cajon Creeks is allowed to go forward, that extinction probability increases.

3. Our research has shown that the three remaining populations are isolated, genetically differentiated and have effective population sizes (N_e) well below targets for preventing short-term inbreeding and long-term loss of genetic diversity (San Jacinto River: $N_e = 14.7$, Santa Ana River: $N_e = 30.4$ and Lytle/Cajon Creek: $N_e = 85.8$). These estimates could be refined with additional

sampling. And, while it is possible that the estimates of effective population sizes could increase, this is highly unlikely unless there are several undetected high-density sites that have not yet been sampled. Our sampling effort for this project was developed and coordinated with expert biologists from the Service, California Department of Fish and Wildlife and species consultants. Though we were not able to access some private lands, we are not aware of any other high-density sites within the Lytle/Cajon Creek population. In an effort to refine our estimates, over the last month, we trapped two additional sites within the Santa Ana population (Judson Brown and Mill Creek) that were thought to be high density sites for SBKR. Trapping results indicated pockets of high density SBKR in Judson Brown (12 SBKR individuals/294 trap nights), although we failed to detect SBKR habitat that was dense with shrubs and non-native grasses, which was a large proportion of the property we could assess from visual surveys. In the adjacent Mill Creek we captured fewer individuals, despite greater effort (4 SBKR/460 trap nights) and recent records of SBKR presence. This site also had dense shrub cover and non-native grasses in many areas, suggesting habitat suitability may have decreased for SBKR following the wet winter and spring growing season, and habitat management may be necessary in conserved areas.

4. SBKR is an alluvial fan sage scrub obligate, a habitat that requires periodic fluvial disturbance to maintain early to mid-successional habitat for the species. However, fluvial process have been lost or modified in much of the remaining SBKR habitat, including the entire Santa Ana River habitat block, which was altered by construction of Seven Oaks Dam in 2000.

5. Lytle Creek/Cajon Wash contains the largest area of remaining habitat of the three extant populations, and given the higher effective population size of the Lytle Creek/Cajon Wash population and the long-term effects of Seven Oaks Dam on the Santa Ana River population, its conservation and management are critical to the species' recovery. Yet, the Lytle/Cajon Creek population is threatened by proposed development that would further eliminate occupied SBKR habitat and a crucial reservoir of the remaining genetic diversity of SBKR. Essential upland refugia would be eliminated, without viable replacement.

6. In the absence of a better understanding of the failure of mitigation proposals used to justify continuing habitat losses associated with federal project approvals, the survival of this species is now dependent upon direct action to avoid further loss of occupied habitat. Examples of failed and/or unproven mitigation include translocation and habitat restoration. As we understand it, habitat losses can only be justified if mitigation actually works and after 20 years it seems to us that the obligation to understand what works and what doesn't is a direct responsibility of the regulators and their permittees.

In conclusion, the status of San Bernardino kangaroo rat, a taxon endemic to California, is clearly poor, and population trends are still declining despite receiving Federal ESA protections over 20 years ago. To date, the Service has failed under its consultative process to implement effective remedial measures, and State intervention is urgently needed. California Endangered Species Act protection would provide the California Department of Fish and Wildlife a critically important tool for conserving and recovering this taxon, and we support the petition recommendation to grant candidacy status to the San Bernardino kangaroo rat under CESA.

Sincerely,

Allison Alberts, Ph.D.
Chief Conservation and Research Officer,
San Diego Zoo Institute
for Conservation Research

Debra M. Shier, Ph.D.
Brown Endowed Associate Director,
Recovery Ecology
San Diego Zoo Institute
for Conservation Research

Rachel Chock, Ph.D.
Postdoctoral Fellow, Recovery Ecology
San Diego Zoo Institute
for Conservation Research

Aryn Wilder, Ph.D.
Researcher, Conservation Genetics
San Diego Zoo Institute
for Conservation Research

Sarah McCullough Hennessy, Ph.D.
Researcher, Recovery Ecology
San Diego Zoo Institute
for Conservation Research

Asako Navarro, M.S.
Population Biologist, Life Sciences
San Diego Zoo

Ronald Swaisgood, Ph.D.
Brown Endowed Director,
Recovery Ecology
San Diego Zoo Institute
for Conservation Research

Oliver A. Ryder, Ph.D.
Kleberg Endowed Director,
Conservation Genetics
San Diego Zoo Institute
for Conservation Research

Cynthia Steiner, Ph.D.
Associate Director,
Conservation Genetics
San Diego Zoo Institute
for Conservation Research

Emily Gray
Senior Research Associate
San Diego Zoo Institute
for Conservation Research

Tiemann, Sheri@FGC

From: Altamirano, Juan <jaltamirano@audubon.org>
Sent: Thursday, July 25, 2019 5:05 PM
To: FGC
Subject: Audubon Petition to list the San Bernardino kangaroo rat (Dipodomys merriami parvus) as an endangered species under the California Endangered Species Act
Attachments: Audubon SBKR.pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Categories: Mtg Deadlines

To whom it may concern.

Please accept our letter to support the petition to list the San Bernardino Kangaroo Rat.

—
Juan Altamirano
Associate Director of Policy
M: 714.319.0303

Audubon California
400 Capitol Mall, Suite 1535
Sacramento, CA 95814
ca.audubon.org

July 25, 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090
fgc@fgc.ca.gov

RE: Petition to list the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) as an endangered species under the California Endangered Species Act, Hearing Date, Aug. 7, 2019 – *Support for granting of candidate status*

Dear President Sklar and Members of the Commission

Audubon California strongly endorses the granting of candidate status under CESA to the San Bernardino kangaroo rat (SBKR). The evidence overwhelmingly demonstrates that listing "may be warranted." Audubon's mission is to conserve and restore natural ecosystems, focusing on birds, other wildlife, and their habitats for the benefit of humanity and the earth's biological diversity.

Only 5% of the SBKR's historic alluvial fan habitat at the base of the San Bernardino Mountains still exists, and most of this no longer has the natural flood regimes this animal requires. Even worse, the status of the animal has markedly declined since the federal listing in 1998. The US Fish and Wildlife Service itself acknowledges that loss of several populations that were extant at the time of listing.

Threats continue. USFWS-approved management plans for the largest population – that along the Santa Ana River – fail to restore the early successional habitat that animal needs. The only population that still has natural hydrology is Lytle-Cajon, yet the entire Lytle population is jeopardized by massive floodplain development and channelization. The mitigation plan is fatally flawed because its proposed "refugia" – adjacent uplands where some animals can escape the floodwaters and repopulate the larger area – will not function as such due to inundation during high-flow events. Despite this, overt political interference from Washington, DC is likely to result in an unmodified project.

The US Fish and Wildlife Service continues to rely on experimental translocation and unproven restoration to justify the loss of occupied habitat. In view of the already severe genetic depletion documented by the San Diego Zoo, unless the State steps in, the SKBR may be doomed as more and more occupied habitat and critical genetic resources are irretrievably lost.

In all cases, constructive regulation can result in win-win outcomes for the species, development, resource extraction, and water management. But only constructive State regulation under CESA can make this happen. On behalf of our members, please carry out CESA.

Sincerely,

Juan Altamirano

Associate Director of Policy

From: Nagami, Damon <dnagami@nrdc.org>
Sent: Monday, July 22, 2019 1:32 PM
To: FGC
Subject: NRDC support for CESA candidate status for San Bernardino kangaroo rat; Item 10, Aug. 7, 2019
Attachments: NRDC ltr to FGC supp SBKR petition 7.22.19.pdf

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Dear President Sklar and Commissioners:

On behalf of the Natural Resources Defense Council, I am writing to support candidate status for the San Bernardino kangaroo rat (SBKR) under the California Endangered Species Act. The SBKR is critically endangered and legal protection under state law is essential for its survival. We ask you to grant candidate status because the scientific and legal thresholds for such advancement are clearly met. Please find the attached support letter with additional details, and we will also be attending and providing comments at the August 7, 2019 FGC meeting. Thank you in advance for considering our views.

Best regards,

DAMON NAGAMI
Senior Attorney, Nature Program
Director, Southern California Ecosystems Project

NATURAL RESOURCES
DEFENSE COUNCIL

1314 SECOND STREET
SANTA MONICA, CA 90401
T 310.434.2300
F 310.434.2399
DNAGAMI@NRDC.ORG
NRDC.ORG

July 22, 2019

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090
fgc@fgc.ca.gov

Re: Support for candidate status for the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) under CESA; Item 10, August 7, 2019

Dear President Sklar and Commissioners:

On behalf of the Natural Resources Defense Council, I am writing to support candidate status for the San Bernardino kangaroo rat (SBKR) under the California Endangered Species Act (CESA). The SBKR is critically endangered and legal protection under state law is essential for its survival. We ask you to grant candidate status because the scientific and legal thresholds for such advancement are clearly met.

Under the applicable legal standard, the petition is only required to show a "substantial possibility" listing *may* be warranted. A prima facie showing that the species is threatened or endangered within the meaning of CESA is made if the information provided in the petition would lead a reasonable person to conclude there is a substantial possibility listing could occur. *Center for Biological Diversity v. Fish & Game Comm'n* (2008), 166 Cal.App.4th 597, 611. It is not a matter of whether there is conflicting evidence, but whether the countervailing information wholly undercuts the prima facie showing. *Id.* at 612. The detailed information contained in the petition, as well as the findings by staff supporting candidate status, are clearly sufficient to meet the legal test.

According to scientists at the San Diego Zoo, the SBKR is on the verge of extinction for genetic reasons alone. Since federal listing of the species in 1998, the efforts of the U.S. Fish and Wildlife Service (USFWS) have been unable to stop the SBKR's decline, with irretrievable loss of 30 percent of potential habitat and seven populations taking place. In 2002, USFWS permitted Seven Oaks Dam to block the Santa Ana River absent effective mitigation measures. The three remaining populations – all small and isolated – all have serious obstacles to viability.

The SBKR needs flooding of river systems to rejuvenate habitat to younger successional stages, but also uplands – "refugia" – where some animals can survive the flood. These conditions remain only at Lytle and Cajon Creeks in San Bernardino County. On the Santa Ana

River, USFWS has failed to institute measures to reactivate the floodplain, and that population – the largest of the three – will be lost over time unless the state can bring parties to the table with creative measures.

If proposed development along Lytle Creek is not modified, and if vital refugia are paved over as currently proposed, this critical population may completely vanish in a large flood. Critical missteps in past USFWS decision-making around this species means that state protection is essential to retain scientific integrity. At this time, only the state can require and implement economically viable solutions like project redesign and mitigation banking, which actually provide *more* dollars per acre than development.

NRDC believes that the intent of CESA is to intervene in exactly the situation now faced by the SBKR, where grave population depletion exists and where alternative regulatory mechanisms are not working. We cannot continue to lose animals based on failed techniques like translocation and we cannot afford to see win-win solutions ignored.

In conclusion, because the information submitted amply shows that listing "may be warranted," candidate status is thoroughly justified. Thank you very much for your consideration.

Very truly yours,

Damon K. Nagami

Damon Nagami
Senior Attorney
Director, Southern California Ecosystems Project

California Program Office
980 J Street, Suite 1730 | Sacramento, CA 95814 | (916) 313-5800
www.defenders.org/california

July 25, 2019

Via email: ***fgc@fgc.ca.gov***

Eric Sklar, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

Re: Petition for listing San Bernardino kangaroo rat under the California Endangered Species Act

Dear President Sklar and Members of the Commission:

On behalf of Defenders of Wildlife and our more than 1.8 million members nationwide, including 279,000 members and supporters in California, I am writing to support the petition to list the San Bernardino kangaroo rat (*Dipodomys merriami parvus*) ("SBKR") as endangered under the California Endangered Species Act ("CESA").

Based on our review of this petition, along with additional letters submitted to the Commission , and the May 30, 2019, evaluation of the petition from the Department of Fish and Wildlife ("DFW Evaluation"), we believe that this petition has met the 90-day finding standard that it provides "sufficient information to indicate that the petitioned action may be warranted." Fish and Game Code Section 2074.2(e)(2). Thus, we urge the Commission to accept this petition and make this species a candidate for listing under CESA.

SBKR has experienced dramatic habitat loss, has a significantly reduced population that is trending towards extirpation, is facing serious and immediate threats to its ongoing survival, and has not benefited from existing management efforts. The future survival of SBKR essentially depends on this species securing additional protection through CESA.

Habitat Loss: SBKR once ranged across 325,000 acres of Southern California. However, in 2018, the USFWS estimated that only 16,300 acres of habitat, not all of it occupied, still functions for SBKR. The petition estimated that SBKR has lost 11,000 acres, or 30%, of suitable habitat (based on land cover characteristics) since its federal listing in 1998.

SBKR is an alluvial fan sage scrub obligate, a habitat that requires periodic fluvial disturbance. However, much of the remaining habitat for SBKR has had fluvial processes lost or degraded, including the entire Santa Ana River block which has been deprived of flooding by construction of Seven Oaks Dam.

Population Reductions: Since federal listing, the U.S. Fish and Wildlife Service ("USFWS") estimates that seven known populations of SBKR have been extirpated, leaving just three remaining

populations: Lytle Creek/Cajon Wash, Santa Ana River, and San Jacinto River. Each of these populations is genetically unique, reflecting their relatively recent isolation from each other. Further, two of the three populations fall below the levels necessary to prevent inbreeding depression.

Serious and Immediate Threats: With such a restricted range and small, isolated populations coupled with numerous pending development projects, the threat of extirpation of SBKR is severe and immediate. The conservation and management of the Lytle Creek/Cajon Wash area is particularly critical for the survival and recovery of SBKR. However, as detailed in the petition, the population of SBKR in this area is threatened by proposed development that would further cause substantial net loss of occupied habitat and critical genetic resources. The Lytle Creek North Master Planning Community eliminates upland refugia and instead relies upon an unstable island, which is inundated during high flow events, as refugia from flooding. This proposal puts the entire Lytle Creek area at risk of loss during a stochastic event. In addition, the Lytle Creek Ranch Development project proposes to impact 1,190 acres of critical habitat and result in a net loss of 171 acres of occupied habitat in the project area. As described in communications from the USFWS regional staff, provided in a letter to the Commission from the petitioners, the risk from this particular development project has been exacerbated by the fact that the project developers have gone over the head of the USFWS to the leadership within the U.S. Department of the Interior, overtly seeking to overrule recommendations from the Carlsbad Fish and Wildlife Office. With this level of political interference, we cannot rely upon the protections in the federal ESA to protect the SBKR.

Failure of Existing Management Efforts: Even if there has not been evidence of efforts to undermine federal protections for SBKR, as described above, existing federal protections have not halted the decline of SBKR. As outlined in DFW's evaluation, the petition provides sufficient information to show that the three strategies for mitigating impacts to SBKR (species relocation, habitat restoration, and mitigation credits) have been either ineffective (relocation and restoration) or insufficient (mitigation credits) to halt the precipitous decline in this species. Indeed, the petition notes that the two mitigation banks created to benefit this species encompass only 1,482 acres – an area too small to support a viable population. In addition to the federal strategies, the tools currently available to the State to conserved and manage the species (Streambed Alteration Agreements, CEQA comments, and Section 401 Clean Water Act permits) are too limited in scope or have proven ineffective. For example, CDFW has provided constructive CEQA comments on development projects, including the Lytle Creek project, but those comments have been ignored.

CESA Protections are Necessary: The petition sets forth the case for why CESA protections are well-suited and necessary to halt the SBKR's current decline into extinction. The state's "fully mitigate" standard for species protection is much stronger than the operative standards under the federal ESA, particularly when the current federal administration is focused on weakening current environmental protections. As DFW's evaluation concluded, the petition "presents sufficient evidence to indicate that additional management may be necessary to conserve and recovery the species." (DFW Evaluation, pg. 18).

For the reasons discussed above, Defenders strongly urges the Commission to accept this petition for further consideration under CESA. SBKR has continued to decline despite its listing under the

federal ESA and needs additional protection under CESA if we are going to have any hope of this species continuing to exist in the wild.

Sincerely,

Kim Delfino
California Program Director

From: Litton [redacted]
Sent: Wednesday, July 24, 2019 7:36 AM
To: FGC
Subject: Petition to list the San Bernardino kangaroo rat- SUPPORT

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Categories: Green Category

RE: Petition to list the San Bernardino kangaroo rat, Fish and Game Commission

Dear President Sklar and Members of the Commission,

I strongly support the granting of candidate status to the San Bernardino kangaroo rat, which has managed to survive in only three small and isolated populations. The SBKR continues to go downhill despite the federal listing, and faces threats from floodplain development and altered flood regimes. Genetic studies show an animal already on the brink.

Scientific management absent of politics, and a state listing can prevent the extinction of a species unique to California. Saving the San Bernardino kangaroo rat and its community of life is exactly the challenge CESA is intended to address. I want to be able to tell my young grandchildren that we have done our very best in protecting this unique resource. Thank you.

Sincerely,
Amy Litton
[redacted]

	Margaret Howlett <mhowlett@briscoelaw.net>
Sent:	Thursday, May 30, 2019 4:53 PM
To:	FGC
Cc:	Bonham, Chuck@Wildlife; David Ivester
Subject:	Petition to List San Bernardino kangaroo rat
Attachments:	Letter to CDFW re petition to list San Bernardino kangaroo rat.pdf
Follow Up Flag:	Flag for follow up
Flag Status:	Completed

Please find attached a letter from David Ivester regarding the petition to list the San Bernardino kangaroo rat as endangered.

Thank you.

Margaret Howlett
Secretary to David Ivester

Briscoe Ivester & Bazel LLP

MARGARET HOWLETT, CCLS
155 Sansome Street, Seventh Floor
San Francisco, California 94104
Office: (415) 402-2700 Direct: (415) 402-2712

BRISCOE IVESTER & BAZEL LLP
155 SANSOME STREET
SEVENTH FLOOR
SAN FRANCISCO, CALIFORNIA 94104
(415) 402-2700
(415) 398-5630 FAX

David M. Ivester
(415) 402-2702
divester@briscoelaw.net

May 30, 2019

Via email: fgc@fgc.ca.gov
California Fish and Game Commission
1416 Ninth Street, Suite 1320
Sacramento, CA 95814

Re: Petition to List San Bernardino kangaroo rat

Dear Members of the Commission:

I write to call your attention to serious deficiencies in the Department's process for reviewing the Petition to list the San Bernardino kangaroo rat as endangered under the California Endangered Species Act ("CESA") and the Petition itself. These deficiencies should be remedied so the Department can properly evaluate the petition before submitting its evaluation report to the Fish and Game Commission. I write as well to provide information, as best as can be done in the little time afforded by the Department's flawed process, indicating serious factual errors in the petition. If the Commission chooses to reach a decision on the Petition, the Commission should reject it.

My firm has long represented landowners throughout California with respect to endangered species matters, including listing of species, and I write with their interests in mind.

I. The Department Failed to Give Adequate Notice of its Receipt of the Petition or Afford Landowners Sufficient Opportunity to Comment on It

Even though the Department is well aware of landowners who would be substantially affected by the proposed listing of the San Bernardino kangaroo rat, the Department failed to notify those landowners of the receipt of the Petition at all or, in some cases, until shortly before the Commission's scheduled June meeting and only a few days before written comments must be submitted for consideration at that meeting.

Exacerbating the inadequacy of the notice, the Department has *accelerated* its evaluation of the Petition for reasons not explained with the aim of submitting its evaluation report to the Commission in June—in substantially less time than the 90 days afforded for such an evaluation

by statute. The time for landowners to submit comments and information to the Department has thus been cut short, excessively so, depriving them of a reasonable opportunity to do so.

Perhaps worse, the Department has actually misled landowners about the time available to them to comment of the Petition and offer information during the Department's initial 90-day evaluation on the Petition. The Department published a notice in the California Regulatory Notice Register that states: "It is anticipated that the Department's evaluation and recommendation relating to the petition will be received by the Commission at its August 7-8, 2019, meeting in Sacramento." The Department also appended a Staff Summary to the copy of the petition posted on the Commission's website echoing this statement and indicating that the Commission will receive the Department's evaluation at its August 7-8, 2019, meeting in Sacramento. Having thus lulled landowners to believe they have until the August meeting to gather and submit comments and information to the Department, the Department—without notice or explanation—accelerated its evaluation; the Department now appears poised to submit its evaluation report two months earlier than it said in its notice and Staff Summary. In doing so, the Department will pull the rug out from under landowners relying on the Department's announced schedule and thinking they have until August to prepare and submit comments and information regarding the Department's initial evaluation of the Petition. By announcing one schedule but operating on another, faster schedule, the Department will effectively deprive landowners of a reasonable opportunity to comment on the Petition during the Department's evaluation.

As a result of the Department's inadequate notice, rushed evaluation, and misleading statements, landowners have not had sufficient opportunity to prepare written comments on the Petition and gather and submit pertinent information, and the Department has conducted its evaluation without the benefit of those comments and the information they would provide.

The consequences of the Department's actions in this regard are not merely theoretical. Even a quick review of the Petition reveals many important factual errors and misleading statements. For instance, in discussing the current range and abundance of SBKR in 2018, the Petition incorrectly states that "recent, extensive trapping in suitable habitat within this block [i.e., the area of SBKR suitable habitat in Lytle and Cajon Creeks] found many sites had low or no SBKR (Shier et al. 2018)." (Petition, p. 10.) Contrary to petitioners' suggestion that Shier et al. 2018 conducted extensive trapping throughout the area of SBKR suitable habitat in Lytle and Cajon creeks, an examination of the Shier report shows that it does not provide any foundation for this significant but erroneous claim. Shier et al. 2018 was focused on collecting just a sufficient amount of genetic sample material from SBKR for its specific, intended genetic analysis. (See Shier et al (2018), pp. 11, 17.) Shier did not trap anywhere in the entire stretch of

the Lytle Creek area of SBKR suitable habitat but for: (1) an area of the CEMEX mining property which would not be expected to have abundant SBKR within it, and (2) within portions of the 198-acre Lytle Creek Conservation Bank which is located at the far downstream end of Lytle Creek adjacent to the confluence with Cajon Creek. More than 700 acres of potentially suitable habitat within the Lytle Creek wash itself were not surveyed by Shier et al. 2018. Shier et al. thus did not conduct extensive trapping as petitioners suggest. Furthermore, the data in the Shier et al. 2018 genetic sampling report similarly does not establish that extensive SBKR trapping was conducted throughout the full range of suitable habitat in Cajon Creek.

Similarly, petitioners also mistakenly claim that the SBKR mitigation measures and related habitat restoration efforts in the Lytle Creek area associated with the Lytle Creek North development project have "failed." (Petition, pp. 28-29). In fact, this 212-acre conservation area in Lytle Creek continues to be occupied by the San Bernardino kangaroo rat, and habitat restoration efforts on refugia areas for the species within that conservation area have demonstrated continued use of the newly created and restored refugia by the SBKR. Petitioners misinform the Department and the Commission by mischaracterizing the successes shown by this SBKR conservation program.

With adequate time to reasonably review the petition and prepare comments, more errors and misleading statements undoubtedly will be revealed and discussed.

II. The Petition Fails to Provide Sufficient Scientific Information to Indicate that the Proposed Listing May Be Warranted

Petitioners rest their assertions about the SBKR's current abundance, distribution, and status largely on what they dub "recent Service unpublished information on [the SBKR's] distribution and status." (Petition, p. 10.) They lean heavily on this "information," citing it 24 times in the Petition —substantially more than any other cited source. In certain important respects, e.g., assertions regarding the current range, distribution, and abundance of populations of SBKR at the Santa Ana River, San Jacinto River and Bautista Creek, and Etiwanda Alluvial Fan, petitioners rely almost entirely on this so-called unpublished information. (Petition, pp. 12, 14, and 15.)

That "information" though is unworthy of petitioner's, the Department's, or the Commission's credence. The material in which it appears does not identify any author, whether individual or institution, nor does it bear any date. Petitioners nonetheless cite it as "USFWS 2018." The material, written in an informal style with relatively few citations to sources and no indication that its contents have been vetted, peer reviewed, or anything of the sort, purports

merely to address "[f]ollow up on topics and questions raised at the Lytle Creek briefing on July, 25, [sic] 2018 with additional background." (Follow Up, p. 1; as the material does not otherwise identify itself, I cite it as "Follow Up.") Most important, the material bears a prominent caution on its face that it is "Deliberative – for internal review only," thus indicating it is not intended for or suited to the use petitioners would make of it. The material repeats this admonishment a couple more times for good measure. (Follow Up, pp. 13 & 15.) Petitioners do not mention these cautionary notes in their Petition, nor do they explain why they nonetheless use the material for purposes it plainly states it is not intended.

Because the Petition rests largely on assertions predicated on unverified "information" in unpublished, unidentified material that cautions against its use for any purpose other than "internal review" by someone, the Petition fails to provide sufficient scientific information to indicate that the petitioned action may be warranted.

III. In an Effort to Suggest the Department May More Effectively Protect the SBKR Under the California Endangered Species Act Than the U.S. Fish and Wildlife Service Can Under the Federal Endangered Species Act, the Petition Mischaracterizes Both the Federal and State Regulatory Programs

Petitioners falsely suggest that permit applicants do not provide mitigation or at least sufficient mitigation of impacts on listed species in the course of consultations under section 7 of the federal Endangered Species Act. They also largely ignore the effects of the taking prohibition of section 9 of the Endangered Species Act and the existing and future Habitat Conservation Plans developed and implemented under section 10 of the Act. From that premise, they then assert—without evidence or explanation—that it is not surprising that mitigation under the federal listing of the SBKR has failed to compensate for loss of habitat that has occurred. (Petition, p. 38.)

Petitioners' caricature of the consultation process under section 7 of the Endangered Species Act simply does not reflect reality. Petitioners emphasize, for instance, that section 7 speaks of minimization of impacts on listed species, but says nothing of mitigation. (Petition, p. 38.) True enough, the statute says as much. Petitioners remain strangely silent though about how the federal program operates in practice, and by their silence apparently hope uninformed readers may suppose that mitigation is not provided during section 7 consultation. As endangered species practitioners well know and as petitioners, who claim to have undertaken an extensive review of biological opinions issued under section 7 (Petition, p. 32) should have noticed, mitigation of impacts on listed species is routinely provided in the course of section 7 consultation. Mitigation measures developed in negotiations with the U.S. Fish and Wildlife

Service typically appear in the project description section of a biological opinion, while further minimization measures prescribed by the Service appear in the incidental take statement contained in the biological opinion. Moreover, without evidence or explanation, petitioners seemly discount the beneficial effects of the extensive avoidance and minimization measures required of permittees by the Service in section 7 consultations. Such cavalier treatment of those measures is unfounded.

Unmentioned by petitioners is the further requirement of section 7 of the Endangered Species Act that consultation must address the impacts of projects on designated critical habitat of listed species and aim to promote the *recovery* of listed species as well. The California Endangered Species Act offers no such mechanism to protect habitat or promote recovery of species.

Petitioners tout the California Endangered Species Act's call for the impacts of take of listed species to be "fully mitigated" and suggest, without explanation, that this may somehow enable the Department to require more or different mitigation than otherwise developed by permittees and the Service under sections 7 and 10 of the Endangered Species Act. (Petition, p. 38.) Unmentioned and unaddressed by petitioners though is that both federal and state agencies are equally constrained in the mitigation measures they can constitutionally impose on permittees. (U.S. Const., 5th Amend. & 14th Amend.; see *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987); *Dolan v. City of Tigard*, 512 U.S. 374 (1974).)

Finally, petitioners assert, again without explanation, that listing SBKR under the California Endangered Species Act will enable the Department to arrest the decline of the SBKR and "[o]nly with sufficient mitigation on all projects can the negative trends in SBKR population begin to be reversed." (Petition, p. 38.) These specious assertions rest on many unstated, unfounded suppositions. First, petitioners apparently suppose that the decline of SBKR is attributable to impacts of projects that have undergone section 7 consultation—a manifestly unfounded supposition. Second, petitioners apparently suppose that mitigation developed by the Service and permittees in section 7 consultation is somehow less than full and that more might have been constitutionally imposed—again a manifestly unfounded supposition. Third, petitioners apparently suppose that the Department could somehow impose more or different mitigation that would solve all SBKR problems—again a manifestly unfounded supposition. Finally, petitioners all but ignore, let alone evaluate, the beneficial effects of section 10 of the Endangered Species Act and the Habitat Conservation Plans developed under it for the SBKR.

Conclusion

Owing to the deficiencies in the process by which the Department evaluated the Petition and the deficiencies readily identified in the Petition even in the brief time afforded, I urge the Commission to reject the Department's evaluation report and direct the Department to conduct a proper 90-day evaluation, affording adequate notice and opportunity to comment to the public. If the Commission is nonetheless inclined to reach a decision on the Petition, I urge the Commission to reject it.

Sincerely yours,

BRISCOE IVESTER & BAZEL LLP

David Ivester

DMI/DMI
cc: Charlton Bonham, Director,
California Department of Fish and Wildlife (by email only)