

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

# California Endangered Species Act



## Petition Evaluation for Western Burrowing Owl (*Athene cunicularia hypugaea*)

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Report to the Fish and Game Commission  
AUGUST 2024



Photo by Mike's Birds

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**List of Abbreviations, Acronyms, and Terms**

- CESA – California Endangered Species Act
- Commission – California Fish and Game Commission
- Department – California Department of Fish and Wildlife
- ESA – Federal Endangered Species Act
- HCP – Habitat Conservation Plan
- NCCP – Natural Community Conservation Plan
- SSC – Species of Special Concern

## Executive Summary

The Center for Biological Diversity, Defenders of Wildlife, Burrowing Owl Preservation Society, Santa Clara Valley Audubon Society, Urban Bird Foundation, Central Valley Bird Club, and San Bernardino Valley Audubon Society submitted a petition (Petition) to the California Fish and Game Commission (Commission) to list western burrowing owl (*Athene cunicularia hypugaea*; burrowing owl) as threatened or endangered pursuant to the California Endangered Species Act (CESA). The western burrowing owl is a small bird of prey that lives in open, arid, relatively flat terrain covered by low vegetation, such as grasslands, prairies, shrub steppes, and desert shrubs. The owl nests and roosts in underground burrows that are typically excavated by other fossorial animals, such as ground squirrels, coyotes, foxes, and tortoises.

On March 18, 2024, the Commission referred the Petition to the California Department of Fish and Wildlife (Department) in accordance with Fish and Game Code section 2073 (Cal. Reg. Notice Register 2024, No. 14-Z, p. 398). Pursuant to Fish and Game Code section 2073.5, subdivisions (a) and (b) and California Code of Regulations, title 14, section 670.1, subdivision (d), the Department prepared this evaluation report (Petition Evaluation) within 120 days of receiving the Petition. The purpose of the Petition Evaluation is to evaluate the sufficiency of the scientific information contained in the Petition in relation to other relevant information possessed or received by the Department during the evaluation period, and to recommend to the Commission whether the Petition should be accepted and considered.

After reviewing the Petition and other relevant information, the Department made the following determinations regarding the information contained in the Petition:

- **Life history.** The Petition provides sufficient information regarding the life history of the western burrowing owl.
- **Range and distribution.** The Petition provides sufficient information regarding the historical and current range and distribution of the western burrowing owl.
- **Detailed distribution map.** The Petition provides a detailed range map and discusses distribution of the western burrowing owl.
- **Kind of habitat necessary for survival.** The Petition provides sufficient information regarding western burrowing owl habitat.
- **Abundance.** The Petition provides sufficient information regarding the abundance of the western burrowing owl in California.
- **Population trend.** The Petition provides sufficient information regarding the western burrowing owl's population trends in regions of California.
- **Factors affecting the ability to survive and reproduce.** The Petition provides sufficient information regarding factors affecting the ability of the western burrowing owl to survive and reproduce. Primary factors listed in the Petition include: habitat loss, fragmentation, and degradation; direct mortality caused by several anthropogenic factors; relocation of owls for project-related mitigation and failure to maintain artificial nest boxes; population isolation and demographic stochasticity; and predation.

- **Degree and immediacy of threat.** The Petition provides sufficient information detailing the degree and immediacy of threats to the western burrowing owl.
- **Impact of existing management efforts.** The Petition provides sufficient information regarding the impact of existing management efforts.
- **Suggestions for future management.** The Petition provides suggestions for future management actions for the western burrowing owl and its habitat.
- **Availability and sources of information.** The Petition provides sufficient sources of scientific information and has made them available to the Department along with the Petition.

The Department has determined that the Petition meets the requirements set forth in Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1). In preparing this Petition Evaluation, the Department determined that there is sufficient scientific information to indicate that the petitioned action to list the western burrowing owl as threatened or endangered under CESA may be warranted. Therefore, the Department recommends that the Commission accept the Petition for further consideration pursuant to CESA.

## Introduction

### Petition Evaluation Overview

The Commission has the authority to list certain species as endangered or threatened under CESA (Fish & G. Code, § 2070). CESA defines the “species” eligible for listing to include “species or subspecies” (Fish & G. Code, §§ 2062, 2067, & 2068) and courts have held that the term “species or subspecies” includes “evolutionarily significant units” (Central Coast Forest Assn. v. Fish & Game Com. (2018) 18 Cal.App.5th 1191, 1236, citing Cal. Forestry Assn., *infra*, 156 Cal.App.4th at pp. 1542 and 1549). The listing process is the same for species, subspecies, and evolutionarily significant units (ESUs) (Fish & G. Code, §§ 2070-2079.1). For purposes of the Department’s petition evaluation and recommendation, a species’ range is the species’ California range only (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal.App.4th 1535, 1551).

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 Commission accepts the petition for consideration, the second step requires the Department to produce, within 12 months (or within up to 18 months with an extension) of the Commission’s acceptance of the petition, a peer-reviewed report based upon the best scientific information available that advises the Commission on whether the petitioned action is warranted (Fish & G. Code, § 2074.6). Then, the Commission, based on that report and other information in the administrative record, 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)).

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 the Department possesses and submit to the Commission a written evaluation report with one of the following recommendations (Fish & G. Code, § 2073.5, subds. (a)-(b)):

- 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.

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 California Code of Regulations, title 14, section 670.1, subdivision (d)(1) to indicate that the petitioned action to list the western burrowing owl as threatened or endangered may be warranted. Sufficient information means that the amount of information presented in the listing petition would lead a reasonable person to conclude that there is a substantial possibility that listing could occur (see *Natural Resources Defense Council v. Cal. Fish and Game Com.* (1994) 28 Cal.App.4th 1104).

## **CESA Petition History**

On March 5, 2024, the Commission received the Petition from the Center for Biological Diversity, Defenders of Wildlife, Burrowing Owl Preservation Society, Santa Clara Valley Audubon Society, Urban Bird Foundation, Central Valley Bird Club, and San Bernardino Valley Audubon Society to list the western burrowing owl (*Athene cunicularia hypugaea*) as threatened or endangered under CESA (Cal. Reg. Notice Register 2024, No. 14-Z, p. 398). On March 18, 2024, the Commission referred the Petition to the Department for evaluation. The Commission publicly received the Petition at its April 17–18, 2024 meeting. At its June 19, 2024 meeting, the Commission granted the Department’s request for a 30-day extension of the period to review the Petition and prepare this Petition Evaluation.

The Petition requests that the Commission list the western burrowing owl as threatened throughout its entire range in California.

Alternatively, the Petition requests that the Commission list certain western burrowing owl evolutionarily significant units under CESA. The Petition argues that California's western burrowing owl populations comprise different ESUs and describes seven distinct biogeographic regions that appear to align with the proposed ESUs: the San Francisco Bay Area, Central Valley, Central-Western California, Southwestern California, Coachella and Imperial Valleys, Northern Desert, and Southern Desert (Figure 1).

The Petition requests that the San Francisco Bay Area, Central-Western California, and Southwestern California populations be listed as endangered, and the Central Valley and Southern Desert Range populations be listed as threatened under CESA. The Petition does not request that the Commission list the Northern Desert or the Coachella and Imperial Valley populations under CESA.

In addition to the petitioned actions described above, if the Commission determines listing the entire Central Valley population as threatened is not warranted, the petitioners request that the Commission evaluate whether the western burrowing owls in the Northern Central Valley, Middle Central Valley, and Southern Central Valley regions constitute distinct populations, and whether listing any of these populations is warranted under CESA. If the Commission determines that listing the entire Southern Desert Range population as threatened is not warranted, the petitioners also request that the Commission evaluate whether the western burrowing owls in the Western Mojave, Eastern Mojave, and Sonoran Desert regions constitute distinct populations and whether listing any of these populations is warranted under CESA (Figure 1).



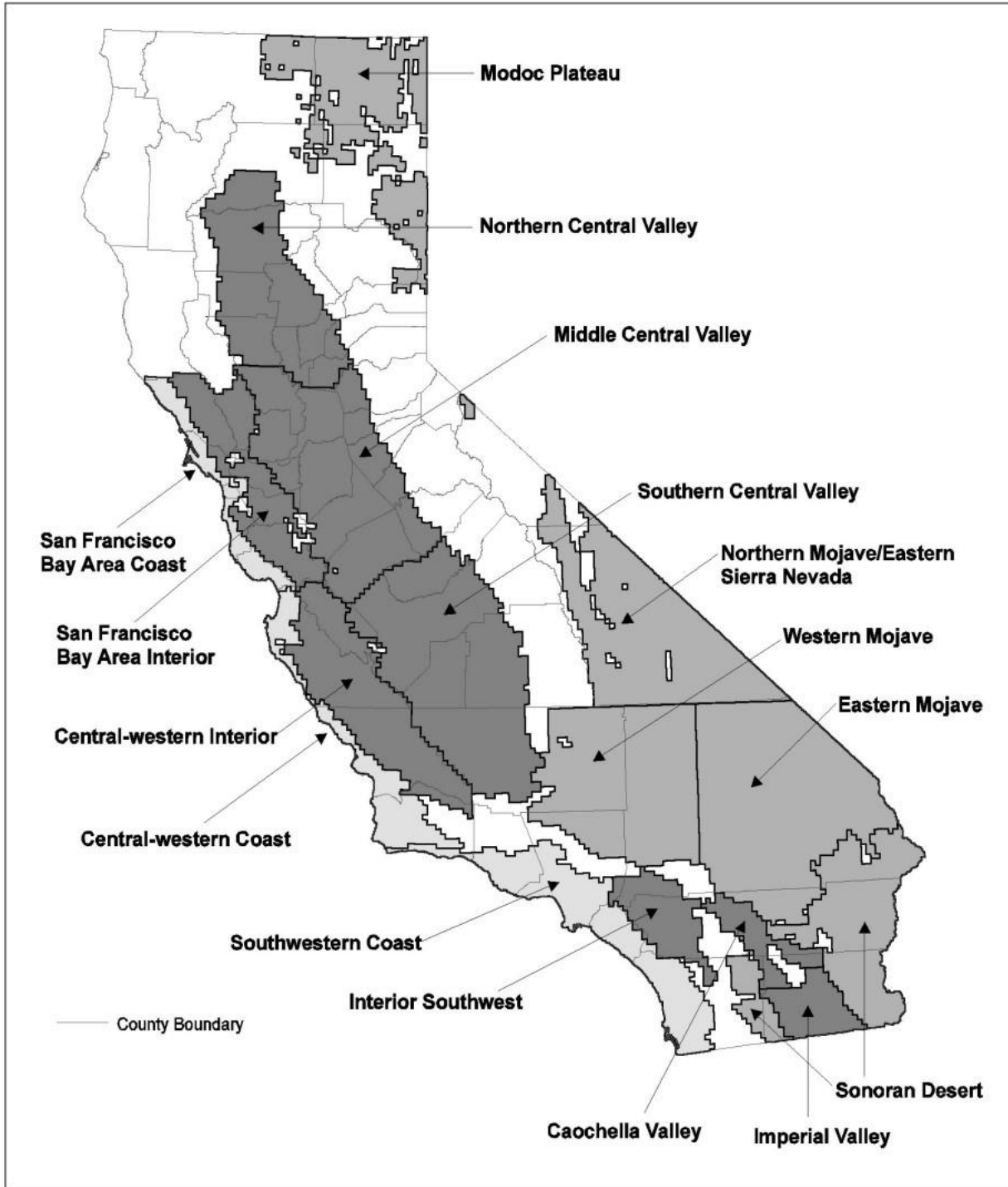


Figure 1. Western burrowing owl regions in California, as delineated by Wilkerson and Siegel (2010). This map was included in the Petition as Figure 2.

## **Additional Species Status Designations**

The western burrowing owl is a California Species of Special Concern (Shuford and Gardali 2008) and is designated as a Bird of Conservation Concern by the U.S. Fish and Wildlife Service (USFWS 2021).

## **Species Description and Taxonomy**

The Petition describes the western burrowing owl as “a small, cryptically-colored owl that is adapted for life in open, arid, relatively flat to rolling terrain covered by low-stature vegetation.” They are “small, with brown and white mottling, and have long, almost bare, stilt-like legs and a stubby tail. Long legs help them see over short-grass vegetation in a landscape with few elevated perches, and also aid in running down prey. Burrowing owls have a round head lacking ear tufts, white eyebrows, yellow eyes, and a distinct oval facial ruff. Adults are a rich sandy-brown color on the head, back, and upper parts of the wings, and are thickly spotted with whites and buffs on the underparts...Unlike many other raptors, the female is slightly smaller than the male, which may be an adaptation for squeezing into narrow burrows. Adult birds are about 19–25 cm (7–10 inches) tall and weigh an average of 150 grams...Juveniles are distinguished from adults by their solid buffy breast and white collar.”

The Petition lists the taxonomic classification of the western burrowing owl: “Class Aves, Order Strigiformes (Owls), Family Strigidae (Typical Owls), Genus *Athene*, Species *cunicularia*, and Subspecies *hypugaea*.” The western burrowing owl’s range extends over much of the western United States. There are two subspecies of burrowing owl in North America, with the other subspecies (*A. c. floridana*) occurring in Florida and the Bahama Islands.

## **Summary of Petition Components**

Pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1), the Department has verified that the Petition contains information regarding each of the following petition components:

- Life History;
- Range;
- Distribution;
- Detailed Distribution Map;
- Kind of habitat necessary for survival;
- Abundance;
- Population Trend;
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of threat;
- Impact of existing management efforts;
- Suggestions for future management; and
- Availability and sources of information.

No information was submitted to the Department relating to the western burrowing owl during the Department's evaluation of the Petition (Fish & G. Code, § 2073.4). Pursuant to Fish and Game Code section 2073.5, the Department evaluated the information contained in the Petition to determine whether there is, or is not, sufficient information to indicate that the petitioned action(s) may be warranted. A summary of the information contained in the Petition regarding each of the components listed above is presented below. In some instances, the Department has grouped similar components together and renamed components to create a more cohesive and readable document.

## **Life History**

### ***Scientific Information in the Petition***

The Petition discusses the life history of the burrowing owl in the "Natural History" section on pages 1–17. The section includes information on reproduction and growth, feeding, seasonal movements, predators, survival, and dispersal. The following is a summary of the information presented.

The burrowing owl nests and roosts in underground burrows that are typically excavated by other fossorial animals, such as ground squirrels, coyotes, foxes, and tortoises. They nest in loose colonies and proximity to ground squirrels increases security by means of mutual alarm-calling. The burrowing owl breeding season typically occurs between February and August. Pairs tend to be monogamous. Generally, females lay one clutch per year of up to 12 eggs. The incubation period is 29 days and juveniles emerge from the burrows at 2–3 weeks old. Parents will feed the juveniles for up to another 2 months and young will stay with their parents until fall. A pair of owls can fledge 4–5 young in good years. Juveniles disperse in the fall but tend to stick close to their parents' nesting territory.

Burrowing owls are most active at night and can forage from dusk until dawn. They feed primarily on large insects and small rodents but will take a wide variety of prey. When nesting, males forage while females incubate the eggs. Males tend to forage within 600 m of the nest burrow. Availability of prey appears to impact reproductive success.

Most of California's burrowing owls are residents (i.e., they do not have seasonal migrations outside California), but some populations are migratory. Resident owls may move away from their breeding areas during the nonbreeding season, but most tracked owls moved less than 5 miles away from their nest sites (although there is documentation of much longer distance movements). Burrowing owls exhibit strong site fidelity and adults often return to the same burrow or a nearby area each year. Some migratory owls that breed outside California (e.g., in the northern portion of the range, as far north as Canada) migrate into California and augment the winter population. Detailed information on the winter movements of these owls is not available, but due to an influx of migrants, California has a larger number of burrowing owls in winter. In addition, an apparently small proportion of western burrowing owls that breed in California migrate south into Mexico or other areas outside California.

Burrowing owls can live 5–8 years and start breeding at 1 year old. Survival of adults and juveniles is variable across California. The between-year adult return rate to nesting sites (used as a proxy for survival rate) has been reported as low as 30% and as high as 83%. A long-term study at the San Jose International Airport suggested that low adult survival rate contributed to a declining population. A variety of predators feed on burrowing owl eggs and young while in the nest, including skunks, badgers, foxes, raccoons, and snakes. Raptors, ravens, crows, and coyotes are predators of older nestlings and adult owls when they are above ground.

The degree of connectivity among populations of western burrowing owls in California is unclear. Individual owls are known to move large distances across biogeographic areas in California, and a genetic analysis from three widely separated study areas failed to identify population differentiation or evidence for genetic inbreeding or population isolation. On the other hand, of 4,708 burrowing owls banded in California, 75 of the 106 owls that were later resighted were within 18 kilometers (roughly 11 miles) of the banding location. The Petition suggests that movement of resident breeding burrowing owls in California is limited and states that there is no evidence that owls from abundant populations supplement geographically isolated or depleted populations through migration.

### **Range, Distribution, and Distribution Map**

This section includes discussion of the Range, Distribution, and Detailed Distribution Map petition components (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

#### ***Scientific Information in the Petition***

The Petition discusses the range and distribution of western burrowing owl in the “Natural History” section on pages 2–4 and in the “Historical and Recent Distribution and Abundance” section on pages 22–82. The Petition quotes from Grinnell and Miller (1944) to describe the historical range of the burrowing owl in California:

“Suitable areas (treeless and level) almost throughout the state, from the Oregon line east of the Siskiyou mountains south to the Mexican border, and from the Nevada border and Colorado River west to the ocean shore; includes practically all islands from the Farallones south. Mostly rare or wanting in coastal counties north of Marin and in all mountainous areas.”

The Petition states that owls are found primarily in “wide, lowland, interior valley bottoms and in flat coastal lowlands,” generally below 60–300 m in elevation. Occurrence data (historical and contemporary observations) was presented for all counties in the California range, with burrowing owls being described as extirpated from several counties (16% of the California range). The Petition provides a map showing the burrowing owl’s breeding range and areas with extirpation or near extirpation (Figure 2). This map also provides information on historical distribution and the status of western burrowing owl populations within its range in California.

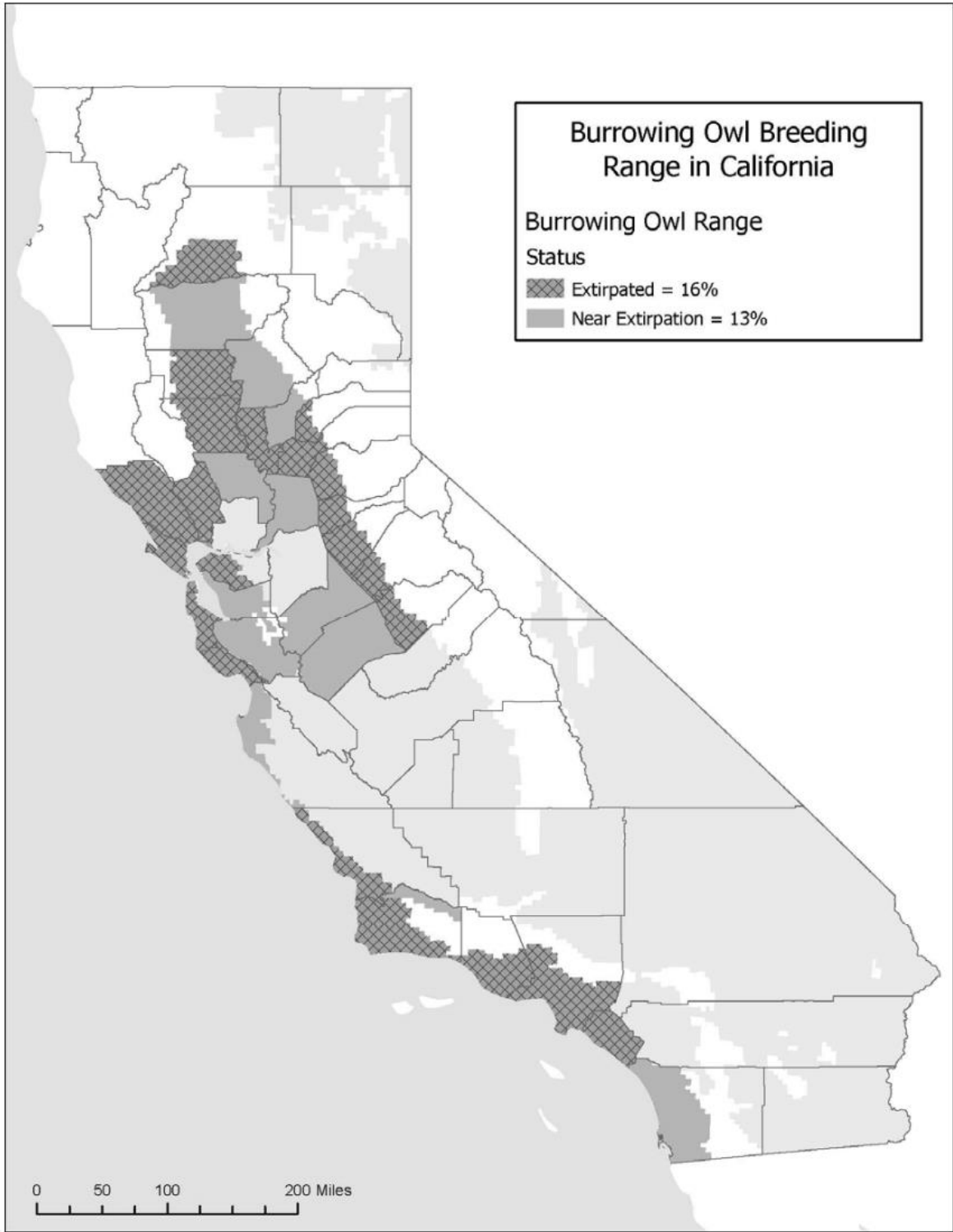


Figure 2. Range of breeding western burrowing owls in California, showing areas of extirpation and near-extirpation. This map was included in the Petition as Figure 1.

Following a statewide survey conducted in 1991–1993, Desante et al. (1996, 2007) reported that 71% of the breeding burrowing owls in California occurred in the Imperial Valley and 24% occurred in the Central Valley. The remaining 5% of the population was described as distributed across the San Francisco Bay Area, central-western California, and southwestern California. The deserts of northern and southern California were not included in the 1991–1993 statewide survey. A second statewide survey in 2006–2007 found a similar population distribution, but with a fairly large proportion of individuals in some of the desert areas not previously surveyed (western Mojave Desert (6%) and Palo Verde Valley in the Sonoran Desert (2%); Wilkerson and Siegel 2010).

## **Habitat**

This section includes discussion of the kind of habitat necessary for the survival of western burrowing owl (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

### ***Scientific Information in the Petition***

The Petition discusses the habitat of the burrowing owl in the “Habitat Requirements” section on pages 10–13. The Petition describes burrowing owl habitat broadly as “a variety of arid and semi-arid environments, with well-drained, level to gently sloping topography, characterized by sparse vegetation, low-stature vegetation, and bare ground.” Burrowing owls occur in natural environments such as grasslands, shrublands, and deserts, but also occur in human-altered landscapes (e.g., agricultural lands, golf courses, cattle pastures). Primary habitat requirements include the presence of burrows for roosting and nesting and vegetation structure that is relatively short and sparse. Burrows used by burrowing owls in California are usually excavated by ground squirrels. Short vegetation allows burrowing owls to see approaching predators and a sparse vegetation structure is necessary for prey accessibility.

## **Abundance**

### ***Scientific Information in the Petition***

The Petition discusses the abundance of the western burrowing owl in the “Historical and Recent Distribution and Abundance” section on pages 22–87.

There have been two statewide surveys for burrowing owls. The first was conducted in 1991–1993 (DeSante and Ruhlen 1995; DeSante et al. 1996, 2007), but did not include the Great Basin and the deserts of southeastern California. The second was in 2006–2007 when the breeding range was resurveyed by Wilkerson and Siegel (2010) using similar methodology as the survey in the 1990s. The 2006–2007 survey covered areas in the eastern deserts that had not been surveyed in the 1990s. By comparing these two surveys, Wilkerson and Siegel (2010) “assessed changes in distribution and abundance from 1993.”

Other sources of abundance data cited in the Petition include the Department’s 2003 petition evaluation, which “located additional information on historical distribution and abundance up

to 2003 (CDFG 2003).” The Petition also includes recent data from the Department’s Natural Diversity Database and the Cornell University eBird project database from 2015 to 2023. A variety of other sources of data are mentioned in the Petition, including published literature, local surveys, museum collections, Breeding Bird Survey data, personal communications, and anecdotes.

Using this information, the petitioners present data on numbers of breeding and migratory burrowing owls for each county within the species’ historical range. Some counties have very limited data while others have data from multiple local surveys. As mentioned above, the petition also cites two statewide surveys. Abundance data presented in the Petition for breeding western burrowing owls from multiple time periods across broad regions of California are summarized in Table 1, below.

Table 1. Estimates of breeding pairs of burrowing owls in California by region. Estimates for 1991–1993 by DeSante and Ruhlen (1995) and DeSante et al. (1996, 2007). Estimates for 2003 by CDFG (2003). Estimates for 2006–2007 by Wilkerson and Siegel (2010). Estimates for 2023 by petitioners based on regional surveys and other information in the Petition. Table recreated from Table 1 in the Petition.

<b>Region</b>	<b>1991–1993</b>	<b>2003</b>	<b>2006–2007</b>	<b>2023</b>
Northern Desert	?	90–149	0–5	1–10
Central Valley (total)	2,221	2,221–2,227	1,670	<1,465
Northern Central Valley	231	231	12	1–2
Middle Central Valley	594	594–600	545	<350
Southern Central Valley	1,396	1,396	1,113	<1,113
San Francisco Bay Area (total)	165	165	119	<25
Bay Area Coast	0	0	0	0
Bay Area Interior	165	165	119	<25
Central-Western (total)	46	92	84	<84

Central-Western Coast	8	8	0	0
Central-Western Interior	38	38	84	<84
Carrizo Plain	NA	46	?	?
Southwestern (total)	263	263	192	<140
Southwestern Coast	36	36	42	<40
Southwestern Interior	227	227	150	100?
Coachella Valley	0	10–20	53	<53
Imperial Valley	6,571	5,600–6,571	6,408	<4,000
Southern Deserts (total)	?	500–1,000	772	<772
Palo Verde Valley	NA	500–1,000	179	<50?
<b>Statewide</b>	<b>9,266</b>	<b>8,941–10,477</b>	<b>9,298–9,303</b>	<b>&lt;6,549</b>

## Population Trend

### *Scientific Information in the Petition*

Using the data presented in the Abundance section, the Petition discusses western burrowing owl population trends in the “Population Trends” section on pages 82–87.

The Petition references several publications that suggest burrowing owl numbers in California declined prior to the first statewide survey in the 1990s. Grinnell and Miller (1944) suggested that population declines had occurred in portions of the state by the 1940s. Remsen (1978) stated that declines observed in the 1940s had “continued through to the present time.” The researchers that conducted the first statewide burrowing owl survey suggested that population declines had occurred between the 1980s and the 1991–1993 surveys (DeSante et al. 1996, 2007); estimated decline in the number of burrowing owl groups (a surrogate for number of colonies) was 62–77% in all of coastal California, 51–66% in the San Francisco Bay Area Interior, and 1–48% in the Central Valley.



Following the second statewide survey in 2006–2007, Wilkerson and Siegel (2010) reported an estimated 11% decline in the statewide breeding population since 1993 (excluding the desert regions that were not surveyed in 1991–1993). The number of burrowing owl breeding pairs for the entire Central Valley declined 27% from the 1991–1993 surveys, and the number of pairs in the San Francisco Bay Area declined 28%. Using a different estimation method, Wilkerson and Siegel (2010) also report that the number of pairs in the southwestern interior declined 95%.

The Petition lists the California counties where burrowing owls are thought to have been extirpated, including portions of the northern Central Valley, all of the coastal Bay Area, most of the central and southern coast, as well as some areas in the interior of the Bay Area. The Petition states areas of extirpation comprise roughly 16% of the burrowing owls' former range. The Petition states burrowing owls are likely to be very close to being extirpated from another 13% of their range, including in portions of the Central Valley, the remaining areas in the interior Bay Area, and the central and southwestern coasts (Figure 2).

The Petition lists the Coachella Valley and Palo Verde Valley as areas where the burrowing owl population increased between the two statewide surveys. The Imperial Valley experienced a significant increase in breeding burrowing owls during the early-to-mid 1900s, commensurate with the intensification of regional agricultural activities; however, the most recent population estimate is significantly less than the three prior estimates. The Petition also discusses two attempts to reintroduce burrowing owls in California—one in San Diego County and another in the Santa Clara Valley.

## **Threats**

This section includes discussion of the factors affecting the ability of the western burrowing owl population to survive and reproduce and the degree and immediacy of threat (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

### ***Scientific Information in the Petition***

The Petition discusses threats to the western burrowing owl in the section titled “Factors Affecting Survival and Reproduction; and Degree and Immediacy of Threats” on pages 88–125.

The Petition identifies five primary threats:

- 1) Habitat loss, fragmentation, and degradation from urban and suburban development, industrial energy development, destruction of ground squirrels, and agricultural practices;
- 2) Direct mortality from development projects, collisions with vehicles and structures, pesticides, and agricultural activities;
- 3) Relocation of owls and failure to maintain artificial nest boxes;
- 4) Population isolation and demographic stochasticity; and
- 5) Predation.

The Petition also discusses other anthropogenic factors that may influence the survival of the species, including harassment, fire control, disease, and climate change.

Of the five primary threats it lists, the Petition identifies habitat loss, fragmentation, and degradation as the primary threat to burrowing owls in California. The Petition suggests the elimination of ground squirrels as a result of control programs is one of the main factors contributing to habitat loss and degradation and both the recent and historical decline of the species. Ground squirrels play a crucial role in supporting burrowing owl populations through the excavation of burrows for breeding, refuge, and food-cache sites, mutual alarm-calling, attracting predators away from owls, and providing shelter in burrows for species burrowing owls prey on.

According to the Petition, agricultural landscapes in California can support dense populations of burrowing owls if there are sufficient flat, open areas suitable for burrows and sustaining prey populations. However, certain types of agriculture pose significant threats to burrowing owls' survival through habitat destruction, fragmentation, and degradation. Factors such as pesticide exposure, destruction of nest burrows by farming machinery, and the conversion of grasslands and rangelands to croplands have contributed to burrowing owl population decline. Orchards and vineyards also pose a direct challenge to burrowing owl survival, as these environments lack suitable nesting sites and increase the risk of predation. While livestock grazing can be compatible with, and even beneficial for, burrowing owl habitat, heavy grazing can diminish prey abundance and the control of ground squirrels in such areas to enhance livestock production can further degrade the habitat. Burrowing owls have been pushed to the edges of croplands, often surviving along roadside embankments and earthen irrigation canals and drains. This makes them vulnerable to flooding, conversion of earthen canals to concrete, and drain dredging. Overall, while some agricultural practices can be compatible with burrowing owl habitat, the Petition concludes that intensive agriculture often leads to habitat loss and degradation.

The Petition states that burrowing owls face numerous other threats to their habitat, primarily stemming from urban development, renewable energy projects, and invasive plant species. The majority of breeding burrowing owls reside in agricultural areas like the Imperial Valley, Central Valley, and Palo Verde Valley. According to the Petition, rapid human population growth and the conversion of agricultural or undeveloped lands to urban and suburban uses in these areas causes the loss of nesting and foraging habitat for burrowing owls.

According to the Petition, direct mortality of burrowing owls occurs from numerous sources in California. The owls inhabit the complex burrow systems of ground squirrels and heavily rely on their underground shelters for protection, especially during the breeding season when caring for their young. However, this behavior makes burrowing owls exceptionally vulnerable to various human activities, such as earthmoving, tilling, and rodent fumigation, which can trap or crush them underground. Urban vandalism, such as plugging burrows, poisoning from primary or secondary ingestion of insecticides and anticoagulant rodenticides, vehicle strikes, and collisions with aircraft can also pose threats to these owls. The Petition states that electric security fences,

industrial renewable energy facilities, and high-speed rail construction further exacerbate this threat.

The relocation of burrowing owls in California, often conducted to mitigate impacts of urban development, is another potential threat for owl populations, according to the Petition. The Petition states that active relocation efforts have had limited success and can lead to stress for burrowing owls. Passive relocations, where burrowing owls are simply displaced without monitoring or follow-up, provide no information about the fate and breeding success of the relocated birds. Despite attempts to mitigate direct harm to burrowing owls during development projects, the Petition states the overall effectiveness of relocation strategies remains questionable. Artificial burrows, commonly used in relocation attempts, require ongoing maintenance, and may not adequately substitute for natural burrows.

The Petition suggests that burrowing owl populations in California face significant challenges due to their small population size and fragmented distribution. Small, isolated colonies are vulnerable to extirpation, especially without the influx of immigrants. Fragmented populations are at higher risk of extinction due to factors like reproductive isolation, inbreeding, and increased predation, and environmental factors such as drought or reduced prey density may further threaten these small populations. While some individual burrowing owls are capable of dispersing widely, the overall demographic and genetic connectivity among California burrowing owl populations is poorly understood. Recent studies have revealed genetic differences between resident and migrant owls, with resident populations showing lower levels of genetic diversity, isolation-by-distance, and higher levels of inbreeding (Barr 2023; Barr et al. 2023).

Predation by native terrestrial and avian predators poses a threat to burrowing owls and is exacerbated by their ground-dwelling behavior. Predation by non-native predators, such as introduced red foxes (*Vulpes vulpes*), feral cats (*Felis domesticus*), and domestic dogs (*Canis lupus familiaris*) also occurs and may be exacerbated by urbanization. While predation may not be a significant threat to healthy burrowing owl populations, it can significantly impact fragmented or remnant populations, especially when combined with other threats.

In sum, the Petition provides sufficient information regarding factors threatening burrowing owl survival and reproduction and the degree and immediacy of these threats.

### **Existing Management Efforts**

This section includes discussion of the impact of existing regulatory mechanisms and management efforts (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

### ***Scientific Information in the Petition***

The Petition discusses the impact of existing regulatory mechanisms and management efforts in the “Inadequacy of Existing Regulatory Mechanisms and Management Efforts” section on pages 126–164.

The Petition describes the current regulatory mechanisms that may benefit the western burrowing owl, including its status as a state Species of Special Concern (SSC), its status as a federal Bird of Conservation Concern, protections under the Migratory Bird Treaty Act, its frequent treatment as a “rare” species under California Environmental Quality Act, Fish and Game Code prohibitions against take of birds (with special protections for raptors), and a few regional regulations (e.g., a dinking ordinance enacted in the city of Davis in Yolo County to protect burrowing owls). The Petition concludes that the current regulatory mechanisms are insufficient to reverse burrowing owl population declines and suffer from insufficient enforcement, which can lead to project proponents ignoring or dismissing them.

The Petition also describes the current management efforts for burrowing owls. There are 35 approved federal Habitat Conservation Plans (HCPs) in California and 22 approved state Natural Community Conservation Plans (NCCPs)—many of which are joint HCP/NCCPs—that include western burrowing owl as a covered species. Other management efforts include Department of Defense Integrated Natural Resource Management Plans, 21 Department-approved conservation banks, and 14 U.S. Fish and Wildlife Service-approved mitigation banks in California that sell credits for the burrowing owl. Additionally, the California Burrowing Owl Consortium, founded in 1989, created the “Burrowing Owl Survey Protocol and Mitigation Guidelines.” The Department has also developed guidelines for excluding burrowing owls prior to activities that will result in burrow destruction, as well as burrowing owl avoidance, minimization, and mitigation approaches. The Petition also summarizes local management efforts in Santa Clara County and the City of Davis (Yolo County).

The Petition contends that the current management efforts for the burrowing owl are inadequate and ineffective. The petitioners argue that current HCPs/NCCPs often fail to adequately address the specific needs of burrowing owls. They summarize studies that report shortcomings of HCPs including the absence of requirements for recovery efforts for covered species, lack of rigorous impact assessments, insufficient mitigation measures, failure to secure funding to ensure mitigation occurs, and a lack of monitoring for effectiveness. The Petition suggests that HCPs/NCCPs have not been effective for burrowing owl conservation because the species continues to decline across the state despite the high numbers of HCPs/NCCPs in California.

The Petition also states that conservation and mitigation banks often lack effective monitoring and management plans, leading to uncertainty regarding their benefits to burrowing owl populations. The Petition explains that there is insufficient information on the number of burrows supported on bank lands. The Petition further states that “the small number of conservation banks with owl habitat, their small size, and the rising cost of purchasing suitable land for habitat make this approach incapable of protecting significant populations of owls” (p. 146). With regard to the guidelines and protocols created by the California Burrowing Owl

Consortium and the Department, the Petition contends that these documents have been misused, were not designed for landscape-scale long-term conservation efforts, and rely on voluntary compliance, limiting their efficacy. Lastly, the Petition states that county and city conservation efforts have not provided meaningful gains for burrowing owl conservation.

## **Future Management**

This section includes discussion of suggestions for future management (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

### ***Scientific Information in the Petition***

The Petition discusses suggestions for future management in the “Recommended Management and Recovery Actions” section on pages 165–167.

The Petition summarizes 15 management and recovery actions recommended for western burrowing owls:

1. List the imperiled populations or the statewide population under CESA;
2. Make the Department’s 2012 survey and mitigation guidelines for burrowing owls required (instead of voluntary) and implemented for HCPs;
3. Update the 2012 guidelines to require survey methods based on more recent research;
4. Limit the use of passive relocation (eviction);
5. Continue the Department’s current translocation policy, which limits active relocation to only scientific research or for NCCPs;
6. Accelerate regional conservation planning in the areas where the species is close to extirpation;
7. Focus on permanent protection (land acquisition, conservation easements) for large, stable colonies currently on unprotected private lands;
8. Require stronger mitigation for impacts to breeding owls or their habitat;
9. Incentivize local mitigation for off-setting project impacts;
10. Increase enforcement of relevant Fish and Game Code sections (3503 and 3503.5);
11. Prioritize public and nonprofit ownership of mitigation and conservation banks over for-profit ventures;
12. Conduct a statewide breeding owl survey;
13. Draft a statewide conservation and recovery plan for the species;
14. Amend current management and land use plans to provide appropriate protections for western burrowing owls; and
15. Review current HCPs/NCCPs that cover western burrowing owls to ensure they are adequately protective.

## **Availability and Sources of Information**

### ***Scientific Information in the Petition***

The Petition cites an extensive list of sources on pages 170–220. No information relating to the petitioned action was submitted to the Department during the evaluation of the Petition pursuant to Fish and Game Code section 2073.5 (See also Fish & G. Code, § 2073.4, subd. (a)). The Department referenced no additional literature when developing this Petition Evaluation.

### **Sufficiency of Scientific Information to Indicate the Petitioned Action May Be Warranted**

The Department evaluated the petition components set forth in California Code of Regulations, title 14, section 670.1, subdivision (d)(1) for sufficiency of information pursuant to Fish and Game Code section 2073.5. The Department finds that the Petition contains sufficient information regarding each of the petition components. If the Commission accepts the Petition for further consideration under CESA, the Department will commence a review of the status of the species at that time pursuant to Fish and Game Code section 2074.6 and California Code of Regulations, title 14, section 670.1, subdivision (f).

### **Recommendation to the Commission**

Pursuant to Fish and Game Code section 2073.5, the Department has evaluated the Petition on its face and determined that, based upon the information contained in the Petition, there is sufficient scientific information to indicate that one or more petitioned action(s) to list the western burrowing owl as threatened or endangered may be warranted, including, but not limited to information in the Petition regarding the historical and current range and distribution of western burrowing owl indicating a decline in the species' range over time, information indicating that western burrowing owl has experienced population declines in regions of California and information indicating that threats to the species, coupled with long-term population declines, suggest a high degree and immediacy of threat to western burrowing owl populations in California. This information could lead a reasonable person to conclude that listing may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

### **Literature Cited**

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