

1 **A.4 WESTERN BURROWING OWL** 2 **(*ATHENE CUNICULARIA HYPUGAEA*)**

3 **A.4.1 Legal and Other Status**

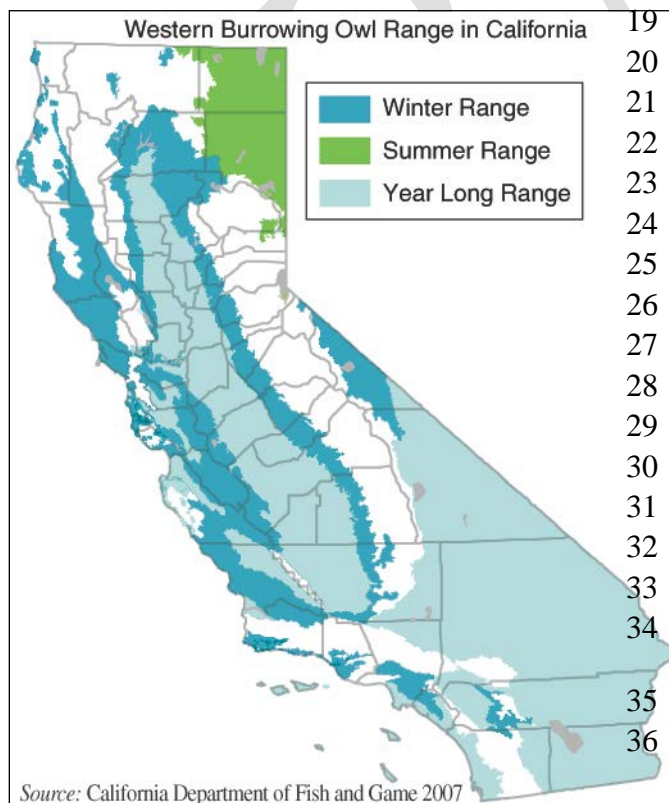
4 The western burrowing owl was initially designated as a
5 state bird species of special concern in 1978 (Remsen 1978)
6 by the California Department of Fish and Game (DFG). The
7 most recent draft of the revised California Bird Species of
8 Special Concern (Shuford, and Gardali 2008) identifies the
9 burrowing owl as a “second priority” bird species of special
10 concern, indicating that the western burrowing owl population or range size is moderately to
11 greatly reduced and that threats are projected to greatly reduce the taxon’s population in
12 California in the next 20 years. Western burrowing owl nest sites are protected in California
13 under Fish and Game Code Section 3503.5. The western burrowing owl has no federal
14 regulatory status; however, the species is protected under the federal Migratory Bird Treaty Act
15 and is designated as a Bird of Conservation Concern by the U.S. Fish and Wildlife Service
16 (USFWS 2002).



photo courtesy Carol Davis

17 **A.4.2 Species Distribution and Status**

18 **A.4.2.1 Range and Status**



There are two subspecies of burrowing owls in North America (Dechant et al. 2003). The breeding range of the Florida burrowing owl (*A. cunicularia floridana*) is restricted to Florida and adjacent islands. The breeding range of the western burrowing owl (*Athene cunicularia hypugaea*) extends south from southern Canada throughout most of the western half of the United States and south to central Mexico. The winter range is similar to the breeding range except that most owls from the northern areas of the Great Plains and Great Basin migrate south and southern populations are resident year round (Haug et al. 1993).

Western burrowing owls are generally widely distributed in suitable habitat

1 throughout the lowland portions of California; however, occupied sites have ranged from 200 feet
2 below sea level at Death Valley to above 12,000 feet at Dana Plateau in Yosemite (DFG 2000). In
3 Southern California, the species is fairly common along the Colorado River Valley (Rosenberg et al.
4 1991) and in the agricultural region of the Imperial Valley. They occur rarely in the Southern
5 California deserts and the high Great Basin deserts of eastern and northeastern California (Small
6 1994). Breeding populations in central California include the southern San Francisco Bay
7 between Alameda and Redwood City, the interior valleys and hills in the Livermore area, and the
8 Central Valley (DeSante et al. 1997). While the northeastern and eastern populations are
9 migratory, the central and Southern California populations are generally considered
10 predominantly non-migratory (Haug et al. 1993).

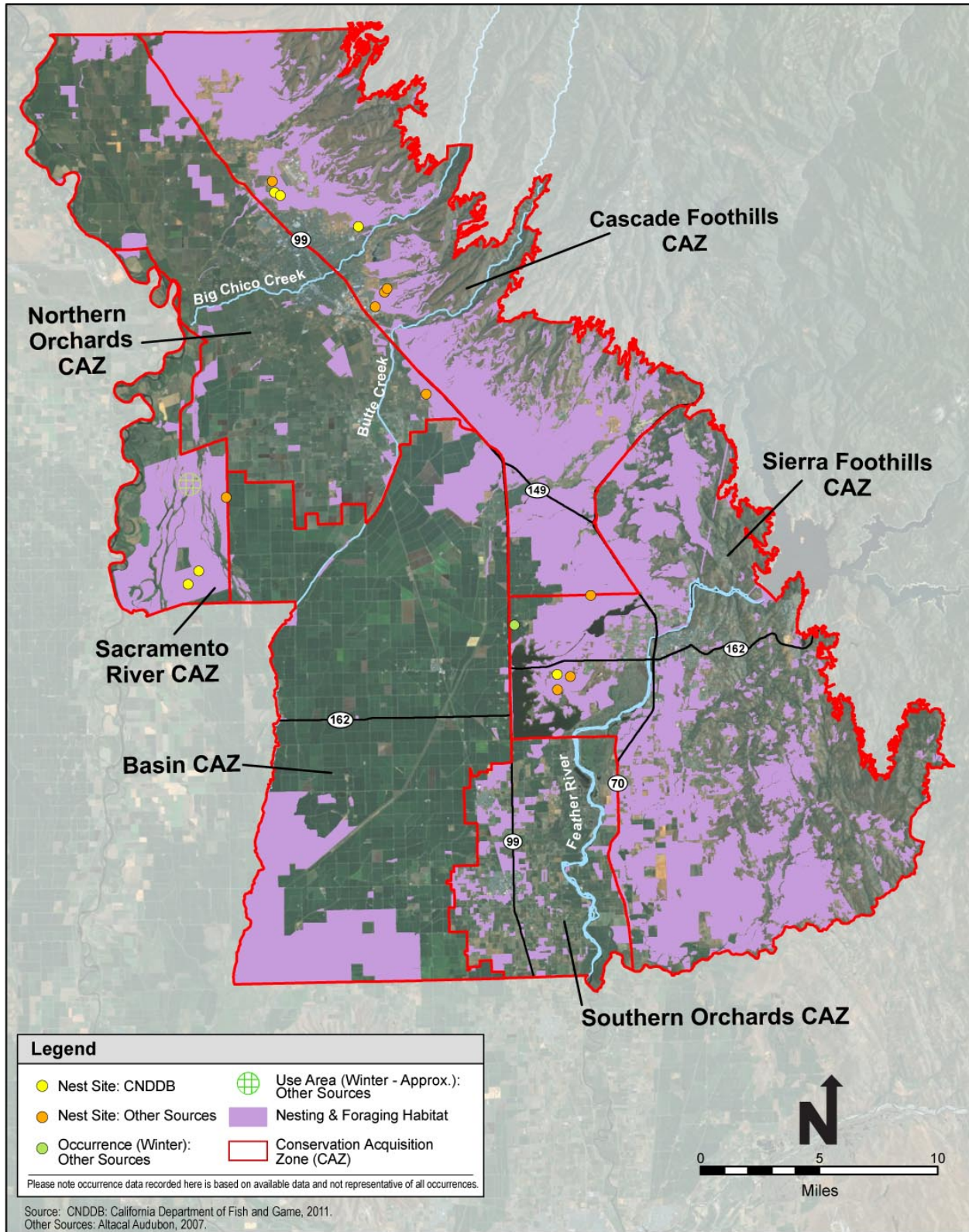
11 The overall population trend throughout the subspecies' North American range is reportedly
12 declining. James (1993) reports that 54 percent of the areas sampled reported declining western
13 burrowing owl populations. Breeding Bird Surveys (BBS) conducted between 1980 and 1989
14 also report significant declines in many areas (Haug et al. 1993).

15 The only comprehensive statewide breeding season survey was conducted from 1991 to 1993 by
16 the Institute for Bird Populations (DeSante and Ruhlen 1995). They estimated a statewide
17 population of 9,266 breeding pairs with 71 percent occurring in the Imperial Valley, 24 percent
18 in the Central Valley, and 1.8 percent in the Bay Area.

19 The population trend in California is also reportedly declining. Surveys in California in 1986 to
20 1991 found population decreases of 23 to 52 percent in the number of breeding groups and 12 to
21 27 percent in the number of breeding pairs of owls (DeSante et al. 1997). Nearly 60 percent of
22 western burrowing owl colonies that existed in the 1980s reportedly disappeared by the early
23 1990s (DeSante and Ruhlen 1995, DeSante et al. 1997). Coastal areas in particular have
24 experienced extirpations or near extirpations in recent years presumably from habitat loss. While
25 western burrowing owls in the Central Valley have exhibited strong site fidelity even with
26 increasing habitat fragmentation, many active areas have been locally extirpated due to
27 increasing urbanization and related causes.

28 **A.4.2.2 Distribution and Status in the Plan Area**

29 Western burrowing owls are resident in Butte County year-round and occur in relatively low
30 densities. Areas of suitable habitat that have the most likelihood of occurrence include the non-
31 orchard agricultural areas along the western side of Butte County. The valley and foothill
32 grasslands along the east side of the study area also appear to support generally suitable
33 conditions. CNDDDB reports very few occurrences of western burrowing owl in Butte County;
34 all are reported in the western portion of the county (see Figure A-4). The most recent breeding
35 season record, reported in 2000, is along Nelson Road just east of State Route 99 and just north
36 of Thermalito Afterbay (Figure A-4). Six additional historical breeding season records from
37 1992 and 1993 are reported, as well as seven recent wintering sites from 2006 and 2007 that are
38 distributed between just south of Highway 162 on the south to north of Chico (Figure A-4).



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Figure A-4. Western Burrowing Owl Modeled Habitat and Recorded Occurrences

1 **A.4.3 Habitat Requirements and Special Considerations**

2 Western burrowing owls are found in open, dry grasslands; agricultural and range lands; and desert
3 habitats often associated with burrowing animals (Klute et al. 2003). They can also occupy golf
4 courses, airports, road and levee embankments, and other disturbed sites where soil is sufficiently
5 friable for burrows (Haug et al. 1993). Western burrowing owls typically use the burrows created
6 by other species, particularly the California ground squirrel (*Spermophilus beecheyi*). The
7 presence of these burrowing species can be a good indicator of the potential presence of the
8 western burrowing owl.

9 **A.4.3.1 Nesting**

10 In Northern California, nest sites are usually found in abandoned ground squirrel burrows; however,
11 other mammal burrows and artificial sites (e.g., culverts, pipes, and rock piles) are also used.
12 Western burrowing owls generally select sites in relatively sandy habitats that allow for modification
13 of burrows and maximize drainage. Vegetation cover is typically low around the burrow to facilitate
14 viewing and hunting. While occupied burrows are sometimes found in flat landscapes, often in
15 elevated mounds created by burrowing activity; they are also commonly found on hillsides, levee
16 slopes, or other vertical cuts, probably to facilitate drainage and maximize visibility. Nest sites are
17 also often associated with nearby perches, including standpipes, fences, or other low structures.

18 Optimal nesting locations are within an open landscape with level to gently sloping topography,
19 sparse or low grassland or pasture cover, and a high density of burrows. Western burrowing owls
20 also sometimes show a tolerance for habitat fragmentation and will continued to occupy otherwise
21 suitable sites until a minimum area threshold is reached. Western burrowing owls are solitary nesters
22 or may nest in loose colonies, usually from four to 10 pairs (Zarn 1974); however, larger colonies
23 have been documented. Most pairs occupy a natal burrow and at least one additional satellite
24 burrow.

25 The dimensions of the nest burrow vary with location, age of burrow, and the species that originally
26 excavated it. Typical burrows constructed by ground squirrels are from 3 to 6 inches in diameter and
27 extend underground at a gradual downward slope from 3 to 10 feet with an enlarged cavity at the end
28 of the burrow. Burrow entrances are often adorned with various objects, feathers, and pellets. The
29 burrow is often lined with grass or other material (Haug et al. 1993). Nest burrow reuse is well
30 documented (Martin 1973, Gleason 1978, Rich 1984, Plumpton and Lutz 1993a, Lutz and
31 Plumpton 1999). Western burrowing owls show a high degree of nest site fidelity and reuse the
32 same nesting burrows and satellite burrows for many years if left undisturbed.

33 Burrowing owls seem to tolerate some level of human activity near nesting sites. They can be
34 found in open spaces near human developments such as areas around airports, golf courses, and
35 military lands (Thomsen 1971, Barclay 2007). Modest amounts of vehicle traffic do not appear
36 to significantly affect burrowing owl behavior or reproductive success (Plumpton and Lutz
37 1993b).

1 **A.4.3.2 Foraging**

2 Western burrowing owls forage in open grasslands, pasturelands, agricultural fields and field
3 edges, fallow fields, and along the edges of roads and levees. Vegetation is low to maximize
4 visibility and access. Short perches such as fenceposts are often used to enhance visibility.

5 **A.4.4 Life History**

6 **A.4.4.1 Seasonal Patterns**

7 As noted above, western burrowing owls are resident in Northern California year-round;
8 however, local seasonal movements often occur and breeding sites will often be unoccupied
9 during the non-breeding season. In California, the breeding season – defined as the period from
10 pair bonding to fledging – generally occurs from February to August. The peak activity period
11 occurs from April through July.

12 **A.4.4.2 Reproduction**

13 Adults begin pair bonding and courtship in February through March. Following pair formation, a
14 nest is established in the natal burrow and females lay a clutch of six to 11 eggs. Average clutch size
15 is seven to nine eggs. Eggs are incubated entirely by the female for a period between 28 and 30 days.
16 During this time, the female is provisioned with food by the male. Following hatching, the young
17 remain in the natal burrow for 2 to 4 weeks, after which they begin to emerge from the burrow and
18 can be observed roosting at the burrow entrance. The female begins hunting as young become less
19 dependent. Adults also often relocate chicks to satellite burrows presumably to reduce the risk of
20 predation (Desmond and Savidge 1998) and possibly to avoid nest parasites (Dechant et al. 2003).
21 After approximately 44 days, young leave the natal burrow and by 49 to 56 days begin to hunt live
22 insects. During this time, the juveniles expand their range and may find cover in the satellite burrow.
23 The juveniles continue to be provisioned by the adults until mid-September when they molt into
24 adult plumage and begin to disperse (Landry 1979). King and Belthoff (2001) report that dispersing
25 young use satellite burrows in the vicinity of their natal burrows for about 2 months after hatching
26 and before departing the natal area.

27 **A.4.4.3 Foraging Behavior and Diet**

28 Western burrowing owls are active day and night and will hunt throughout the 24-hour day, but
29 are mainly crepuscular, hunting mostly at dusk and dawn, and are less active in the peak of the
30 day. They tend to hunt insects in daylight and small mammals at night. They usually hunt by
31 walking, running, hopping along the ground, flying from a perch, hovering, and fly-catching in
32 mid-air.

33 Western burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and
34 grasshoppers, comprise a large portion of their diet. Small mammals, especially mice, rats,
35 gophers, and ground squirrels, are also important food items. Other prey animals include reptiles

1 and amphibians, scorpions, young cottontail rabbits, bats, and birds such as sparrows and horned
2 larks. Consumption of insects increases during the breeding season (Zarn 1974, Tyler 1983,
3 Johnsgard 1988, Thompson and Anderson 1988, John and Romanow 1993).

4 **A.4.5 Threats**

5 **A.4.5.1 Urbanization/Fragmentation**

6 Urbanization, including residential and commercial development, and the construction of
7 infrastructure necessary to sustain development (e.g., roads and oil, water, gas, and electrical
8 conveyance facilities), is a principal cause of habitat loss for western burrowing owls and is a
9 continuing threat to remaining Northern California western burrowing owl populations.
10 Urbanization permanently removes western burrowing owl habitat and has led to permanent
11 abandonment of many western burrowing owl colonies in the developing portions of the Central
12 Valley, Bay Area, and throughout the state.

13 While urbanization is considered a key cause for population declines, western burrowing owls
14 are also known to exhibit strong site fidelity and have shown a relatively high level of tolerance
15 for human encroachment, degradation of native habitats, and fragmentation of habitats (Schultz
16 1993, Trulio 1995). Active western burrowing owl breeding colonies have been reported in
17 small parcels or narrow strips of disturbed habitat along levees or utility corridors and
18 surrounded by urban development. Colonies have also been reported along the edges of airport
19 runways, around the perimeter fences of prisons, and in other urbanized or highly disturbed
20 habitats (Thompson 1971). While disturbances may depress western burrowing owl
21 reproductive potential in urban settings compared with more natural habitats (Thompson 1971),
22 the owls will often continue to occupy traditional sites as long as essential habitat elements
23 remain present, until the disturbances force the owls out, or until the extent of available habitat is
24 reduced below habitat requirements (Millsap and Bear 1988).

25 **A.4.5.2 Agricultural Crop Conversion**

26 Western burrowing owls sometimes nest on edges of agricultural areas, foraging in suitable
27 agricultural fields (Gervais et al. 2003) (e.g., recently harvested fields, alfalfa and other hay crop
28 fields, irrigated pastures, fallow fields). Conversion of agricultural fields to crop types such as
29 orchards, vineyards reduces the available foraging habitat for western burrowing owl and leads
30 to abandonment of nesting areas.

31 **A.4.5.3 Levee Maintenance**

32 Western burrowing owl nest sites can also be found along the outside slope or at the toe of levees
33 (DeSante et al. 2004, Rosenburg and Haley 2004); however, levee stability practices used for
34 flood control, including vegetation removal, grading, and reinforcement with rock can destroy
35 burrowing owl nesting habitat (Catlin and Rosenburg 2006).

1 **A.4.5.4 Rodent Control**

2 Rodent control, particularly along levees and roadsides, can decimate ground squirrel populations,
3 thereby reducing available nesting and cover habitat for western burrowing owls.

4 **A.4.5.5 Other Human Disturbances**

5 Although western burrowing owls are relatively tolerant of low levels of human activity, human-
6 related impacts such as shooting and burrow destruction adversely affect this species (Zarn 1974,
7 Haug et al. 1993). Artificially enhanced populations of native predators (e.g., gray foxes,
8 coyotes) and introduced predators (e.g., red foxes, cats, dogs) near western burrowing owl
9 colonies can be a significant local problem. Burrowing owls can also get tangled in loose fences,
10 abandoned wire, fishing line, rat traps, and other human-made materials.

11 The conversion of burrowing owl habitat for purposes of meeting human needs decreases both
12 the abundance and quality of nesting habitat (Barclay et al. 1998). Additionally, as a species that
13 does not excavate their own burrows, they are dependent on burrowing mammals that are
14 commonly eradicated by humans. Few provisions exist to protect burrowing owl habitats and
15 the species that create their burrows. As a result, burrowing owls appear to be declining
16 throughout most of California.

17 **A.4.6 Relevant Conservation Efforts**

18 Few conservation efforts have been undertaken to conserve western burrowing owl populations.
19 The rejection of recent efforts to list the species at the state and federal levels limits the extent of
20 possible regulatory influence. Protection typically occurs at the local project level through
21 implementation of the guidelines prepared by DFG (1994). The guidelines do address protection
22 of active western burrowing owl sites and compensation for impacts to these sites; however, the
23 guidelines do not address conservation or protection at a regional level. DFG is developing a
24 statewide conservation strategy for the burrowing owl.

25 Some regional conservation efforts in California have focused on the development and
26 implementation of habitat conservation plans/natural community conservation plans. These
27 regional conservation approaches can be an effective tool to manage and sustain burrowing owl
28 populations if they protect sufficient suitable and occupied western burrowing owl habitat. The
29 western burrowing owl is a covered species or a proposed covered species in several regional
30 conservation plans in the Central Valley region of California. These include the Placer County
31 Conservation Plan, the San Joaquin County Multi-species Habitat Conservation and Open Space
32 Plan, the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation
33 Plan, the Natomas Basin Habitat Conservation Plan, the South Sacramento County Habitat
34 Conservation Plan, the Solano County Multispecies Habitat Conservation Plan, the Yolo County
35 Natural Heritage Program Plan and the Bay Delta Conservation Plan. If effectively coordinated,
36 these efforts can be a valuable tool in managing burrowing owl populations in the central portion
37 of Northern California.

1 **A.4.7 Species Habitat Suitability Model**

2 **A.4.7.1 Nesting and Foraging Habitat**

3 Nesting and foraging habitat for the western burrowing owl includes the following land cover
4 types:

- 5 • Blue oak savanna;
- 6 • Grassland;
- 7 • Grassland with vernal swale complex;
- 8 • Vernal pool;
- 9 • Altered vernal pool;
- 10 • Disturbed ground;
- 11 • Irrigated cropland;
- 12 • Irrigated pasture; and
- 13 • Managed wetlands.

14 **A.4.7.2 Assumptions**

15 Western burrowing owls require habitat with three attributes: open, well-drained terrain; short,
16 sparse vegetation; and underground burrows or burrow facsimiles (Klute et al. 2003). Western
17 burrowing owls forage in open grasslands, pasturelands, agricultural fields and field edges,
18 fallow fields, and along the edges of roads and levees, where vegetation is low to maximize
19 visibility and access. In Northern California, most nest sites occur in abandoned ground squirrel
20 burrows; however, other mammal burrows and various artificial sites, such as culverts, pipes,
21 and rock piles are also used (Haug et al. 1993). Optimal nesting locations are within an open
22 landscape with level to gently sloping topography, sparse or low grassland or pasture cover, and
23 a high density of burrows. During the breeding season, they may also need enough permanent
24 cover and taller vegetation within their foraging range to provide them with sufficient prey, such
25 as small mammals (Wellicome 1997). The land cover types listed above are the mapped land
26 cover types that provide these attributes within the Plan Area. However, the model may
27 overestimate the extent of habitat because it is based on broad vegetation categories, which likely
28 include areas with vegetation that is too tall or with unsuitable topography.

29 **A.4.8 Recovery Plan Goals**

30 Currently, there is no recovery plan for the western burrowing owl.

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