

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

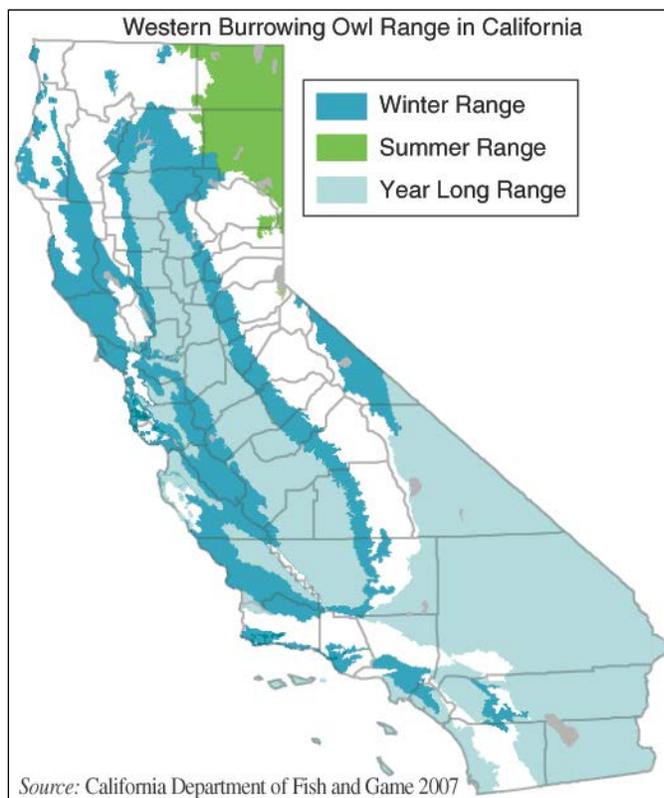
A.4.1 Legal and Other Status

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



A.4.2 Species Distribution and Status

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 throughout the lowland portions of

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

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

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

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

A.4.2.2 Distribution and Status in the Plan Area

Western burrowing owls are resident in Butte County year-round and occur in relatively low densities. Areas of suitable habitat that have the most likelihood of occurrence include the non-orchard agricultural areas along the western side of Butte County. The valley and foothill grasslands along the east side of the study area also appear to support generally suitable conditions. CNDDDB reports very few occurrences of western burrowing owl in Butte County; all are reported in the western portion of the county (see Figure A.4-1, *Western Burrowing Owl Modeled Habitat and Recorded Occurrences*). The most recent breeding season record, reported in 2000, is along Nelson Road just east of State Route 99 and just north of Thermalito Afterbay (Figure A.4-1).

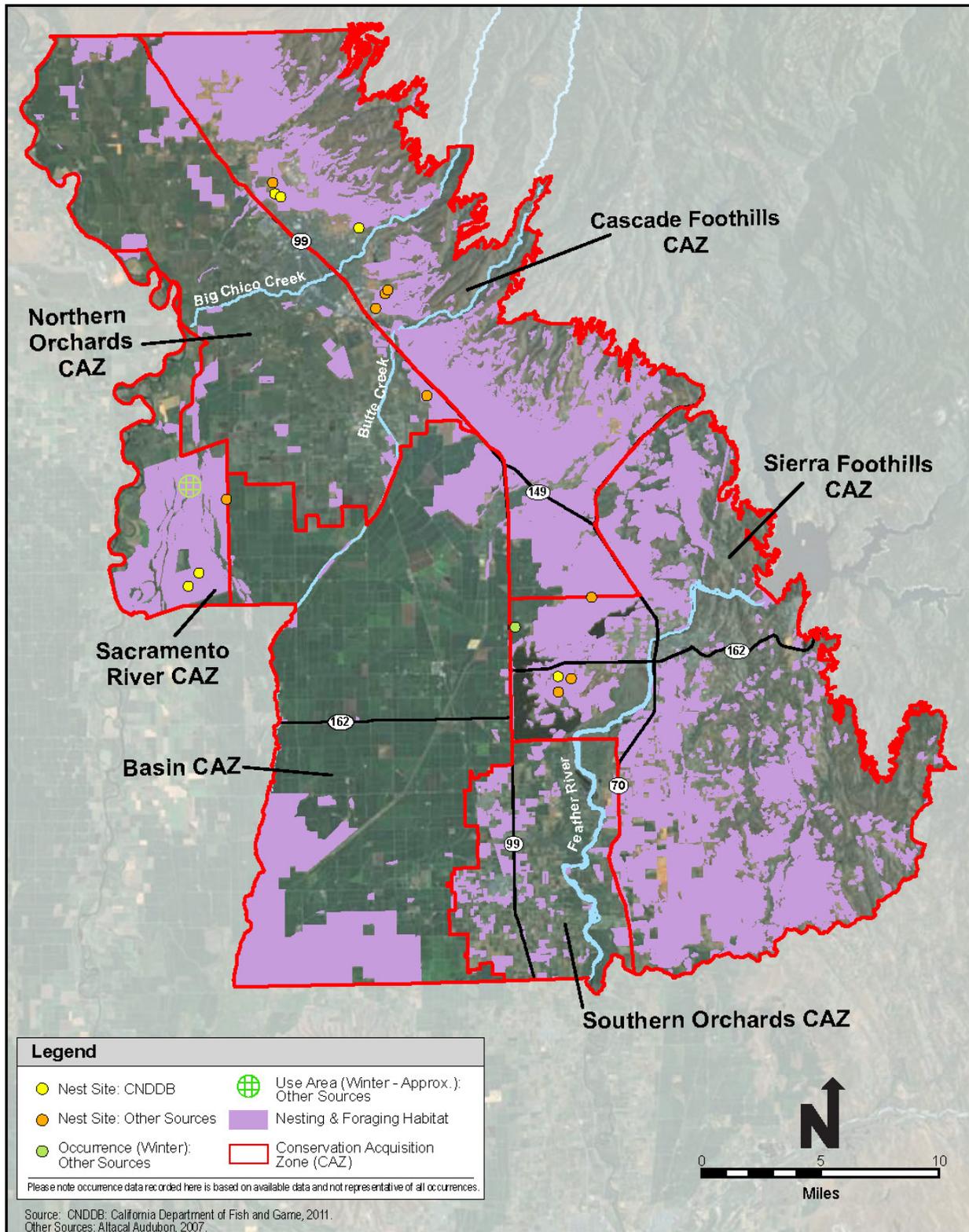


Figure A.4-1. Western Burrowing Owl Modeled Habitat and Recorded Occurrences

A statewide survey of the entire breeding range of the species in 2006–2007 surveyed 860 5 km x 5 km blocks and estimated a total statewide population of 9,187 (SE = 2,346) pairs, of which only 12 pairs were estimated for the northern Central Valley (zero breeding pairs in Butte County, Wilkerson and Siegel 2010). In comparison, a similar statewide assessment (DeSante et al. 2007) estimated 231 pairs for the same area in 1991–1993. Six additional historical breeding season records from 1992 and 1993 are reported, as well as seven recent wintering sites from 2006 and 2007 that are distributed between just south of Highway 162 on the south to north of Chico (Figure A.4-1).

A.4.3 Habitat Requirements and Special Considerations

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

A.4.3.1 Nesting

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

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

The dimensions of the nest burrow vary with location, age of burrow, and the species that originally excavated it. Typical burrows constructed by ground squirrels are from 3 to 6 inches in diameter and extend underground at a gradual downward slope from 3 to 10 feet with an enlarged cavity at the end of the burrow. Burrow entrances are often adorned with various

objects, feathers, and pellets. The burrow is often lined with grass or other material (Haug et al. 1993). Nest burrow reuse is well documented (Martin 1973, Gleason 1978, Rich 1984, Plumpton and Lutz 1993a, Lutz and Plumpton 1999). Western burrowing owls show a high degree of nest site fidelity and reuse the same nesting burrows and satellite burrows for many years if left undisturbed.

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

A.4.3.2 Foraging

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

A.4.4 Life History

A.4.4.1 Seasonal Patterns

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

A.4.4.2 Reproduction

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

the vicinity of their natal burrows for about two months after hatching and before departing the natal area.

A.4.4.3 Foraging Behavior and Diet

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

Western burrowing owls tend to be opportunistic feeders. Large arthropods, mainly beetles and grasshoppers, comprise a large portion of their diet. Small mammals, especially mice, rats, gophers, and ground squirrels, are also important food items. Other prey animals include reptiles and amphibians, scorpions, young cottontail rabbits, bats, and birds such as sparrows and horned larks. Consumption of insects increases during the breeding season (Zarn 1974, Tyler 1983, Johnsgard 1988, Thompson and Anderson 1988, John and Romanow 1993).

A.4.5 Threats

A.4.5.1 Urbanization/Fragmentation

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

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

A.4.5.2 Agricultural Crop Conversion

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

A.4.5.3 Levee Maintenance

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

A.4.5.4 Rodent Control

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

A.4.5.5 Other Human Disturbances

Although western burrowing owls are relatively tolerant of low levels of human activity, human-related impacts such as shooting and burrow destruction adversely affect this species (Zarn 1974, Haug et al. 1993). Artificially enhanced populations of native predators (e.g., gray foxes, coyotes) and introduced predators (e.g., red foxes, cats, dogs) near western burrowing owl colonies can be a significant local problem. Burrowing owls can also get tangled in loose fences, abandoned wire, fishing line, rat traps, and other human-made materials. There is also a locally substantial risk to burrowing owls from traffic mortality (Klute et al. 2003, Haug et al 1993), because owls have a tendency to forage along roads (Gervais et al. 2003).

The conversion of burrowing owl habitat for purposes of meeting human needs decreases both the abundance and quality of nesting habitat (Barclay et al. 1998). Additionally, as a species that does not excavate their own burrows, they are dependent on burrowing mammals that are commonly eradicated by humans. Few provisions exist to protect burrowing owl habitats and the species that create their burrows.

A.4.6 Relevant Conservation Efforts

Few conservation efforts have been undertaken to conserve western burrowing owl populations. The rejection of recent efforts to list the species at the state and federal levels limits the extent of possible regulatory influence. Protection typically occurs at the local project level through implementation of the guidelines prepared by DFG (1994). The guidelines do address protection of active western burrowing owl sites and compensation for impacts to these sites; however, the

guidelines do not address conservation or protection at a regional level. DFG is developing a statewide conservation strategy for the burrowing owl.

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

A.4.7 Species Habitat Suitability Model

A.4.7.1 Nesting and Foraging Habitat

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

- Blue oak savanna
- Grassland
- Grassland with vernal swale complex
- Vernal pool
- Altered vernal pool
- Disturbed ground
- Irrigated cropland
- Irrigated pasture
- Managed wetlands

A.4.7.2 Assumptions

Western burrowing owls require habitat with three attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles (Klute et al. 2003). Western burrowing owls forage in open grasslands, pasturelands, agricultural fields and field edges, fallow fields, and along the edges of roads and levees, where vegetation is low to maximize

visibility and access. In Northern California, most nest sites occur in abandoned ground squirrel burrows; however, other mammal burrows and various artificial sites such as culverts, pipes, and rock piles are also used (Haug et al. 1993). Optimal nesting locations are within an open landscape with level to gently sloping topography, sparse or low grassland or pasture cover, and a high density of burrows. During the breeding season, they may also need enough permanent cover and taller vegetation within their foraging range to provide them with sufficient prey, such as small mammals (Wellicome 1997). The land cover types listed above are the mapped land cover types that provide these attributes within the Plan Area. However, the model may overestimate the extent of habitat because it is based on broad vegetation categories, which likely include areas with vegetation that is too tall or with unsuitable topography.

A.4.8 Recovery Plan Goals

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

A.4.9 References

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