

**Petition Evaluation for
WESTERN BURROWING OWL
(*Athene cunicularia hypugaea*)**

October 2003

EXECUTIVE SUMMARY

This evaluation report was prepared in response to a petition received by the Fish and Game Commission on April 8, 2003, from the Center for Biological Diversity, along with the Santa Clara Valley Audubon Society, Defenders of Wildlife, San Bernardino Valley Audubon Society, California State Park Rangers Association, and the Tri-County Conservation League, seeking action to list the Western Burrowing Owl (*Athene cunicularia hypugaea*) as a threatened or endangered species under the California Endangered Species Act ("CESA"; Fish & G. Code, § 2050 et seq.).

The report evaluates the information provided in the petition as well as other available information and includes the Department's recommendation on whether the listing may be warranted. CESA specifically requires the Department to "evaluate the petition on its face and in relation to other relevant information the Department possesses or receives," and to recommend to the Commission whether the petition contains sufficient information to indicate the petitioned action may be warranted (Fish & G. Code, § 2073.5(a); see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). "Sufficient information" means "that amount of information ... that would lead a reasonable person to conclude the petitioned action may be warranted." (*Natural Resources Defense Council v. Fish and Game Commission* (1994) 28 Cal.App. 4th 1104, 1119.) "May be warranted" means a substantial possibility that listing could occur." (*Id.* at p. 1125.) Therefore, the Department's standard in developing its recommendation is whether there is "sufficient information", meaning enough information that would lead a reasonable person to conclude, that there is a substantial possibility that the requested listing could occur. In accordance with these requirements, this report analyzes and evaluates information contained in the petition and other relevant information known to the Department.

CONCLUSIONS

The petitioners recommend that the western burrowing owl (WBO) be immediately **listed as endangered or threatened** throughout its range in California. The Department does not concur with this recommendation. Although burrowing owls have clearly declined in some parts of their range in California, sufficient data is lacking in other parts of the state to indicate a decline and healthy populations of WBO exist in others areas of the state. It appears that there has been a shift in population density, such that the Imperial Valley and Palo Verde Valley support populations and have reached densities that were not likely present historically. In addition, WBO can be quite difficult to detect,

particularly in large natural grasslands (D. K. Rosenberg, unpublished data). It is very likely that the populations of burrowing owls persisting in the Carrizo Plains and other large tracts of public land are much larger than originally estimated due to the difficulty of detection. Other lands throughout WBO range in California administered by the Bureau of Land Management, the Department of Defense, land conservancies, and the Department provide habitat and contain populations of WBO.

Burrowing owls tend to be habitat generalists and can respond favorably to resource management practices. The range contractions occurring along some of the coastal counties are in areas that apparently maintained few WBOs prior to reported declines (USFWS 2003). In California, WBOs have shown a high tolerance for human encroachment and degradation of native habitats (USFWS 2003). The WBO continues to persist in some of these coastal areas despite intense urban development.

Overall, the burrowing owl population within California appears to have declined in the areas with the greatest urban growth, while maintaining large populations within areas of intensive agriculture (e.g., Gervais et al. 2003, Rosenberg and Haley 2003), or designated open space. Owls also persist in grasslands such as the Carrizo Plain Natural Area (Ronan 2002), but surveying these regions is difficult and the true magnitude of these populations is unknown.

The Department believes that, at this time, there is not sufficient information to support the contention that the WBO populations within California are either in danger of becoming extinct throughout all or a significant portion of their range or that the species is likely to become endangered in the foreseeable future in the absence of special protection and management efforts.

**EVALUATION OF PETITION:
REQUEST OF THE CENTER FOR BIOLOGICAL DIVERSITY ET AL. TO LIST
THE WESTERN BURROWING OWL
(*Athene cunicularia hypugaea*)
AS A THREATENED OR ENDANGERED SPECIES**

October 2003

Introduction

The Center for Biological Diversity, along with the Santa Clara Valley Audubon Society, Defenders of Wildlife, San Bernardino Valley Audubon Society, California State Park Rangers Association, and the Tri-County Conservation League submitted a petition to the Fish and Game Commission on April 8, 2003, seeking action to list the Western Burrowing Owl (*Athene cunicularia hypugaea*) as a threatened or endangered species under the California Endangered Species Act (“CESA”; Fish & Game Code, §2050-2116).

CESA specifically requires the Department to “evaluate the petition on its face and in relation to other relevant information the Department possesses or receives,” and to recommend to the Commission whether the petition contains sufficient information to indicate the petitioned action may be warranted (Fish & Game Code, §2073.5(a); see also California Code of Regulations, title 14, §670.1, subd. (d)(1)). “Sufficient information” means “that amount of information ... that would lead a reasonable person to conclude the petitioned action may be warranted.” (*Natural Resources Defense Council v. Fish and Game Commission* (1994) 28 Cal.App. 4th 1104, 1119.) “May be warranted” means a substantial possibility that listing could occur.” (*Id.* at p. 1125.) Therefore, the Department’s standard in developing its recommendation is whether there is “sufficient information”, meaning enough information that would lead a reasonable person to conclude, that there is a substantial possibility that the requested listing could occur. In accordance with these requirements, this report evaluates the information provided in the petition, as well as other available information, and includes the Department’s recommendation as to whether listing may be warranted.

The petition provides an adequate description of life history traits of the WBO, and cites studies that provide more detailed life history information. Life history information is described in the petition under the heading “Ecology of the Western Burrowing Owl” and is summarized below.

Taxonomy

The WBO (*Athene cunicularia hypugaea*) is one of two subspecies of burrowing owl (*Athene cunicularia*) that occur in North America. The other subspecies *A. c. floridana* occurs in Florida and on the Bahama Islands. The

WBO belongs to the Class Aves, Order Strigiformes (owls), Family Strigidae (typical owls), Genus *Athene*, Species *cunicularia*, and Subspecies *hypugaea*.

Originally, the burrowing owl was named *Strix cunicularia* by Molina in 1782 and has received several taxonomic changes until placed in the genus *Speotyto* and finally in *Athene* (Clark et al. 1997).

Distinguishing Characteristics

WBOs are small owls (Figure 1). Their height ranges from 19.5 – 25.0 cm and they weigh approximately 150 grams. They have characteristically long slender tarsi covered with short hair-like feathers that terminate in sparse bristles on the feet. The head is rounded and lacks ear tufts and is chocolate in color with white streaking or spotting. Eyes are a lemon-yellow color and the beak is pale horn-colored. The wings are relatively long and rounded and the tail is short, both are brown with white barring (Haug et al. 1993). The WBO is a ground dwelling owl, nesting and roosting in burrows constructed often by ground squirrels, badgers, skunks, kangaroo rats, and tortoises (Zarn 1974) (Figure 2). Burrowing owls are capable of excavating their own burrows where burrowing mammals are absent, (Thomsen 1971) but rarely do so. Researchers have observed structures such as culverts, piles of concrete rubble, and pipes used as burrows (pers.comm. J. Gervais 2003). This species is unique among North American owls as it is active both in day and night and frequently nests in loose colonies in suburban and farmland environments.

Distribution

Within the United States, the breeding range for the WBO includes eastern Washington and Oregon, southern, central and eastern California, central and eastern Montana, southern Idaho, Utah, Nevada, Arizona, Wyoming, Colorado, New Mexico, North Dakota, South Dakota, Nebraska, western and central Kansas, western and central Oklahoma, western Minnesota, northwestern Iowa and western Texas (Klute et al. 2003). Information on migration routes and timing is not well documented. Burrowing owls are generally found on the northern breeding grounds (as far north as Canada) from mid-March through September (Haug et al. 1993). Courtship and the formation of pairs usually occur in March and April in most areas (Grant 1965). In an Imperial Valley Study Coulombe (1971) found that “20-25% of the breeding population remains in the Imperial Valley during the winter months, with probable immigration from the north and emigration to the south in this period”. Breeding range extends throughout the Central Valley, the Imperial Valley, in the desert regions of the northeastern and southeastern part of the state, and along the central and southern coasts of California (DeSante et al. 1997) (Figure 3). It appears that winter migrants from other parts of North America may augment resident populations, although specific information is lacking. The very small number of band recoveries (27 recovered from 1927 through 1990) provides

limited information regarding wintering areas (Haug et al. 1993). Burrowing owls banded in British Columbia, Washington, Oregon, and California appeared to migrate southward along the Pacific Coast (Klute et al. 2003). The winter range of WBO in California can be illustrated using data from the annual Christmas Bird Counts (Figure 4).

Breeding

In California, pair formation may start as early as late December (Thomsen 1971), but occurs primarily between February 1 and August 30. Nest site selection begins after pair formation when the males gather and distribute most of the nesting material. Incubation lasts 28-30 days long and is performed by the female (Coulombe 1971). The male is the provider of food during incubation and during the early nesting stage. The female assists in foraging when the young reach three to four weeks of age (Martin 1973). The young owls begin feathering out at two weeks of age and are capable of sustained flight by about six weeks of age. Burrowing owl families often switch burrows every few weeks when the young are three to four weeks old (Haug et al. 1993, Dechant et al. 1999). Burrowing owl nesting habitat consists of open areas with mammal burrows. They occupy a variety of arid and semi-arid environments, with well drained soils, and level to gently sloping lands characterized by sparse vegetation and bare ground (Haug et al. 1993, Dechant et al. 1999). Breeding habitats include grassland, pasture, fallow fields, road and railroad rights-of-way, and urban habitats such as campuses, airports, and golf courses (Dechant et al. 1999). Burrowing owls require a mammal burrow or natural cavity surrounded by an area of sparse cover. In California, burrowing owls often use burrows excavated by California ground squirrels or round-tailed ground squirrels. Burrow availability is often limited in areas lacking ground squirrel colonies.

Burrowing owls can reproduce at one year of age. Second broods have not been observed in the WBO (Haug et al. 1993). Their average clutch size over the range of the owl was 6.5 eggs with a range of 4-12 (Haug et al. 1993). In California, Landry (1979) reported a range of 1-11 with an average of 7 (nest sample size was 32). Studies have documented nesting success from 100% in New Mexico (Martin 1973), to 33% in California (Thomsen 1971). Martin (1973) theorized that limited resources in his New Mexico study population may have allowed them to maximize their natality in their reproductive strategy in comparison to the California study population. The number of young fledged per nest has ranged from 4.9 to 1.6, and the number of young fledged per successful nest has ranged from 4.9 to 2.9 (Martin 1973). Taken from a general summary of research findings for the United States, burrowing owls produced 3.33 nestlings and 2.55 fledglings in human-altered habitats and 1.05 nestlings and 0.68 fledglings in natural habitats (Botelho and Arrowood 1996). In California, Gervais and Rosenberg (1999) documented up to 10 fledglings per nest in high reproductive years. The number of young successfully fledged from nests in the Central Valley documented by DeSante et al. (1997) ranged from 3 – 6.

Nesting territories of burrowing owls have been documented to range from 4.9 – 6.5 ha in Minnesota and 4.1 – 7.3 ha in North Dakota (Grant 1965). In an Imperial Valley study Coulombe (1971) estimated an average 22 owls per square mile (approximately 12 ha per owl). A demographic study was initiated in 1997 and coordinated through The Institute for Bird Populations, Oregon State University, and San Jose State University. The study included four study areas representing the primary habitats in which most of California's burrowing owl populations exist. The study areas were within the South San Francisco Bay (urban environment), Naval Air Station Lemoore (small grassland patches surrounded by agriculture), Carrizo Plain National Monument (large grassland), and the Imperial Valley (representing intensive agriculture). Preliminary results from this study indicate 1.1 pairs per km² (1.1 pr. per 100 ha) in Bay Area, 0.9 pairs per km² in Lemoore, 1.0 pairs per km² in Carrizo, and 8.3 pairs per km² in Imperial Valley (Rosenberg et al., unpubl. data).

Average daytime foraging areas documented during research in eastern Wyoming encompassed 3.5 ha (Thompson 1984). Foraging area requirements are considerably larger than nesting area requirements and can range from 14 – 481 ha (Haug 1985). In heavily cultivated areas of southern Saskatchewan, foraging territories averaged 35 ha (Sissons et al. 2001).

Site fidelity by burrowing owls for migratory populations is moderate to high to general breeding areas, ground squirrels colonies, and even to specific nest burrows (Lutz and Plumpton 1999). Site fidelity is generally higher for adults than juveniles; higher for males than females; and higher for successful nesters than unsuccessful nesters. The highest annual return rate was 39% in Colorado (Lutz and Plumpton 1999).

Food Habits

Burrowing owls are opportunistic feeders taking primarily arthropods, small mammals, birds, amphibians and reptiles (Haug et al. 1993). In California, food items documented included crickets, meadow voles, earwigs, birds (particularly horned larks), frogs, toads, lizards, snakes, turtles, and crustaceans (Haug et al. 1993). A burrowing owl during rehabilitation fed primarily on minnows (G. Gould pers. comm. 2003). Seasonal variability of food items occurs with more invertebrates taken in the summer and more small mammals taken during the winter (Haug et al 1993). Although insects dominate the diet by frequency, vertebrates may account for the vast majority of the biomass (Green et al. 1993). In California, there is evidence that rodent populations, such as those of California voles (*Microtus californicus*), may greatly influence survival and reproductive success; both functional and numerical responses were observed in response to a population increase of voles in 1999 in the Central Valley (Gervais 2002).

Burrowing owls usually forage in short grass (2-6 inches in height), mowed and grazed pastures, along canal bank ecotones, golf courses, airports and in ruderal areas within urban settings. Vegetation greater than 1 meter in height is often avoided by foraging burrowing owls (Haug and Oliphant 1982, 1990; Wellicome 1994). Burrowing owls feed primarily at dawn and dusk (crepuscular), but have been observed feeding throughout the day and night. Burrowing owls hunt by walking, hopping, or running along the ground, by flying from a perch, by hovering, and by fly-catching in the air; the method tends to vary depending upon time of day and habitat type (Thompson and Anderson 1988, Haug et al. 1993). The burrowing owl is primarily a grassland species, but it is capable of persisting and even thriving in landscapes highly altered by human activity. Owls living in the intensive agricultural areas within the Imperial Valley nest along water conveyance structures surrounded by crops and occur in densities that are among the highest ever recorded for the species (Rosenberg and Haley 2003). Owls in the Central Valley were found nesting along roadsides and canals, and under the runways and associated structures within the Lemoore Naval Air Station (Gervais 2002) and were observed using the surrounding agricultural fields as foraging habitat (Gervais et al. 2003). In Santa Clara County, burrowing owl populations are found in highly variable sites such as Moffett Federal Airfield and a local urban park (Trulio 1997). The primary required habitat characteristics appear to be the presence of burrows for roosting and nesting, and vegetation structure that is short with only sparse shrubs or taller vegetation.

Owls appear to forage within close proximity to their burrow during the nesting season, usually within a few hundred to a thousand meters (Haug and Oliphant 1990, Sissons et al. 2001, Gervais 2002, Gervais et al. 2003, Rosenberg and Haley 2003). Foraging owls have been detected up to 2.7 km from the nest burrow (Haug and Oliphant 1990). Studies conducted in the Central Valley of California, indicated that owls used whatever cover types were available close to the nest burrow and there was no indication of avoidance of crop cover types (Gervais et al. 2003). Over 80% of foraging observations during the breeding season occurred within 600 m of the nest burrow in the San Joaquin and Imperial Valleys (Gervais et al. 2003, Rosenberg and Haley 2003).

Longevity and Mortality Factors

Burrowing owls have been documented to live up to eight years and eight months (Kennard 1975). In southern California, Thomsen (1971) documented survival rates of 30% for juveniles and 81% for adults based on banded birds. Predators include badger, domestic cat, weasel, skunk, domestic dog, coyote, hawks, falcons, crows, great horned owl, snakes, and bobcats (Haug et al 1993; Evans 1982). Collisions with vehicles have been documented to be a serious cause of mortality, probably because of WBO habits of hunting along roads during the evening hours; vehicle-caused mortality will likely increase with further increase in road density, traffic volume, and vehicle speed (Bent 1938, Ratcliff 1987, Forman et al. 2003). Burrowing owls often line their burrows with dung,

presumably to mask their scent from predators (Martin 1973). Thompsen (1971) found burrows lined with divots from a local golf course presumably for the same reason.

Range and Distribution

The petition includes a summary of the range and distribution of the burrowing owl under section “V. Range”, and section “VI. Historical and Recent Distribution and Abundance” The authors of the petition describe county by county changes in distribution and abundance and provide detailed records of burrowing owl observations. However, the Department located additional species occurrence information during the evaluation that adjusted the range map provided in the petition.

In summary, the petition describes WBO distribution as contracting within urban centers in the Bay Area and along the south coast in California (San Diego, Orange, Santa Barbara, Santa Cruz and Santa Clara counties in general). In contrast, large populations persist in the Imperial and Central Valleys and anecdotal information provided by regional CDFG staff suggests that naturally low density populations persist in shrub steppe habitats (Lassen and Modoc counties) and desert scrub habitats (Inyo, San Bernardino, Riverside counties).

Additional Information Obtained by the Department

The Department obtained information not contained in the petition from regional DFG staff, as well as other sources where available. While not available for all geographic areas reported on in the petition, available, supplemental information is included, below, in order to augment and clarify some of the regional and county-by-county reports in the petition.

General Distribution

WBOs were reported by Grinnell and Miller (1944) to reach highest densities in interior valleys and coastal lowlands. Surveys conducted by DeSante and Ruhlen (1995) further confirmed burrowing owl preference for lowland areas when their research indicated that over 90% of the breeding owls located in California used habitats between 60-300 meters in elevation within their survey area. WBOs in the northern portion of their range are migratory, leaving their breeding areas in fall and returning to the same area in the spring. Most burrowing owls nesting in California tend to remain throughout the winter.

Range and Distribution Described in the Petition

WBO distribution appears to be contracting within urban centers in the Bay Area and along the south coast in California (San Diego, Orange, Santa Barbara, Santa Cruz and Santa Clara counties in general). In contrast, large

populations persist in the Imperial and Central Valleys and anecdotal information provided by regional CDFG staff suggests that naturally low density populations persist in shrub steppe habitats (Lassen and Modoc counties) and desert scrub habitats (Inyo, San Bernardino, Riverside counties).

DeSante derived data from a census conducted in the early 1990's and compared it to information on the status of Burrowing Owls in the previous decade. "Locally (generally by county) coordinators provided information on breeding Burrowing Owls prior to the census by plotting on maps the locations and numbers of all breeding pairs of Burrowing Owls known during the 10- or 11-year period from 1981 to 1 year prior to the census" (DeSante et al. 1996). The authors acknowledged in their report that "... adequate data on which to base estimates of local, regional and total population sizes as well as estimates of population trends were not available for Burrowing Owls in California prior to their work" (DeSante et al. 1996). DeSante and Ruhlen (1995) reported on the results of burrowing owl surveys conducted throughout California during 1991 to 1993, excluding the Great Basin and desert areas. The surveys indicated a 37 to 60 percent decrease in the number of breeding groups within the survey area since the early 1980s with the burrowing owl being extirpated from several counties (Marin, San Francisco, Santa Cruz, Napa, Ventura, and coastal San Luis Obispo) and nearly extirpated from several additional counties (i.e. Sonoma, Orange, and coastal Monterey), although owls were uncommon in these counties prior to extirpation (DeSante et al. 1996). Development is believed to be the primary cause of the potential extirpation and decline of burrowing owls in these counties.

They also found a non-significant increase in the number of pairs of breeding owls between 1991 and 1992 and a significant increase in the number of pairs of 19% between 1992 and 1993 within the survey area indicating some level of stability. DeSante and Ruhlen (1995) attributed their results to losses of small breeding groups, but increases in the size of large breeding groups. There were a total of 165 breeding groups identified in the 1980s within the survey area (DeSante et al. 1996), and 76 of these groups were located again during the survey effort between 1991 through 1993. However, an additional 69 groups were identified between 1991-1993 that were not identified during the 1980s. DeSante et al. (1996) reports that in relationship to breeding groups in the survey area "Although there was no overall negative decline, some regions experienced considerable declines."

The survey documented that declines in burrowing owl populations were greatest along the coast, while populations within portions of the Central Valley also appeared to be declining but at a lower rate from 1981-1991. Approximately 24% of the breeding owls occurred in the Central Valley (2,221 pairs) during the survey conducted from 1991-93 (DeSante et al. 1996). The petition reported that burrowing owl breeding range had contracted approximately 8% since historic times based upon information provided in research conducted by DeSante et al.

(1996). The petition authors estimated the historical burrowing owl range in California to be approximately 103,245 square miles (66,076,800 acres), of which 6,460 square miles, (3,302,400 acres) represent areas from which WBO has potentially been extirpated (6.3%). Figure 3 illustrates the estimated number of breeding pairs based upon various surveys and estimates based upon information referenced within the petition and information added by the Department.

Additional Range and Distribution Information obtained by the Department

Northern Coastal California

The petition also reports that there is some evidence of burrowing owls breeding in Humboldt County historically and that this population has been extirpated. The Department's review of this claim led to an interview with Dr. Stan Harris (HSU Professor Emeritus) who indicates that the burrowing owls in the Wilder collection for Humboldt County are very poorly catalogued and they may not have been breeders.

Northern Desert Range

Additional information not contained within the petition was obtained by the Department when staff contacted Bureau of Land Management Field Offices and CDFG Regional Offices. The Alturas Field Office reported anecdotally that burrowing owls have been observed during the breeding season (2003) within the local Alturas area as well as in the southern portion of their District. A report (2003) from the Lassen County Unit Manger indicated WBOs have been regularly observed within his unit over the past 20 years.

Central Valley

The Department believes that the WBO data for portions of the Central Valley is confusing and poorly represented in the petition. WBO populations are often associated with airports and ruderal areas in the Sacramento Valley. (Gifford CDFG, pers. comm. 2003). Agricultural habitats in the San Joaquin and Imperial Valleys appear to provide high habitat value; however this relationship is not duplicated in the mid and north Central Valley where there are few records of burrowing owls on active agricultural lands. The petition fails to demonstrate a decline in population for the Sacramento Valley population. Other than historic records, the most accurate population estimate is based on DeSante's 1993 survey (DeSante et al. 1996). There has not been a follow-up over the ten year period since the 1993 estimate. Other than one undocumented estimate for Yolo County (1985), the trend for the remainder of CDFG Sacramento Valley – Central Sierra Region (comprising a portion of the Central Valley from Glenn County to San Joaquin County and east to the Nevada State line) is "unknown" (Gifford

CDFG pers. comm. 2003).

Many of the historic records cited in the petition indicate that burrowing owls probably occupied all the valleys and low lying areas in California and were abundant until widespread human population growth and development occurred. According to Keeler (1891) and Dawson (1923) all of the treeless open areas from the foot of the Sierras to the ocean were occupied. Presumably, the areas referenced meant habitats that were at least seasonally dry. Chico State University, Department of Geography and Planning and GIS Department (April 2003) recently completed a report entitled "Central Valley Historic Mapping Project". The report estimates the change in habitat acreages. Within the middle region of the Central Valley the acreage of wetlands during pre-1900 was estimated at approximately 394,946 acres compared to approximately 23,893 acres estimated for current conditions. Also, estimated acres of aquatic habitat increased from 24,387 acres during pre-1900 to 181,166 acres estimated for current conditions. Please see Table 1 for a complete summary of habitat change acreages for the entire Central Valley. In a somewhat similar manner, Millsap and Bear (2000) documented land conversion in Florida that increased burrowing owl suitability following the clearing of forest and the filling of wetland habitats for new developments.

Data for burrowing owls in the Sierra foothill and valley portions of Placer, El Dorado, Amador, and Calaveras counties is sparse, despite the presence of large areas of annual grasslands in these locations. Historic references imply that burrowing owls were common or abundant from the foot of the Sierras to the ocean. However, the foothill counties currently have large areas of (introduced) annual grasslands with populations of ground squirrels, and yet there are very few occurrence records for burrowing owls that have been collected by Department staff while reviewing other projects.

In Sacramento County, CDFG staff reported that the petition does not include small colonies of burrowing owls that occur in the southern fringe of the City of Sacramento. In this area burrowing owls occur in vacant lots, along rail lines, urban creeks, levees, and storm water facilities. These populations may have formed during the mid stages of urbanization due to an increase in suitable habitat provided by ground squirrels and barren areas (Milsap and Bear 2000).

Contrary to the petition findings, anecdotal information provided by Regional Department staff for the southern Central Valley indicates that the burrowing owl populations appear to be stable. Conservation lands acquired for San Joaquin Valley threatened and endangered species may also provide suitable habitat for burrowing owls. For example, many of the lands conserved for the San Joaquin kit fox include ground squirrel colonies and provide habitat with available burrows. Aqua Fria Multispecies mitigation bank in western Merced County was created for burrowing owl and kit fox conservation and covers approximately 3,200 acres. The WBO population at Lemoore NAS

(southwest of Fresno) recently has been studied in regard to demographics, pesticide residues, and habitat use (Rosenberg et al. 1998, Gervais 2002, Gervais and Anthony In Press, Gervais et al. 2003). Of the 18,784 acres within NAS Lemoore, approximately 14,000 are allocated to agricultural production and 50 acres provide wildlife habitat from a reclaimed landfill that is designated as Fresno kangaroo habitat. The NAS Lemoore Adaptive Management Plan (Rosenberg et al. 1998) for WBO estimates 1,070 acres of nesting habitat and suggests a goal of having 72 adult pairs at the site. In 1997 a complete census of WBO was conducted at NAS Lemoore. Researchers located 54 active nests located in five primary areas clustered around the wildlife areas, runway strips in Air Operations, buffer strips near runways, the capped landfill, and the radio receiver site (Rosenberg et al. 1998).

The Department contacted the Bakersfield BLM Field Office and requested WBO observation records not previously submitted to the CNDDDB. Additional records were obtained and submitted by a BLM Field Biologist and added to the CNDDDB. These records documented that three active burrows were observed in the Lost Hills area, 25 pairs in 2002 and 25+ pairs in 2003 were observed in the Alpaugh area, and 7 pairs had been observed in the last ten years in the Corpus Road area.

San Francisco Bay Area

The Department's information (Schauss CDFG, pers. comm. 2003) indicates that WBO use the northern portion of San Benito County (in the petition this area was included in the southern Central Valley summary), for wintering habitat but these locations have not been confirmed as breeding areas. There are large parts of San Benito County that apparently haven't been surveyed, and where property access is poor and status of WBO is unknown. However, as in Santa Clara County, most of the favorable potential burrowing owl habitat is threatened by development or agriculture (Schauss CDFG, pers. comm. 2003).

Central Western California

Ronan (2002) reports that significant breeding populations of burrowing owls also persist in grasslands such as the Carrizo Plain Natural Area but surveying these regions is difficult. The WBO is distributed widely over the area (Ronan 2002). Research by Rosenberg et al. (2000) located 46 nests within the Carrizo Plain study area (Figure 3). Research conducted by Gervais et al. (2003 status report) at the Carrizo Plains Natural Area (approximately 250,000 acres) included the capture of 62 burrowing owls for banding and radio tagging. Trapping was conducted within BLM property boundaries that are less than 800 m in elevation.

Southwestern California

Department information indicates declines in burrowing owl populations have occurred in this region of the state.

Santa Barbara County

Burrowing owls no longer breed in coastal Santa Barbara County; there remains a possibility of breeding in the Cuyama Valley; however, the absence of recent reports suggest that resident/breeding owls, if any, are present in very low numbers. A few burrowing owls are detected each year on several of the county Christmas Bird Counts, indicating a limited wintering population in the northern part of the county.

Ventura County

The Ventura County Bird Atlas project, which has just entered the data gathering phase and project data indicates the WBO is a “localized breeder” with few known remaining breeding sites (e.g. Mugu NAS).

Los Angeles County

Burrowing owls have been extirpated as a breeder from the coastal and interior basin of Los Angeles County. A few owls are detected in this area each winter. The Antelope Valley provides the last stronghold for the species in this county with a small breeding population and a core wintering population of unknown size; however, these owls are primarily located on private lands where there is a high expectation of future urban development. The petitioner cites an estimate of 10 pairs of breeding burrowing owls in the Antelope Valley. Although all data have not been analyzed, the Los Angeles Breeding Bird Atlas findings suggest a range of approximately 20-50 pairs of owls in the Antelope Valley (L. Allen, pers. comm.).

Orange County

In Orange County, the burrowing owl is nearing extirpation as a breeding species and the winter population is estimated to be approximately 50. One known nesting colony is on Seal Beach Naval Weapons Station. Management at present is accommodating the burrowing owl as a nesting species and coordinating their activities with CDFG and USFWS staff.

San Diego County

Two locations qualifying as “colonies” of burrowing owls (supporting more than 5-6 breeding pairs of owls) are known in San Diego: North Island Naval Air Station, and the East Otay Mesa (Border area) southwest of Otay Mountain. The North Island location is owned and managed by the Navy. Although populations have historically fluctuated due to management activities, including monitoring to

prevent impacts from discing to active burrows, there is now some protection afforded under an Integrated Natural Resource Management Plan (INRMP) for the base. The East Otay Mesa population is located in an area of ongoing disturbance by Border Patrol activities and primarily located in areas zoned for future development. Outside of these locations, there are estimated to be between 5 – 15 breeding pairs in the county. This population estimate was developed from a county-wide effort, collected over the course of five consecutive years and completed in 2002, as part of the San Diego Bird Atlas Project, coordinated by Philip Unitt of the San Diego Natural History Museum.

Wintering burrowing owls are reported each year in San Diego County. These records are usually of single birds or a few individuals. Recent wintering sites include Carlsbad golf course, Batiquitos Lagoon, Whelan Lake, Dennerly Canyon, Mission Bay/San Diego River Flood Channel, Rancho Jamul Ecological Reserve, and the Ramona region.

Imperial Valley

Burrowing owl populations in the Imperial Valley have increased with the intensification of agricultural activity, from originally sparse numbers (Garrett and Dunn 1981, DeSante et al. in press). Burrowing owls in this region currently appear to attain some of the highest densities recorded for the species. This population may comprise over 70% of the known breeding owls in California estimated at between 5,600 – 6,571 pairs (DeSante et al. 1996). Research and surveys indicate that in California burrowing owl populations are declining in areas with the greatest urban growth while larger populations occur in areas of intensive agriculture (e.g., Gervais et al. 2003, Rosenberg and Haley 2003), or designated open space.

Coachella Valley

Coachella Valley occurred within DeSante's survey area but a WBO population was missed. Data gathered during the development of a conservation plan for the Coachella Valley indicate an extant population (74 observation records both historic and current see Figure 5). An estimated 10-20 breeding pairs are scattered over the lower end of the valley and on some of the preserves developed by the Coachella Valley Mountain Conservancy (C. Barrows, pers. comm. 2003)(Figure 3).

Southern Desert Range

The Palo Verde Valley, located in eastern Riverside County was outside of the survey area (described in the petition as the eastern 50% of Riverside County), described as similar to the Imperial Valley in agricultural practices (N. Andrew CDFG, pers. comm. 2003), and is the second largest burrowing owl core population area in southern California. It is estimated that 500-1000 pairs of

burrowing owls occupy the Palo Verde Valley at this time (J. Kidd, pers. comm. 2003). The petition references DeSante et al. (1996) and describes this area as the southern desert range and that burrowing owls in this range occur as small, scattered populations, and have historically never been common. The Department agrees with this description in areas of semi-natural habitat. However, the Palo Verde Valley and Bard Valley (Imperial County) to the south are similar to Imperial Valley in regards to agricultural practices and hence have the potential to support higher densities of burrowing owls. In order to further quantify the extent of these populations, a systematic survey of the burrowing owl populations is needed within these valleys. Also, within the southeastern desert area described in the petition, personal communication with Mr. Tom Campbell (Biologist, China NWF, approximately 500,000 acres) indicates that a population of breeding burrowing owls occurs on the base. A comprehensive survey has not been conducted; however anecdotal information from Mr. Campbell indicates that WBO are seen on a fairly regular basis, particularly in the deserts surrounding Ridgecrest.

California Department of Fish and Game Lands

A database query was made regarding all of the Department's lands that either have records of burrowing owls or that have potentially suitable WBO habitat. A total of 64 properties were found to have these attributes.

California Natural Diversity Database

The Department's California Natural Diversity Database records for burrowing owls contain 590 element occurrence records. An element occurrence is defined for burrowing owls as a burrow site. Records that were submitted without identifying a burrow site are not included in the database. The database points are spatially illustrated in Figure 5.

Habitat Necessary for Survival

The petition included a thorough description of the habitat necessary for survival of the WBO. The habitat necessary for survival is described in the petition under the heading "Habitat Requirements".

Suitable habitats for the WBO are identified in the California Wildlife Habitat Relationship (WHR) program (a general listing of habitats within the range of a species, see Figure 4 for WHR WBO range). The WHR indicates "that the species is a yearlong resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. The Department agrees with the petition that little of the native perennial grasslands or native prairie habitat within California remains. A recent mapping project conducted by Chico State University (2003) reports that grassland land cover type decreased in the Central Valley from 7,085,483 acres

estimated as occurring during the pre-1900 time period compared to 3,198,301 acres estimated for the present (Table 1). Although this grassland cover type is predominately annual grass and not native prairie, it does provide potential WBO habitat and hence indicates the extent of the land cover change over the last century. However, as noted earlier, all grassland type habitats are not suitable WBO habitat.

The WBO nesting habitat consists of open areas with mammal burrows. The WBO is a habitat generalist and is capable of surviving within urban fringe and intense agricultural production landscapes. The burrow is paramount for habitat suitability, as well as low vegetation cover adjacent to the burrow. WBO uses a variety of arid and semi-arid environments, with well drained, level to gently sloping topography characterized by sparse vegetation and bare ground. Owls readily nest along agricultural water conveyance canals surrounded by crops (Rosenberg and Haley 2003). The WBO also are found nesting along roadsides, adjacent to airport runways, urban parks, golf courses, athletic fields, and railroad beds. The primary habitat characteristics tend to be the presence of burrows for roosting and nesting, and vegetation structure that is relatively short and perches if vertical habitat structure limits visibility.

Burrows are usually provided by ground squirrels (California ground squirrel and round tailed ground squirrel) which the owls reshape to fit their needs. WBO have also been observed to use the following sites for nesting or roosting; badger holes, coyote dens, sand dune cavities under ice plant, drift wood piles, culverts, concrete rubble piles, rock outcrops and stand pipes. WBO can also excavate their own burrows in soft soils adjacent to agricultural irrigation canals (J.A. Gervais, personal observation). Gleason (1978) and Gleason and Johnson (1985) also found that where mammal burrows is scarce, WBO have been found nesting in natural rock and lava cavities.

The WBOs tend to forage close to their burrow during the nesting season, usually staying within a few hundred to a thousand meters (Haug and Oliphant 1990, Sissons et al. 2001, Gervais 2002, Gervais et al. 2003, Rosenberg and Haley 2003). Foraging owls have been detected up to 2.7 km from the nest burrow during other times of the year (Haug and Oliphant 1990). In the Central Valley of California, owls used all available cover types close to the nest burrow and did not indicate any avoidance of specific crop cover types (Gervais et al. 2003). Over 80% of the feeding observations made during a research study in the Central and Imperial Valleys (Gervais et al. 2003, Rosenberg and Haley 2003) were made during the breeding season and occurred within 600 meters of the nest burrow.

Abundance

The petition contains a comprehensive review by county of the abundance of the WBO. Abundance information is described in the petition under the

heading “Historic and Recent Distribution and Abundance”. Please see the “Range and Distribution” section above for details.

Population Trend

The petition cites studies that provide detailed scientific information, baseline studies, and analyses relevant to population trend including Haug et al. 1993, DeSante et al. 1997, James and Espie 1997, AGFD 1995, Marti and Marks 1989, Sheffield 1997 and Anderson et al. 2001. The petition also relies on personal communications with burrowing owl researchers. The Department has reviewed this section and finds information to indicate population decline has occurred and continues at present within portions of the burrowing owl range (including the Bay Area and southern coastal environs) while within other portions of the range populations are increasing or stable (Imperial Valley and in portions of the Central Valley). However, due to the lack of WBO surveys, insufficient data exists to determine the extent of populations that occur on approximately 40% of the WBO range that occurs in the arid desert environs where WBO populations occur in low densities.

Based upon DeSante and Ruhlen (1995) and DeSante et al. (1996), the California breeding owl population within the survey area (excluding the Imperial Valley) was estimated to be declining in abundance at a rate of 4% - 7% per year. Seemingly contrary to this research, the USFWS Breeding Bird Survey (BBS) indicates that there were significant increases in relative abundance in California for the 1966-2001 survey period (Trend = 5.5, $P < 0.01$, $n = 32$). The BBS data also indicates that during the 1980-2001 interval the data mirrored this trend (Trend = 5.0, $P < 0.05$, $n = 24$). The n = the sample size, which in this case is the number of survey routes that were run and included burrowing owl observations. Each BBS route is 24.5 miles long and stops are made every $\frac{1}{2}$ mile and they are run in the spring during the breeding season. The observer records for approximately 3 minutes every visible and audible bird. The routes were established randomly within physiographic regions to provide a good sampling design. Data credibility is considered good, with adequate sample size and moderate precision, and moderate abundance along the routes for the burrowing owl data (Sauer et al. 2002).

Further qualitative analysis of the route specific data indicates that 3 routes within Imperial County have consistently had high numbers of burrowing owl observations while the majority of the routes have very low observation values. This extreme difference in the number of observed burrowing owls between the three high and the remaining moderate to low observed value routes would tend to significantly influence the statewide BBS trend analysis of that data. Because of this, the value of this data set in assessing WBO status in California is questionable. Figure 5 illustrates the location of BBS routes that have had WBO observations within the last 5 years. Another annual survey that is conducted is the Christmas Bird Count (CBC)(Figure 4). The data are

collected in the winter instead of during the breeding season and these data indicate a declining trend in overwintering owls over the period 1959-1988 within California (Trend = - 1.2, $P < 0.05$, $n = 97$ (Sauer et al. 1996)), however, a substantial portion of these owls are not believed to be California residents. Current data through 2002 is available but has not been included in the USFWS analysis. The raw data for the CBC from 1999 through 2002 is listed in Table 2 indicating high count wintering areas in the east Contra Costa, San Jose, and Sacramento County areas, as well as the Salton Sea area.

DeSante and Ruhlen (1995) determined that throughout their survey area within California that nearly 60% of the breeding groups of owls mapped in the 1980's had disappeared by the early 1990's. This research indicated that within the Central Valley the decrease in the number of breeding groups was very high over the decade of the 1980's (up to 50% loss of known breeding groups) and extremely high in the urbanized central-western and southwestern areas (up to 70% loss of known breeding groups). Research by DeSante et al. in 1997 found that the rate of burrowing owl population decline was the greatest in coastal Sonoma, Marin, San Francisco, coastal San Mateo, and Santa Cruz counties. This research indicated that no owls were found within the surveyed areas of these counties during 1991. However, Desante and Ruhlen (1995) also found a non-significant increase in the number of pairs of breeding owls between 1991 and 1992 and a significant increase in the number of pairs of 19% between 1992 and 1993 and attributed their results to losses of small breeding groups, but increases in the size of large breeding groups. There were a total of 165 breeding groups identified in the 1980s within the survey area (DeSante et al. 1996), and 76 of these groups were located again during the survey effort between 1991 through 1993. However, an additional 69 groups were identified between 1991-1993 that were not identified during the 1980s. DeSante et al. (1996) reports that in relationship to breeding groups in the survey area that "Although there was no overall negative decline, some regions experienced considerable declines."

Research investigating burrowing owl demographics (reproduction, survival, dispersal) within four core (south San Francisco Bay area, NAS Lemoore, Carrizo Plain National Monument, and the Imperial Valley) population areas (Rosenberg et al. progress report 2003, Gervais 2002, Ronan 2002, Rosenberg and Haley 2003, Rosenberg et al. unpublished data) indicates densities, survival rates, and reproductive rates of WBO were high in a wide range of modified habitats. These demographic characteristics were highest in agricultural areas (Lemoore and Imperial) and similar between the urban area of South San Francisco Bay and the grasslands of Carrizo. If an assumption is made that Carrizo's population growth rate over the long term is close to stable, then the modified environments of agriculture and urban landscapes (given the conditions at the time of the research) seem likely to provide habitat that supports stable populations. Alternatively, an argument can be made that the documented long-term decline in the San Francisco Bay area is due to nest habitat loss

causing a contraction of WBO breeding range. This research also provides evidence of population connectivity between the Carrizo Plain, the south Bay area, and NAS Lemoore WBO populations. Also, these same studies by Gervais (2002) and Rosenberg and Haley (2003) revealed that the number of breeding pairs of burrowing owls at the Lemoore and the Imperial study sites stayed fairly constant between 1997 and 2000 despite fairly high variation in production and survival rates.

Population Trend Summary

The petition relied on historic and current scientific literature, along with expert opinion, to describe the WBO population in California. In conducting its analysis for this report, the Department carefully reviewed the same information as cited by the petitioners. The Department agrees that the scientific evidence indicates WBO populations have declined in portions of their range when contrasted with historic accounts, though the exact magnitude of the historic decline is not known and has not been quantified. Currently, the best available scientific information from more recent studies indicates a decline of 60% of the breeding groups of burrowing owls known to have existed within the research survey area between the 1980s and the early 1990s (DeSante and Ruhlen 1995). Within the highly developed urban landscapes open space lands such as industrial parks, airports and rail yards, tend to maintain populations of burrowing owls due to the adaptive behavioral characteristics of WBO. Also, due to the lack of WBO surveys in the arid desert environs of California (representing approximately 40% of their range), insufficient data exists to evaluate the extent of their populations where low density populations occur. Therefore, due to the fact that a large extent of the WBO populations occur in core populations (such as the Lemoore, Carrizo, and Imperial Valley study sites) that are stable, the Department at this time does not believe that the declining populations within highly developed portions of their range jeopardize the overall stability of the State population.

Factors Affecting the Ability of the Population to Survive and Reproduce

The petition provides sufficient scientific information on factors affecting the ability of the population to survive and reproduce. Though the petition does not actually contain a heading with this title, it is covered under the heading "VIII Nature, Degree, and Immediacy of Threat". The petition states "The burrowing owl is a species in crisis throughout most of its range in California. DeSante and Ruhlen (1995) estimated that at least 50% of the state's owl population was lost in the previous decade in both urban and agricultural areas of the state." Further the petition states that this loss is documented to be at a rate of approximately 8% per year. As stated previously, burrowing owls are believed to be extirpated in 5 counties, nearly extirpated from 6 additional counties as well as from portions of 4 counties.

The apparent main threats to burrowing owls are the loss of suitable habitat due to urban development and eradication of ground squirrels. Most of the extirpated populations identified by DeSante et al. (1997, unpublished data) occur within counties along the coast. These coastal counties have experienced tremendous growth over the last few decades. Urban development is also increasing in the Central Valley, and loss of agricultural and other open landscapes is likely to impact owl populations. Burrowing owls do persist in urban environments but in an unnatural and somewhat unstable condition due to the increased number of threats associated with living adjacent to urban areas (vehicles, pesticides, and domestic animals). However, Millsap and Bear (2000) indicated that lower density development appeared to benefit the owls due to increased prey availability around homes, and reduced mortality from natural causes (Millsap and Bear 2000).

Another identified risk for burrowing owls within developed landscapes is mortality caused by traffic (Konrad and Gilmer 1984, Haug and Oliphant 1997, Clayton and Schmutz 1997, Millsap 2002, D. K. Rosenberg et al., unpublished data). It would appear that burrowing owls nesting along roadsides or parking lots could be at greatest risk, however owls have been observed to forage along roads over 1 km from the nest burrow (J. A. Gervais, personal observation). Very little road kill data is collected so it is difficult to evaluate this subject.

Pesticides are likely to impact burrowing owl populations living in heavily agricultural environments (James and Fox 1987, James et al. 1990). In the Central Valley, however, there was no indication that foraging owls selected fields recently treated for pesticides, although owls did use crops extensively during foraging activities (Gervais et al. 2003). Some owls likely die of pesticide exposure, and some owls carry body burdens of persistent contaminants such as DDE that may impair reproduction or survival (Gervais et al. 2000). An analysis of the potential impacts of pesticide exposure rates on population growth rate suggested negligible effects (Gervais 2002, Gervais and Anthony in press).

The largest populations of burrowing owls remaining in California occur in agricultural environments. In addition to possible pesticide exposure, these owls are potentially vulnerable to land use practices. Discing to control weeds in fallow fields may destroy burrows, and the management of water conveyance structures will determine whether burrows persist through the breeding season (Rosenberg and Haley 2003). Ironically, the high density of owls present in the Imperial Valley is almost certainly due to agricultural development (Rosenberg and Haley 2003). A HCP for the Imperial Valley area has been drafted and includes mitigation measures for burrowing owls and monitoring requirements. Of the three basic canals engineered to deliver water to the Imperial Valley, the secondary canals that branch off of the three main canals provide the primary burrowing owl nesting habitat. The configuration of the secondary canals including the height and slope of the berms apparently provides more suitable habitat than either the larger primary canals or the smaller tertiary canals. The

secondary canals include both concrete lined and earthen construction and are apparently used at similar rates. It appears that canal embankments are more commonly used for nesting than drains because the vegetation is maintained at lower levels in the canals.

Another cause of burrowing owl population decline could potentially be related to the change in agricultural crops. Department staff has observed that burrowing owls appear not to use areas adjacent to orchard or vineyard type crops like they use areas adjacent to row crops. Conversion of row crops to orchard/vineyard crops could reduce burrowing owl habitat suitability.

Although natural predation may be significant in grassland habitats such as the Carrizo Plains (Ronan 2002), predators such as large raptors and coyotes may also benefit owls in more disturbed areas by checking the populations of feral predators such as domestic cats, although there is no data on this question.

Summary

The Department believes the petition and supporting information discussed above, and in the Threats section below, accurately summarize the factors that may negatively affect the ability of WBO populations to survive and reproduce.

Degree and Immediacy of Threats

The petition provides information on the degree and immediacy of threats to the WBO. Threats to the burrowing owl were divided into Urban Development, Threats to core populations in the Imperial Valley and Central Valley, Destruction of Burrowing Rodents, Relocation of Owls, Agricultural Practices, Pesticides, Predation, Disease, Small Population Sizes, and Other Anthropogenic Factors. They are discussed below as presented in the petition.

Urban Development

Urban development is a threat to burrowing owl populations. The petition thoroughly covers this threat. The petition cites DeSante and Ruhlen (1995) that 85 % of the known breeding population of burrowing owls in California is found on agricultural land in the Imperial and Southern Central Valley and that these areas are rapidly urbanizing according to the California Department of Finance population growth statistics (CDF 1993, 1994, 2001). Discussions with Department of Conservation staff confirm the loss of agricultural production lands. Between 1984 and 2000 approximately 3,633 acres have been converted from agriculture to urban development, at a rate of approximately 227 acres per year within the Imperial Valley. The total acres in the Imperial Valley of irrigated agricultural lands in production in the year 2000 were approximately 519,500. The population within Imperial County is recorded at 149,000 for 2000 and it is

projected to grow to 294,200 by the year 2020. The growth increase is high, but the overall population in the County is still low relative to other County populations.

The petition also references documents that address the rapid urbanization of the Central Valley. The petition references the Department of Conservation Farmland Conversion Report (CDOC 1994, 2000) which documented the loss of approximately 74,006 acres of land converted from agriculture to urban and built up uses from 1990 to 1998 within the Central Valley. However, within the southern Central Valley (San Joaquin Valley) which maintains approximately 15.1% of the known breeding population, significant reserve lands have been set aside for other sensitive species such as the kit fox and many are known to support burrowing owl populations. In total, approximately 1,465,000 acres within the Central Valley are reserve lands or are in public ownership. The Department agrees that the threat of land conversion from agriculture to intensive urban development poses a risk to WBO populations. However, at this time the Department does not agree that the stability of the rangewide populations is presently at risk.

The petition documents the extreme development pressure and habitat loss for the burrowing owl in the Bay Area environs. The petition references a Department document (2002) that recorded the loss of 84 pairs of burrowing owls within the Bay Area population over the last three years.

In southern California the petition documents that planned developments in western Riverside and San Bernardino counties threaten many of the remaining significant breeding populations. Department Staff indicate that the burrowing owl has been severely reduced as a breeding species in the five coastal counties of southern California. Staff has documented approximately 30-70 nesting pairs occurring at about 25 sites from Santa Barbara County south to the Mexican border. Wintering populations are reduced from historic levels based on Christmas Bird Count data and field observation in these southern coastal counties. Again, the Department agrees that the loss of WBO habitat to intense urbanization poses a risk to some populations. However, at this time the Department believes that due to the stability and extent of the breeding populations in other portions of their range that there is no present risk to the statewide WBO population indicating that listing may be warranted.

Threats to core populations in the Imperial Valley and Central Valley

The petition emphasizes the risk of having approximately 95% of the known breeding population of burrowing owls within the Imperial Valley (71%) and the Central Valley (24%) (DeSante and Ruhlen 1995). However, due to the low detectability of burrowing owls in large open landscapes (grassland, shrub steppe, and desert scrub) it is difficult to estimate the burrowing owl population outside of the survey area. The habitat within the Imperial Valley represents only

2.5% of the total occupied habitat within the DeSante (1995) survey area and yet this area contains approximately 71% of the known breeding owls. The petition states that the size of the burrowing owl population in the Imperial Valley is a by-product of the agricultural land use and that negative changes in land use practices could significantly effect the breeding population. However, at this time the Department believes that this threat does not pose a present risk to WBO populations indicating that listing may be warranted. Many factors including the extent of the WBO range in California and the diversity of habitats occupied provide security to the stability of the population. Also, the fact that research on WBO in the 1970's within the Imperial Valley documented similar demographic characteristics as recent research (Coulombe 1971, and D. K. Rosenberg et al., unpublished data) indicated that although the management of irrigated agriculture may change over time (three decades) WBO appear to adapt.

Destruction of burrowing Rodents

The petition cites Anderson et al. (2001) who indicate that there is a direct connection between loss of burrowing mammals and the recent and historic declines in burrowing owl populations. The long term control of burrowing rodent populations has been part of various agricultural land management practices intended to minimize the loss of crops and forage for domestic livestock. These control programs have reduced the number of burrows available for use by burrowing owls. The petition cites Gordon (1996) who documented that widespread ground squirrel control programs were begun as early as 1869 and cited Marsh (1987) who documented that more than 9.9 million acres in California were under some form of ground squirrel control during his research in the late 1980's. The petitioners cite research documenting that landowners and managers on grazing, vineyard, and crop production lands operate rodent control programs involving shooting, poisoning with acute toxicants, anticoagulants, fumigants, trapping, and sealing burrows (Butts 1973, Salmon et al. 1982, Rosenberg et al. 1998). The petitioners also noted that burrowing owls have been incidentally poisoned and their burrows destroyed during rodent control programs.

The petition cites research that illustrates how healthy colonies of burrowing rodents are essential for the health of burrowing owl colonies and that periodic elimination of ground squirrels reduces the likelihood that burrowing owls will maintain colonies (DeSante et al. 1996). Overall the Department concurs with the petitioners regarding the necessity to maintain healthy ground squirrel colonies to maintain healthy burrowing owl colonies. However, at this time the Department does not believe rodent control programs pose a risk indicating that listing may be warranted.

Relocation of Owls

The petitioners contend that most relocation of owls is detrimental to

burrowing owl populations. The Department's Staff Report (CDFG 1995) regarding burrowing owl mitigation outlines the Department's recommendations for minimizing impacts to burrowing owls. The Department does not concur with the petitioners' accounts of how the staff report addresses mitigation measures or necessarily how the mitigation for specific projects was carried out. The petition states that the Department often encourages passive or active relocation activities or eviction to accommodate development. The Department only recommends passive relocation as a last resort when the destruction of burrows cannot be avoided during a project. The Department does not recommend active relocation as mitigation (trapping and moving the owls off site) or eviction (closing the burrows and forcing the owls to move without providing alternative burrows). The Department first advocates for impact avoidance; for projects that are using passive relocation to mitigate for impacts pursuant to CEQA, the Department recommends habitat conservation set asides, preferably contiguous with the extant WOB colony.

Agricultural Practices

The Department concurs with petitioners' statements that although intensive agricultural operations can have a negative impact on burrowing owl populations, current agricultural practices in California are not thought to be a significant threat to the persistence of viable breeding owl populations, as indicated by the high densities of owls within the Imperial Valley. Research by Coulombe (1971) conducted approximately 30 years ago reported that burrowing owls were a conspicuous feature of the irrigated farm lands of the Imperial Valley as they remain today.

Direct impacts caused from agricultural practices are discing, plowing, and mowing. The Department concurs with the petitioners that discing or tilling may directly destroy burrows and potentially owls if they are caught within the burrows. The Department also agrees that mowing is a preferred alternative if not done during May and June when chicks are first emerging. However, at this time the Department believes that due to the stability and extent of breeding populations in irrigated agricultural habitat and within other habitats throughout their range that direct impacts from agricultural practices do not pose a risk indicating that listing may be warranted.

Livestock grazing can be beneficial for burrowing owls because of the low vegetation height preferred by burrowing owls to aid in predator detection. Grazed areas may also attract ground squirrels and hence increase burrow availability. However, overgrazed lands may reduce prey availability for WBO. The Department also concurs with the petition that the major negative impact from livestock grazing management areas is the control of ground squirrel colonies to enhance forage production. A balanced approach to livestock grazing management areas allows for moderate grazing which in turn minimizes the potential size of ground squirrel colonies, while allowing adequate habitat for

burrowing owls.

Other Agricultural Impacts

The petitioner does a thorough job outlining other potential impacts to burrowing owl caused by agricultural related activities. The main concern in this category is maintenance practices on levees and in irrigation canal banks. These practices can result in the destruction of burrows and owls trapped in burrows.

Pesticides

The petition provides a good review of actual and potential impacts to WBO caused by various pesticides. The Department concurs with the petitions evaluation and the conclusion that although agricultural contaminants can impact owls, recent research indicates that reproduction and survival in agricultural areas found no population level effects from pesticides on burrowing owls (Gervais et al. 1997; Gervais 2002; Gervais et al. 2003; Gervais and Anthony in press).

Predation

The petition outlines the significant predator issues associated with anthropogenic ecosystem changes that have impacted burrowing owl populations and will likely continue to impact populations in the future. Millsap and Bear (2000) indicated that lower rates of development appeared to benefit the owls due to increased prey availability around homes, and reduced mortality from natural causes. Also, it appears that lower predation rates also occur within intense agricultural settings because of the lack of predator cover. In contrast, more natural habitats (Carrizzo Plains and Salton Sea NWR) support higher predator densities and tend to contribute to lower burrowing owl production. At this time the Department believes that due to the stability and extent of the breeding populations that this threat does not pose a risk to the statewide WBO population indicating that listing may be warranted.

Disease

The petition covers disease issues known to potentially impact burrowing owl populations. The Department concurs with the assessment that there are currently no documented diseases or parasites that have had a direct impact on burrowing owl populations. The petition appropriately outlines the potential diseases that may have an impact on burrowing owl populations. Burrowing owls may be susceptible to West Nile Virus. The petition provides that West Nile Virus has been found in more than 138 species of birds (including seven species of owls) found dead in the United States since 1999 and that it arrived in California this summer. Another disease concern includes sylvatic plague that can cause

mortality within burrowing rodent populations and which then may have an indirect impact on burrowing owl colonies. The Department's Wildlife Investigations lab tracks wildlife disease issues such as these and will provide guidance should disease factors become an issue with burrowing owls in California.

Small Population Sizes

The petition discusses the impacts of small population sizes on burrowing owls. Small population sizes and small fragmented habitat patches negatively impact many vertebrate species. Burrowing owls, because of their ground nesting behavior are predisposed to the potential for elevated predation levels on nests within small fragmented habitats. Outside of the Imperial Valley many of the remaining burrowing owl populations throughout their range in California persist in small fragmented habitats and consist of small colony sizes. Additional research is necessary, but current research conducted within San Diego County indicate that approximately 6 pairs of burrowing owls are a minimum breeding population size necessary for a remnant colony to persist over time (P. Bloom, pers. comm.).

Recent banding studies conducted at Lemoore NAS indicate that some burrowing owl populations are capable of dispersing widely and successfully recruiting individuals from other populations (Gervais 2002). The petition also references recent research (Korfanta 2001) conducted on 3 study populations (Lemoore, Carrizo Plains, and the Imperial Valley) that failed to identify population differentiation or any evidence of genetic inbreeding or population isolation. However, the petition also referenced additional research conducted on a population of burrowing owls in Davis, California that reported higher genetic similarity occurred within the study population when compared to a collection of geographically separated owls (Johnson 1997), suggesting that some inbreeding was occurring. The petition again referenced research by Johnson (1997) that reported the extinction of a small population in less time than was predicted by a population viability model (PVM). The Department believes that additional banding studies coordinated with various permitted management actions would provide valuable information regarding core population connectivity.

Other Anthropogenic Factors

The petition describes 8 additional threats that can impact burrowing owl populations within various areas of their range in California. The Department briefly discusses each threat cited in the petition below.

Fire prevention activities are necessary to maintain public safety and protect property. However, various techniques have varying impacts on burrowing owl populations. Mowing to reduce fire hazard is preferred to disking

or tilling which can destroy burrows necessary for burrowing owl persistence in an area. Some municipalities advocate mowing to help conserve burrowing owl colonies. However, many private land owners still disc or till their lands, inadvertently impacting owl colonies.

Vehicle strikes kill burrowing owls each year due to the high use of road side habitats by owls. Vehicle caused mortality has been observed in most landscapes such as urban, reserve, agricultural, and military.

Aircraft strikes, although unlikely, have been documented to cause mortality to burrowing owls. Airports in general tend to provide suitable habitat for burrowing owls. Many airports have responded by passively moving owls away from runways. The petition references the Lemoore NAS and the San Jose Airport as having management plans that address WBO conservation by providing nesting habitat away from the runway systems.

Electric security fences have been documented to kill burrowing owls at thirteen California state prisons. Modifications have been made to the security fences that help to minimize burrowing owl impacts at 13 of the state's 25 prisons with electric fences. The petition references the development of a 50 year California Department of Corrections electric fence habitat conservation plan that minimizes the burrowing owl mortality to approximately 15-17 individuals per year at all of the facilities combined and requires the Department of Corrections to implement mitigation measures that will help WBO.

Wind turbines used to generate electricity have been documented to cause burrowing owl mortality. Some mortality levels have been high in areas such as the Altamont Pass. Changes in management of lands under and adjacent to wind turbines has helped to minimize the attraction of raptors to these areas by reducing the prey densities. Research by Smallwood et al. in press (2003) estimated that at least 1,080 birds are killed in the Altamont Pass Wind Resource Area annually. Thirty two species of birds were collected following fatal collisions with wind generators. The species included Golden Eagle, Red-tailed Hawk, Northern Harrier, Prairie Falcon, Burrowing Owl, California Gull, Loggerhead Shrike, Horned Lark, and Tricolored Blackbird.

Shooting was referenced by the petition as having been a significant source of mortality in the past. However, currently shooting has a limited impact on burrowing owls throughout most of the range.

The petition also references vandalism as a threat and cites numerous papers that confirmed that vandalism has caused significant impacts to burrowing owl colonies within urban areas. Milsap and Bear (2000) reported a reduction in nest failures when their urban study area coincided with the implementation of a formal, mandatory burrowing owl education program in the Cape Coral public schools. This approach can facilitate urban species/habitat

conservation while cultivating public education about our natural resources.

The petition groups the remaining potential mortality impacts together. They include various pipes left within construction zones, as well as PVC mining claim posts that have been documented to kill burrowing owls. Falconers have been observed accidentally taking burrowing owls. The petition references Bloom (pers. comm. 2002) who contends that the removal of burrowing owls adjacent to least tern colonies has contributed to the recent extirpation of burrowing owls along the San Diego coast.

Summary

The Department concurs with the threats identified in the petition as having, to varying degrees, negative impacts on burrowing owl colonies. These threats left unabated will continue to suppress local burrowing owl populations in California. However the Department does not believe that the listed threats either individually or collectively pose a risk indicating that listing may be warranted.

Impact of Existing Management Efforts

The petition contends that the existing management efforts for burrowing owls within California are inadequate to provide for their conservation. The petition references Anderson et al. (2001) who contends that although multiple agencies have management programs for burrowing owls that their habitat has not been adequately conserved or suitable lands set aside in conservation reserves to maintain burrowing owl populations. Although the protection of habitats for other listed wildlife species may serve to protect burrowing owl habitat, the petition contends that this is not enough. The petition contends that grasslands are not specifically protected by law and are rarely protected by state, federal, or municipal reserve systems. The petition also asserts that CEQA project mitigation for burrowing owls often results in the translocation of owls and localized extirpation of breeding colonies. The petition states that burrowing owl management has been limited to project by project mitigation recommendations regarding development impacts and that this has not provided for long-term maintenance of burrowing owls.

The petition details both federal and state regulatory mechanisms currently in place that provide some level of protection for WBOs, as well as regional and local government plans. Under the federal regulatory mechanisms, the petitioners discuss the federal species of special concern designation, federally listed species that overlap with burrowing owl habitat and range, habitat conservation plans, and federal conservation banks. Under the state regulatory mechanisms, the petitioners discuss the state species of special concern designation, CEQA, CDFG burrowing owl mitigation guidelines, Fish and Game Code sections 3503 and 3503.5, Natural Community Conservation Plans (NCCPs), and state mitigation banks. And finally, the petitioners discuss

regional, county, and city plans.

The Department briefly discusses each of these regulatory mechanisms below, as well as the Status Assessment and Conservation Plan for the Western Burrowing Owl prepared by the USFWS (BTP R6001-2003), and Department of Defense Integrated Natural Resource Management Plans. The Department believes that the existing regulations and guidelines help to conserve burrowing owl populations in some regions of California.

Federal Regulatory Mechanisms

The petition discusses the WBO's status as a National Bird of Conservation Concern, burrowing owl habitat overlap with other listed species, Habitat Conservation Plans, and Conservation Banks. The Department added a discussion regarding the Status Assessment and Conservation Plan for Western Burrowing Owl recently prepared by the USFWS and the protection afforded by the Migratory Bird Treaty Act.

The petitioners state that the **National Bird of Conservation Concern** designation by the USFWS provides limited protection for the burrowing owl. The petition states that although this list was developed to allow landowners and other project proponents an opportunity to plan early for the conservation of the species, that the provisions developed are implemented at the discretion of the project proponent and do not provide sufficient protection for the burrowing owl. However, the petitioners also state that this status does provide limited mitigation within Habitat Conservation Plans, and that the USFWS does encourage these species to be covered during consultations with other federal agencies. Citing DeSante et al. (1996) the petition contends that 91% of known burrowing owls occur on private lands and the threats to these populations are not subject to any federal regulation.

The petitioners also recognize that **burrowing owl habitat may be protected through the protection of other federally listed species habitat**, due to the shared habitat and range of various species. The petitioners contend that the primary way the burrowing owl could benefit from the listing of other species is through the protection of owl nesting and foraging habitat shared with these species. The petition indicates that many of the species (San Joaquin kit fox, blunt nosed leopard lizard, various kangaroo rats, San Joaquin pocket mouse, Tulare grasshopper mouse, desert tortoise, and the Mohave ground squirrel) have continued to decline after listing and question whether federal listing of these species has adequately protected these species and therefore question how well the reserve lands protect burrowing owls. The majority of the species referenced above are far less mobile than the burrowing owl and therefore are more susceptible to fragmentation (blunt nosed leopard lizard, various kangaroo rats, San Joaquin pocket mouse, and Tulare grasshopper mouse). Also, the declines observed in the early '90's of the small mammal and

reptile populations in the southern San Joaquin Valley coincided with an El Nino event and may not be representative of the effectiveness of these lands to conserve burrowing owls.

The petition thoroughly discusses **Habitat Conservation Plans (HCPs)** and contends that although in some cases a HCP may help conserve and recover some listed species, they tend to function mainly as exemptions from the Endangered Species Act and habitat protection policies.

The petitioners discuss **Conservation Banks and Mitigation Banks** developed by the Department. These banks are both administered jointly by the USFWS and Department. Please see evaluation under Mitigation Banks below.

Recently the USFWS published the “**Status Assessment and Conservation Plan for Western Burrowing Owl**” (BTP-R6001-2003). This publication was not included in the petition but describes the current condition of WBOs across their range, detailing their current threats, and outlining critical needs for the conservation of burrowing owls.

The burrowing owl is a migratory species protected by international treaty and the **Migratory Bird Treaty Act (MBTA)** of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter for any migratory bird listed in 50 C.F.R. part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations. These provisions generally require that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle. Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g. killing or abandonment of eggs or young) may be considered “take” and is potentially punishable by fines and/or imprisonment. The Department believes that the MBTA provides a strong legal basis when making recommendations on CEQA related projects to conserve breeding burrowing owls. MBTA requirements are incorporated into California law at Fish and Game Code section 3513.

Department of Defense, Integrated Natural Resource Management Plans (INRMPs) were recently updated or are in the process of being updated per the SIKES Act. Both USFWS and CDFG biologists have had the opportunity to comment on the draft plans before letters of concurrence were or will be signed by the appropriate CDFG Regional Manager and their USFWS counterpart. Burrowing owls often occur on DOD lands and are usually covered in the INRMP as a California Species of Special Concern. Passive relocation of burrowing owls following the Department’s Staff Report guidelines (1995) has been permitted on DOD lands as a way to relocate owls into burrows away from active runways serving to protect both owls and pilots. Naval Air Station, Lemoore had an “Adaptive Management Plan for the Burrowing Owl Population at NAS Lemoore”, prepared by Rosenberg et al. (1998) as a proactive approach to resource management for a non-listed species.

State Regulatory Mechanisms

The petitioners discuss the California Species of Special Concern listing designation, the California Environmental Quality Act, the CDFG Mitigation Guidelines, the California Fish and Game Codes, Natural Community Conservation Plans, and Mitigation Banks. The Department summarizes each of these regulatory actions below.

The petitioners contend that the **Species of Special Concern** designation has provided little practical benefit to the burrowing owl. This designation is intended for use as a management tool and for information; species of special concern have no special legal status. Species with this designation are often covered or discussed in CEQA documents along with state or federally listed species. Strategies to minimize impacts to these species are often included within CEQA documents or CDFG provides comments pursuant to CEQA to add conservation measures concerning species with this designation. While the legal effect of this designation is different from the legal effect of listing pursuant to CESA, species of special concern are considered in most CEQA projects, and consideration/mitigation for these species within the CEQA guidelines have provided for conservation of these species to a greater degree than for species without this designation.

The petitioners discuss the adequacy of **CEQA** at conserving burrowing owl populations and contend that even with all the considerations given under CEQA to mitigating impacts to burrowing owls, mitigation practices do not function adequately to prevent the ultimate decline of the population in certain highly developed landscapes. CEQA declares that it is the policy of the state to “prevent the elimination of fish or wildlife species due to man’s activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities” and requires public agencies to analyze and, in some cases, to mitigate the environmental impacts of projects they approve or carry out. The petition contends that CEQA theoretically has substantive mandates for environmental protection, but references areas in California where despite, the CEQA process to protect burrowing owl habitat, significant declines of occupied burrows have occurred.

The petition discusses the **CDFG Staff Report on Burrowing Owl Mitigation (1995)**. The petitioners discuss the formation of the California Burrowing Owl Consortium (CBOC), and the preparation of their document entitled “Burrowing Owl Survey Protocol and Mitigation Guidelines” in 1993. The Department has been involved with this conservation organization since its inception. The CDFG Staff Report prepared in 1995 utilized much of the information that was developed in the CBOC document. The CDFG Staff Report is intended to assist CDFG staff in reviewing CEQA projects which may impact

burrowing owl habitat. The Staff Report was developed by CDFG Headquarters Staff with input from Regional Staff and the public. The Staff Report's cover memo provides as follows:

“Either the mitigation measures in the staff report may be used or project specific measures may be developed. Alternative project specific measures proposed by the Department divisions/regions or by project sponsors will also be considered. However, such mitigation measures must be submitted to ESD (Environmental Services Division, now part of Habitat Conservation Planning Branch) for review. The review process will focus on the consistency of the proposed measure with Department, Fish and Game Commission, and legislative policy and with laws regarding raptor species.”

The petition contends that the Staff Report's use of a 100 meter radius around an active burrow (approximately 6.5 acres) as a threshold where impacts should be considered significant has been used inappropriately in project level mitigation. This threshold was developed by using a combination of intuitive disturbance distances (a few dozen meters) and territory considerations (Plumpton 1992, Desmond 1991). The Staff Report recommends as the second specific mitigation measure the following; “do not disturb occupied burrows during the nesting season...To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (approximately 100 meter foraging radius around the burrow) per pair or unpaired bird, should be acquired and permanently protected. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to the Department.”

In summary, the Department recognized the limitations to the Staff Report. However, the use of this Staff Report during CEQA review has helped to conserve numerous burrowing owls and their habitat over the eight years that it has been in use.

The petitioners describe the **California Fish and Game Code** sections that prohibit the take, possession, or destruction of the nest or egg of any bird (Fish & G. Code, § 3503), and that prohibit the take, possession, or destruction of birds of prey or their nest or eggs (Fish & G. Code, § 3503.5.). The petitioners contend that there does not seem to be any enforcement of these codes and it is unknown whether these codes have ever been used to prosecute illegal “taking” of burrowing owls or owl nests and eggs. Also the petitioners contend that these code sections do not provide adequate protection for habitat. During 2001 there were 53 protected species citations issued by the Department, indicating some level of enforcement activity. Since approximately 1994 there have been 86 citations written for 3503 and 3503.5, of which 60 were for 3503.5. The Department believes these sections of the code provide some protection for burrowing owls, although not a level equivalent to that provided by listing under CESA.

The petitioners discuss the **Natural Community Conservation Planning (NCCP) Act** and contend that unlike the federal Endangered Species Act, the NCCP Act contains no regulatory standards for plan approval and implementation. The NCCP Act does not require that stringent findings be made for plan approval and it requires signed implementing agreements. To some extent the new NCCP Act reflects lessons learned on the southern California NCCPs that were discussed in the petition. The new Act requires independent scientific input, has very high standards for approval, and mandates a plan for funding. NCCPs acknowledge that there is a high degree of environmental uncertainty that must be accommodated, hence the emphasis on monitoring and adaptive management. Anything in a plan can be changed, if it needs to be, through the process. NCCPs are science-based, but economics and politics also contribute to the final plan, and there must be stakeholder buy-in. These are collaborative, consensus-based plans that are a balancing act. Each is unique, based on the best biological information available at the time. The Department lists the NCCP Act and program as one of its top priorities because of its extreme value for conserving wildlife and habitat in areas of rapid urbanization.

The petitioners discuss **Conservation Banks and Mitigation Banks** developed by the Department. The petition mentions that the U.S. Fish and Wildlife Service (FWS) has formally approved one conservation bank with suitable habitat for burrowing owls. The conservation bank mentioned in the petition has been authorized to sell burrowing owl credits by the Department of Fish and Game (Department) for either Swainson's hawk foraging habitat impacts or destruction or degradation of burrowing owl foraging habitat adjacent to occupied burrows. In addition to the conservation bank discussed in the petition (Dolan Ranch Conservation Bank, Colusa County), two other conservation banks have been approved to sell credits for burrowing owl occupied habitat: Haera Conservation Bank (San Joaquin County) and Brushy Creek Conservation Bank (Contra Costa County). The petition asserts that the "conservation approach for burrowing owls implicitly endorses extirpation of owls from areas of high development by not requiring on-site conservation measures." The same complaint, however, could be made of mitigation for species listed under CESA.

Conservation banks are not meant to replace the Department of Fish and Game policy to recommend first and foremost the avoidance and minimization of impacts. Conservation banks often serve as a mitigation tool in addition to avoidance and minimization measures. The conservation banks also provide mitigation options when impacts are unavoidable. The CBOC recommended in their "Burrowing Owl Survey Protocol and Mitigation Guidelines" (1997) that suitable habitat should be replaced offsite if onsite habitat is developed below a 6.5 acre threshold and impacts are unavoidable. The Consortium then recommends off-site mitigation ratios for replacing the impacted habitat. Further,

the CBOC recommended the off-site mitigation land be purchased or preserved by a conservation easement and managed to promote burrowing owl use of the site.

The Department-approved conservation banks for burrowing owls consist of occupied habitat and/or suitable unoccupied habitat as defined by the Burrowing Owl Survey Protocol and Mitigation Guidelines. The sites are protected in perpetuity by a conservation easement and each bank operator provides an endowment fund to provide funds to manage the Conservation bank lands in perpetuity.

In addition to the conservation bank described in the petition, the Department has approved two other burrowing owl conservation banks. These two conservation banks collectively protect over 418 acres of occupied burrowing owl habitat, and proposals are being considered to expand the banks to protect additional occupied habitat acreage. One of the approved conservation banks protects over 200 burrows with owl sign and at least 16 pairs. The site has enough suitable foraging habitat to support 18 to 19 pairs (based on the Consortium's estimated minimum foraging habitat needed per pair).

Regional and Local Government Plans

The petitioners contend that the lack of consistency in interpreting burrowing owl protection guidelines developed by the Department, but never formally adopted by the Department, has led to confusion, conflict, and disarray in the regulatory community and among consulting biologists. The Department Staff Report has not been formally adopted as policy, but is currently used to help guide staff recommendations regarding CEQA project review. The petitioners discuss the failings of regional, county, and city plans to adequately protect burrowing owl populations or their habitat. The Department concurs in general with concerns regarding these plans, but believes that some of the local plans provide conservation measures for burrowing owls that have helped to conserve the resource.

Suggestions for Future Management

Recommended Management and Recovery Actions

The petition covered suggestions for future management under a section entitled "Recommended Management and Recovery Actions". The petitioners contend that this petition has documented the local extirpation of burrowing owls, ongoing and dramatic population declines throughout the majority of their range in California, as well as the complete failure of regulatory agencies and current management efforts to reverse this trend. The petitioners assert that elevated legal protection is necessary to protect this species. The petition reports that the CBOC recommended the following management and recovery actions: protect

remaining breeding pairs (especially those that are part of large breeding groups), protect and enhance breeding habitat, and amend management and land use plans to ensure recovery of the species.

The petitioners recommend the following management and recovery actions be taken: Protect remaining breeding groups and pairs and protect and enhance breeding habitat, amend existing management and land use plans, involve a wide array of agencies and organizations to develop recovery plans, and develop solid monitoring protocols and projects to facilitate appropriate feed back for management actions.

Availability and Sources of Information

The petitioners included both literature cited and personal communications in the development of this petition.

In evaluating the petition, the Department utilized literature, information from knowledgeable Department staff, published and unpublished information, and communication, with burrowing owl experts.

The petition and supporting information utilized for this report are available through the following address and telephone contact: Department of Fish and Game, Habitat Conservation Planning Branch, Attn: Sam Blankenship, 1416 Ninth Street, Sacramento, CA., 95814, telephone (916) 651-8762.

Detailed Distribution Map

The petition included a burrowing owl range and distribution map (Appendix 1) produced by John H. Barclay, using data derived from a census of burrowing owls in California 1991-1993 by David F. DeSante and Eric D. Ruhlen.

Summary of the Evaluation of the Petition

The petitioners recommend that the WBO should be immediately **listed as endangered or threatened** throughout its range in California. The Department does not concur with this recommendation. Although burrowing owls have clearly declined in some parts of their range in California, sufficient data is often lacking in other parts of the state to indicate a decline and healthy populations of WBO exist in other areas of the state. It appears that there has been a shift in population density, such that the Central Valley, Imperial Valley, and Palo Verde Valley support populations and have reached densities that were not likely present historically. In addition, the petition did not include data on populations of WBO that can be quite difficult to detect, particularly in large natural grasslands (D. K. Rosenberg, unpublished data). It is very likely that the populations of burrowing owls persisting in the Carrizo Plains and other large tracts of public land are much larger than originally estimated due to the difficulty

of detection. Other lands administered throughout the WBO range in California by the Bureau of Land Management, the Department of Defense, land conservancies, and the Department provide habitat and contain populations of WBO.

Burrowing owls tend to be habitat generalists and can respond favorably to resource management practices. The range contractions occurring along some of the coastal counties are in areas that historically contained lower densities of burrowing owls.

Overall, the burrowing owl population within California appears to have declined in the areas with the greatest urban growth, while maintaining large populations within areas of intensive agriculture (e.g., Gervais et al. 2003, Rosenberg and Haley 2003), or designated open space. Owls also persist in grasslands such as the Carrizo Plain Natural Area (Ronan 2002), but surveying these regions is difficult and the true magnitude of these populations is unknown.

Demographic studies on four California populations (San Jose, Lemoore, Carrizo Plains, and Imperial Valley) suggest variable population trends over five years, with each study population indicating good and bad years for survival and reproduction (D. K. Rosenberg et al., unpublished data; Gervais 2002, Ronan 2002, Rosenberg and Haley 2003). Burrowing owls banded at Naval Air Station Lemoore have been recovered as breeders at the Carrizo Plain and the San Jose area indicating population connectivity and hence greater stability. Also these studies indicate that the number of breeding pairs in the Central Valley (Naval Air Station Lemoore) and the Imperial Valley study remained nearly constant between 1997 and 2000, despite significant fluctuations in productivity and survival (Gervais 2002, Rosenberg and Haley 2003).

The petition relies strongly on DeSante et al. (1996) to illustrate potential declines in the WBO range in California. However, within the discussion section of the report the authors clearly state the value and limitations of their data and analysis. The authors state that reliable estimates of population size did not exist prior to their census (i.e. 1980's) for all areas except the Bay Area interior and that the 1980's data was derived from anecdotal information regarding locations of breeding pairs. The authors state, in the section of the paper discussing changes in the number of breeding groups, that because an additional 69 groups were found during the 1991-1993 census that were not identified in the 1980's, they did not observe an overall decline in total numbers of groups known in all regions of the census area. The authors estimated the WBO breeding population within their census area to be 9,127 plus or minus 1,243 breeding pairs during the period of 1991-1993. The authors go on to state that this estimate is likely biased low due to the inability to observe all owls in the sampling areas. They also state that the standard of error is likely biased low for specific sampling reasons. The authors clearly state that despite the limitations of the population estimates, the relative numbers within the survey area probably represent the

current distribution of WBO.

The census developed and analyzed by DeSante et al. (1996) was a tremendous and valuable project. This work will help to develop and refine future census protocols for wildlife and provide valuable baseline data for WBO. However, there are limitations on how the data can be used in describing possible trends in WBO populations.

The USFWS Status Report and Conservation Plan for Burrowing Owls (2003) provides:

“California supports one of the largest year-round (resident) and winter (migrant) populations of burrowing owls within the United States. The distribution of burrowing owls has changed considerably since introduction of industrial agriculture and increased urbanization, reflecting both losses and gains in local populations. Surveys conducted during 1991-1993 reported >9,000 breeding pairs. Most of the burrowing owls occurred in the Imperial and Central Valleys, primarily in agricultural areas. Burrowing owls have disappeared or declined in several southern California and San Francisco Bay area counties and in coastal areas. Without increased regulatory protection of habitat, burrowing owls will likely be extirpated in some areas. However, the large and widespread current population of burrowing owls and their high reproductive performance in disturbed environments suggests that the California population is not under immediate or foreseeable threat. Changes in agricultural practices, particularly regarding water conveyance, and urbanization have the potential to quickly affect California’s burrowing owl population. Evaluation of the ability of large publicly managed lands to support burrowing owl populations is important to assess the burrowing owls viability in California. “

“Genetic analyses of burrowing owls from three of the demographic study sites (Lemoore, Carrizo, and Imperial Valley) failed to identify population differentiation (Korfanta 2001). This was likely due to the continuous habitat relative to the long-distance dispersal of juveniles and some adults (Rosier et al. unpubl. ms). Owls are most abundant within the Central and Imperial Valleys. Based on the survey of DeSante et al. (unpubl. ms), most (91%) burrowing owls occur on private lands. However, the difficulty of detecting burrowing owls nesting within large grasslands (Ronan 2002, Rosenberg et al., unpubl. data) coupled with the densities estimated for Carrizo suggest that large publicly managed grasslands within public lands may have large numbers of burrowing owls.”

“In California, burrowing owls have shown incredible tolerance for human encroachment and degradation of native habitats. In urban areas, they are often found nesting within landfills, golf courses, airports, and vacant

lots within highly developed areas (Haug et al. 1993, Trulio 1997). The primary criterion for burrowing owl occurrence is a nest burrow. Because of this, habitat quality is spatially variable and highly dynamic. In modified ecosystems, habitat quality is often dependent on individual landholders and sensitive to a wide variety of land uses, such as farming practices.”

In closing, the Department concludes, at this time, there is not sufficient information to support the contention that the WBO populations within California are either in danger of becoming extinct throughout all or a significant part of their range or that the species is likely to become endangered in the foreseeable future in the absence of special protection and management effort.

Literature Cited in this Evaluation

- Anderson, J. W. 1979. The burrowing owl in Sacramento. Bulletin, Sacramento Zoological Society. Vol. 16, No. 1 (from a scientific paper presented at the 1977 annual meeting of the American Ornithologists' Union, Berkeley, CA).
- Anderson, S. H., L. W. Ayers, J. A. Dechant, M. T. Green, W. H. Howe, S. L. Jones, D. S. Klute, D. K. Rosenberg, S. R. Sheffield, and T. S. Zimmermann. 2001. Draft status assessment and conservation plan for the western burrowing owl in the United States. Administrative Report. U. S. Department of the Interior, Fish and Wildlife Service, Denver, Colorado.
- AGFD (Arizona Game and Fish Department). 1995. Status designations notebook. Heritage Data Management System. Phoenix, Arizona.
- Baird, S. F. 1870. Ornithology. Volume I. Land birds. Geological Survey of California. Edited by S. F. Baird, from the manuscript and notes of J. G. Cooper.
- Bent, A. C. 1938. Life histories of North American birds of prey. Part 2. Smithsonian Institution, U. S. National Museum Bulletin 170, Washington, D. C.
- Belloq, M. I. 1997. Ecology of the burrowing owl in agroecosystems of central Argentina. Pages 52-57 in J. L. Lincer and K. Steenhof [eds.] The burrowing owl, its biology and management: including the Proceedings of the First International Symposium. Raptor Research Report No. 9.
- Botelho, E. S., and P. C. Arrowood. 1996. Nesting success of western Burrowing Owls in natural and human-altered environments. Pages 61-68 *in* Raptors in Human Landscapes. Academic Press Inc.
- Butts, K. O. 1973. Life history and habitat requirements of burrowing owls in

- western Oklahoma. Thesis, Oklahoma State University.
- Clark, R. J. 1997. A review of the taxonomy and distribution of the Burrowing Owl (*Speotyto cunicularia*). Journal of Raptor Research Report 9:14-23.
- CBOC (California Burrowing Owl Consortium). 1997. Burrowing owl survey protocol and mitigation guidelines. Appendix B. Pages 171-177 in Lincer, J. L. and K. Steenhof (editors). 1997. The burrowing owl, its biology and management. Raptor Research Report Number 9.
- CDF (California Department of Finance). 1993. Population projections by race/ethnicity for California and its counties, 1990-2040. Report 93 P-1. Sacramento, California, April 1993.
- CDF (California Department of Finance). 1994. Population projections, as reported by the Marin Independent Journal, February 8, 1994.
- CDF (California Department of Finance). 2001. Official state estimates. California Department of Finance, Demographic Research Unit, May, 2001. World Wide Web publication: www.dof.ca.gov/.
- CDOC (California Department of Conservation). 1994. California farmland conversion report 1990-1992. Farmland Mapping and Monitoring Program, Division of Land Resource Protection.
- CDOC (California Department of Conservation). 2000. California farmland conversion report 1996-1998. Farmland Mapping and Monitoring Program, Division of Land Resource Protection.
- CDFG (California Department of Fish and Game). 1995. Staff report on burrowing owl mitigation. Unpublished report. 8 pp.
- Canfield, C. S. 1869. Habits of the burrowing owl of California. American Naturalist 2:583-586.
- Chico State University, Geography and Planning and Geographic Information System Department. 2003. Central Valley Historic Mapping Project.
- Clayton, K. M., and J. K. Schmutz. 1997. Burrowing owl (*Speotyto cunicularia*) survival in prairie Canada. Pp. 107-110 in J. R. Duncan, D. H. Johnson, and T. H. Nicholls, editors. Biology and conservation of owls in the northern hemisphere. USDA Forest Service General Technical Report No. NC-190.
- Coulombe, H. N. 1971. Behavior and population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. Condor 73:162-

176.

- Dawson, W. L. 1923. The birds of California. Volume Two. South Moulton Company, San Diego, Los Angeles, San Francisco, 1923.
- Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, P. A. Rabie, and B. R. Euliss. 1999 (revised 2001). Effects of management practices on grassland birds: Burrowing Owl. Northern Prairie Wildlife Research Center, Jamestown, ND. 33 pages.
- DeSante, D. F., and E. Ruhlen. 1995. A census of burrowing owls in California, 1991-1993. Institute for Bird Populations, Point Reyes Station, CA.
- DeSante, D. F., E. Ruhlen, and D. K. Rosenberg. 1996. The distribution and relative abundance of burrowing owls in California: evidence for a declining population. Institute for Bird Populations. Point Reyes Station, California.
- DeSante, D. F., E. D. Ruhlen, and D. K. Rosenberg. In press. Density and abundance of burrowing owls in the agricultural matrix of the Imperial Valley, California. *Studies in Avian Biology*.
- DeSante, D. F., E. D. Ruhlen, S. L. Adamany, K. M. Burton, and S. Amin. 1997. A census of burrowing owls in central California in 1991. Pp. 38-48 in J. L. Lincer and K. Steenhof, editors. *The burrowing owl, its biology and management*. Raptor Research Report No. 9.
- Desmond, M. J. 1991. Ecological aspects of Burrowing Owl nesting strategies in the Nebraska panhandle. M.S. thesis. University of Nebraska, Lincoln, NB. 114 pp.
- Evans, D. L. 1982. Status report on twelve raptors. U.S. Department of Interior, Fish and Wildlife Service Scientific Report No. 238. pp. 13-17.
- Fisher, W. K. 1904. List of birds of Santa Clara County and Santa Cruz Mountains, exclusive of water birds. *Handbook of Birds of the Western United States*, pp. 1i-1iv. (F. M. Bailey, editor). Houghton, Mifflin and Company.
- Garrett, K., and J. Dunn. 1981. The birds of southern California. Los Angeles Audubon Society, Los Angeles, California, USA.
- Gervais, J. A. 2002. Evaluating space use and pesticide exposure risk for burrowing owls in an agricultural environment. Ph.D. Dissertation, Oregon State University, Corvallis, Oregon USA.

- Gervais, J. A., and R. G. Anthony. In press. Interactions of chronic organochlorine contaminants and environmental variability in the demographics of a population of burrowing owls. *Ecological Applications*.
- Gervais, J. A., R. G. Anthony, and D. K. Rosenberg. 2003. Space use and pesticide exposure risk of male burrowing owls in an agricultural landscape. *Journal of Wildlife Management* 67(1):155-164.
- Gervais, J. A., and D. K. Rosenberg. 2003. Draft Bird Species of Special Concern Species Account. Prepared for CDFG under contract with PRBO.
- Gervais, J. A., D. K. Rosenberg, D. M. Fry, L. Trulio, and K. K. Sturm. 2000. Burrowing owls and agricultural pesticides: evaluation of residues and risks for three populations in California. *Environmental Toxicology and Chemistry* 19(2):337-343.
- Gleason, R. S. 1978. Aspects of the breeding biology of Burrowing Owls in southeastern Idaho. H.S. Thesis. University of Idaho, Moscow, Idaho.
- Gleason, R. S., and D. R. Johnson. 1985. Factors influencing nesting success of Burrowing Owls in southeastern Idaho. *Great Basin Naturalist* 45:81-84.
- Green, G. A., R. E. Fitzner, R. G. Anthony, and L. E. Rogers. 1993. Comparative diets of burrowing owls in Oregon and Washington. *Northwest Science* 67:88-93.
- Grinnell, J. 1915. A distributional list of the birds of California. *Pacific Coast Avifauna* Number 11. Cooper Ornithological Club.
- Grinnell, J., and A. H. Miller. 1944. *Distribution of the birds of California*. Museum of Vertebrate Zoology, University of California, Berkeley, CA USA.
- Grinnell, J. and M. W. Wythe. 1927. *Directory to the bird-life of the San Francisco Bay region*. *Pacific Coast Avifauna* Number 18. Cooper Ornithological Club.
- Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing owl (*Speotyto cunicularia*). Pp. 1-18 in A. Poole and F. Gill, editors. *The birds of North America: life histories for the twenty-first century*, No. 61. Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, DC USA.
- Haug, E. A., and L. W. Oliphant. 1987. Breeding biology of Burrowing Owls in Saskatchewan. Pages 269-271 in G. L. Holroyd, P. H. R. Stepney, G. C.

- Trottier, W. B. McGillivray, D. M. Ealey, and K. E. Eberhart, editors. Endangered species in the prairie provinces. Natural History Occasional Paper No. 9. Provincial Museum of Alberta, Edmonton, Alberta.
- Haug, E. A., and L. W. Oliphant. 1990. Movements, activity patterns, and habitat use of burrowing owls in Saskatchewan. *Journal of Wildlife Management* 54:27-35.
- James, P. C., and R. H. M. Espie. 1997. Current status of the burrowing owl in North America: an agency survey. Pp. 3-5 in J. L. Lincer and K. Steenhoff (editors). *The burrowing owl: its biology and management*. Raptor Research Foundation, Inc., Boise, Idaho.
- James, P. C., and G. A. Fox. 1987. Effects of some insecticides on productivity of burrowing owls. *Blue Jay* 45: 65-71.
- James, P. C., G. A. Fox, and T. J. Ethier. 1990. Is the operational use of strychnine to control ground squirrels detrimental to burrowing owls? *Journal of Raptor Research* 24:120-123.
- Johnson, B. S. 1992. Effects of demography, mating patterns, and sociality on the population genetics and dynamics of burrowing owl *Athene cunicularia*. Dissertation, University of California, Davis.
- Johnson, B. S. 1997a. Characterization of population and family genetics of the burrowing owl by DNA fingerprinting with pV47-2. Pages 58-63 in Lincer, J. L. and K. Steenhof (editors). 1997. *The burrowing owl, its biology and management*. Raptor Research Report Number 9.
- Johnson, B. S. 1997b. Demography and population dynamics of the burrowing owl. Pages 28-33 in Lincer, J. L. and K. Steenhof (editors). 1997. *The burrowing owl, its biology and management*. Raptor Research Report Number 9.
- Johnson, B. S. 1997c. Reproductive success, relatedness, and mating patterns of colonial burrowing owls. Pages 64-67 in Lincer, J.L. and K. Steenhof (editors). 1997. *The burrowing owl, its biology and management*. Raptor Research Report Number 9.
- Johnson, B. S. and T. A. Schulz. 1985. Biology and status of the burrowing owl on the campus of the university of California, Davis. *Raptor Res. Found. Symp. Biol. Status, and Management of Owls, Sacramento* [Abstract].
- Keeler, C. A. 1891. Geographical distribution of land birds in California. IV. The island fauna. *Zoe*. Volume I, January 1891. pp. 337-343.

- Kennard, J. H. 1975. Longevity records of North American birds. *Bird Banding* 46:55-73.
- Klute, D. S., Ayers, L. W., Green, M. T., Howe, W. H., Jones, S. L., Shaffer, J. A., and Zimmerman, T. S. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. USDI, Fish and Wildlife Service Biological Technical Publication ; FWS/BTP-R6001-2003, Washington, DC, USA.
- Konrad, P. M., and D. S. Gilmer. 1984. Observations on the nesting ecology of burrowing owls in central North Dakota. *Prairie Naturalist* 16:129-130.
- Landry, R. E. 1979. Growth and development of the burrowing owl, *Athene cunicularia*. Long Beach, CA: California State University. 66 pp. Thesis.
- Lutz, R. S., and D. L. Plumpton. 1999. Philopatry and nest site reuse by Burrowing Owls: implications for productivity. *Journal of Raptor Research* 33:149-153.
- Martin, D. J. 1973. Selected aspects of burrowing owl ecology and behavior. *Condor* 75:446-456.
- Medenhall, V. M. and L. F. Pank. 1980. Secondary poisoning of owls by anticoagulant rodenticides. *Wildlife Society Bulletin* 8:311-315.
- Millsap, B. A. 2002. Survival of Florida burrowing owls along an urban-development gradient. *Journal of Raptor Research* 36:3-10.
- Murray, G.A. 1976. Geographic variation in the clutch sizes of seven owl species. *The Auk* 93:602-613.
- Noss, R. F., M. A. O'Connell, and D. D. Murphy. 1997. The science of conservation planning: habitat conservation under the Endangered Species Act. Island Press.
- O'Connor, R.J., E. Dunn, D.H. Johnson, S.L. Jones, D. Petit, K. Pollock, C.R. Smith, J.L. Trapp, E. Welling. 2000. A programmatic review of the North American Breeding Bird Survey. Report of a Peer Review Panel. (<http://www.mp2-pwrc.usgs.gov/bbs/bbsreview/bbsfinal.pdf>).
- Palacios, E., D. W. Anderson, E. Mellink, and S. Gonzalez-Guzman. 2000. Distribution and abundance of burrowing owls on the peninsula and islands of Baja California. *Western Birds* 31:89-99.
- Plumpton, D. L. 1992. Aspects of nest site selection and habitat use by burrowing owls at the Rocky Mountain Arsenal, Colorado. M.S. Thesis,

- Texas Tech. Univ., Lubbock, Texas.
- Power, M.E., D. Tilman, J.A. Estes, B.A. Menge, W.J. Bond, L.S. Mills, G. Daily, J.C. Castilla, J. Lubchenco, and R.T. Paine. 1996. Challenges in the quest for keystones. *Bioscience* 46:609-620
- Price, W. W. 1898. Birds of the campus. *The Sequoia* 7(26):310-311.
- Ronan, N. A. 2002. Habitat selection, reproductive success, and site fidelity of burrowing owls in a grassland ecosystem. M.S. Thesis, Oregon State University, Corvallis, OR.
- Ronan, N. A. and D. K. Rosenberg. 1999. Burrowing owl demography study: Carrizo Plain 1999 Progress Report.
- Rosenberg, D. K. 1999. Burrowing owl demography study: Carrizo Plain 1999 progress report. Institute for Bird Populations. Point Reyes Station, California.
- Rosenberg, D. K., and K. L. Haley. 2001. The ecology of burrowing owls in the agroecosystem of the Imperial Valley, California.
- Rosenberg, D. K., J. A. Gervais, H. Ober and D. F. DeSante. 1998. An adaptive management plan for the burrowing owl population at NAS Lemoore. The Institute for Bird Populations. Point Reyes Station, CA. Publication No.95.
- Rosenberg, D.K., D. Catlin, and K. Tice. 2003. Dispersal of burrowing owls in California. The Institute for Bird populations, Unpublished Report.
- Rosenberg, D.K., L. Trulio, and D. DeSante 2000. Studies on space-use and demography of burrowing owls in California. Annual Field Progress Report.
- Rowe, M. P., R. G. Coss, and D. H Owings. (1986). Rattlesnake rattles and burrowing owl hisses: a case of acoustic Batesian mimicry. *Ethology* 72, 53-71.
- Salmon, T. P., W. P. Gorenzel, and W. J. Bentley. 1982. Aluminum phosphide (Phostoxin) as a burrow fumigant for ground squirrel control. Proceedings of the 10th Vertebrate Pest Conference, Monterey, California. pp. 143-146.
- Sauer, J. R., J. E. Hines, and J. Fallon. 2002. The North American breeding bird survey, results and analysis 1966-2001. Version 2002.1. USGS Patuxent Wildlife Research Center, Laurel, Maryland, USA. (<http://www.mbr-pwrc.usgs.gov/bbs/bbs2001.html>).

- Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count Home Page. Version 95.1. Patuxent Wildlife Research Center, Laurel, Maryland, USA. (<http://www.mbr.nbs.gov/bbs.cbc.html>).
- Schulz, T. A. 1997. Observations, resightings, and encounters of rehabilitated, orphaned, and relocated burrowing owls. Pp. 128-131 in Lincer, J.L. and K. Steenhof (editors). 1997. The burrowing owl, its biology and management. Raptor Research Report Number 9.
- Sissons, R. A., K. L. Scalise, and T. I. Wellicome. 2001. Nocturnal foraging and habitat use by male burrowing owls in a heavily cultivated region of southern Saskatchewan. *Journal of Raptor Research* 35:304-309.
- Smallwood, S. S., C. G. Thelander, and L. Spiegel. In press. 2003. Toward a predictive model of avian fatalities in the Altamont Pass Wind Resource Area. California Energy Commission, Sacramento, CA.
- Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland Municipal Airport. *Condor* 73:177-192.
- Thompson, C. D., and S. H. Anderson. 1988. Foraging behavior and food habits of burrowing owls in Wyoming. *Prairie Naturalist* 20:23-28.
- Trulio, L. 1997. Burrowing owl demography and habitat use at two urban sites in Santa Clara County, California. Pp. 84-89 in J. L. Lincer and K. Steenhof, editors. The burrowing owl, its biology and management. Raptor Research Report No. 9.
- United States Fish and Wildlife Service (USFWS). 1995. Biological information report. Palm Springs ground squirrel survey, August 11, 1995.
- Van Denburgh, J. 1899. Notes on some birds of Santa Clara County, California. *Proc. Amer. Phil. Soc.* 38:157-180.
- Wellicome, T. I., G. L. Holroyd, K. Scalise and E. R. Wiltse. 1997. The effects of predator exclusion and food supplementation of burrowing owl (*Speotyto cunicularia*) population change in Saskatchewan. Pages 487-497 in J. R. Duncan, D. H. Johnson and T. H. Nicholls [EDS.]. *Biology and conservation of owls of the Northern Hemisphere: Second International Symposium*. USDA, For. Serv. Gen. Tech. Rep. NC-190, North Central For. Exp. Station.
- Zarn, M. 1974. Burrowing owl. U. S. Department of the Interior, Bureau of Land Management. Tech. Note T-N-250, Denver, CO. 25 pp.

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**LIST OF INFORMATION SUBMITTED TO THE DEPARTMENT
PURSUANT TO SUBDIVISION (a) OF SECTION 2073.4
DURING EVALUATION OF THE PETITION**

- Personal communication with Mr. Jeff Kidd, Consulting Biologist/Raptor Researcher – Riverside County, estimated 500-1000 pairs of Western Burrowing Owls currently occupy the Palo Verde Valley environs.
- Personal communication with Ms. Miriam Hulst, Biologist – Department of Defense, provided 14 Western Burrowing Owl observation summaries for Camp Roberts (10) and Camp San Luis Obispo (4).
- Ms. Ingrid Johnson, Biologist – Bureau of Land Management, Palm Springs South Coast Field Office, provided an ArcView shape file with meta data for 74 Western Burrowing Owl observations in Coachella Valley environs.
- Personal communication with Mr. Cam Barrows, Biologist – Coachella Valley Conservancy, estimated a low density of 10-20 Western Burrowing Owls occupy the Coachella Valley environs.
- Western Burrowing Owl information provided to the Department from Live Oak Associates, Inc. (following a meeting per their request) including maps and summary tables of HCPs and a summary of Camp Pendleton's Integrated Natural Resource Management Plan.
- California Department of Food and Agriculture report and summary information regarding field studies of two rodenticides.
- City of Chino, January 2003 Resource Management Plan – The Preserve, which includes details on Western Burrowing Owl mitigation.
- Western Burrowing Owl information provided to the Department from Live Oak Associates, Inc. (following a meeting per their request) including maps and summary tables of HCPs and a summary of Camp Pendleton's Integrated Natural Resource Management Plan.
- California Department of Food and Agriculture (CDFA) reports: 1. *Final Report Study No. 00-0471, Field Efficacy Studies Comparing 0.005% and 0.01% Diphacinone and Chlorophacinone Baits for Controlling California Ground Squirrels (Spermophilus beecheyi)*; and 2. *Ecological Risk Assessment for Grain-Based Field-Use Anticoagulant Rodenticides Registered by the California Department of Food and Agriculture for Special Local Needs.*

- Transmittal letter from CDFA for the #2 referenced report above and for a report summarizing comments from CDFA regarding the Petition to List Western Burrowing Owls. We also included a copy of the CDFA petition comment report.
- City of Chino, January 2003 Resource Management Plan – The Preserve, which includes details on Western Burrowing Owl mitigation.
- Transmittal letter from Mr. Clifford Moriyama et al. to Director Robert C. Hight transmitting copies of two letters that Mr. Moriyama et al. identify legal and scientific shortcomings of the petition and why the proposed petitioned action is not warranted. One letter is from Dr. Rick Hopkins of Live Oak Associates, in association with Dr. Dennis Murphy of the University of Nevada, Reno. The second letter is from Robert Thornton with the Nossaman, Guthner, Knox and Elliott law firm.
- Along with the transmittal letter and attachments provided by Mr. Moriyama, a summary of HCPs, NCCPs, MSCPs, and IAs were provided, as well as a copy of a letter to Mr. Ronald Rempel (CDFG Deputy Director) from Daniel Webb (CDFA Deputy Secretary) with attachments.
- Metadata corresponding to 74 Western Burrowing Owl observations in Coachella Valley environs represented as point data provided to the Department by Ms. Ingrid Johnson, Biologist – Bureau of Land Management, Palm Springs South Coast Field Office, via an ArcView shape file. Correspondence from Ms. Johnson via email characterizes the database as draft coverages being developed for the Coachella Valley Multiple Species Habitat Conservation Plan/Natural Communities Conservation Plan.
- Western Burrowing Owl information provided by the Center for Biological Diversity regarding the area from which breeding owls are extirpated or nearing extirpation in California.

Copies of any written records identified above can be requested by calling Mr. Sam Blankenship at (916) 651-8762.



Figure 1. Western burrowing owl loafing on perch.



Figure 2. Burrowing owl at entrance to its nest in a mowed portion of the Yolo County Park (picture taken by Mr. Richard Hanschu).

Table 1. Summary of Central Valley Land Cover Changes, Central Valley Historic Mapping Project (Chico State University, 2003)

Nine land cover classifications were used to look at changes in land cover for the 14.7 million acres of the Great Central Valley of California. A more detailed map using more habitat types was not possible due to a lack of early maps with adequate detail. No early maps showing grasslands are known to exist and as an example “other floodplain” could not be broken into habitat types due to a lack of information. Note that grasslands habitats are now dominated by introduced annuals instead of native perennial species.

Land Cover	Pre-1900 (in acres)	1945 (in acres)	1960 (in acres)	Present (in acres)
Urban/Agricultural	0	6,346,459	8,169,169	9,690,262
Riparian	1,021,584	368,989	246,429	132,586
Wetlands	2,040,766	793,907	544,645	133,261
Aquatic	241,168	141,974	89,627	261,683
Grassland	7,085,483	3,946,049	3,283,692	3,198,301
Valley/Foothill hardwood	1,165,114	873,315	805,828	852,767
Alkali desert scrub	1,755,724	1,545,084	1,120,461	431,196
Chaparral	3,469	3,467	3,293	11,254
Other floodplain habitat	1,424,137	718,201	474,355	0
Totals	14,737,445	14,737,445	14,737,499	14,711,310

Table 2. Summary of Christmas Bird Count Data for highest three count circles (5 km radius) for 1999-2002).

1999	2000	2001	2002
Salton Sea south 26 owls	Salton Sea south 20 owls	San Jose 34 owls	East Contra Costa 24 owls
Sacramento 18 owls	East Contra Costa 16 owls	Salton Sea south 34 owls	Salton Sea south 11 owls
Buena Vista 17 owls	Rio Consumnes 13 owls	Sacramento 10 owls	Blythe 9 owls