

# **Burrowing Owl Management and Monitoring Plan for**

Lower Otay Lake Burrowing Owl Management Area

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*for*

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## SUMMARY

The Burrowing Owl (*Athene cunicularia*) breeding population in San Diego County has decreased 90 percent in the last 25-30 years. Managing of Burrowing Owls is a critical component of San Diego's Multiple Species Conservation Plan (MSCP); and the MSCP Biological Monitoring Plan identified it as one of the grassland raptor species to be monitored. In a pro-active mode, the City would like to have a number of sites prepared/managed to attract and support Burrowing Owls. These "Receiver Sites" would also be available for owls that needed to be actively translocated out of harm's way when a more local passive translocation was not feasible or desirable. Based on focused surveys for Burrowing Owls and other raptors by the Wildlife Research Institute (WRI) and others, numerous city-owned parcels were identified as having some potential for attracting and/or supporting Burrowing Owls, many of which were within the geographical limits of the MSCP. These parcels were examined based on a set of site criteria, developed for this project, and a short list of sites were visited at the reconnaissance level. Based on these site visits and input by the California department of Game and Fish and the U. S. Fish and Wildlife Service, the Lower Otay Lake site was identified as the best of the potential Receiver Sites. To start the habitat management process, WRI installed 22 burrows (11 nest chambers) on this site and began the installation of rock piles to attract the owls and provide habitat for their prey. This Management and Monitoring Plan the Lower Otay Lake Burrowing Owl Management Area was created for the City of San Diego, to provide recommendations and guidelines on how to improve and maintain the habitat at this site and monitor it for Burrowing Owls.

## **INTRODUCTION/BACKGROUND**

### **Legal Status**

The Burrowing Owl (*Athene cunicularia*) is protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-712). The MBTA makes it unlawful to take this species, its eggs, or its nest. Sections 3505, 3503.5, and 3800 of the California Department of Fish and Game (CDFG) Code prohibit the take or destruction of the bird, its nests, or eggs. The Burrowing Owl is also a Species of Special Concern to California and, as such, the California Environmental Quality Act (CEQA) requires mandatory findings of significance (i.e., significant or not significant) if impacts are likely to occur to this species. It is a Species of Special Concern in California because of declines in suitable habitat and both localized and statewide population declines (DeSante et al. 1997). For these reasons, it may qualify for listing (CDFG 1995). Its decline is, however, not limited to the United States. It is considered Threatened in Alberta, Endangered in Saskatchewan, Endangered at the national level in Canada, and extirpated in Manitoba. It is being reintroduced in British Columbia. Further reflecting the urgency of protecting this species over a large geographic area, USFWS and the Canadian Wildlife Service identified the Burrowing Owl as a candidate species for bi-national action in 1998 (Wellicome and Holroyd 2001).

### **Historic and Current Distribution of Burrowing Owls**

The following is excerpted from a recent paper given at the 2003 California Burrowing Owl Symposium (Lincer and Bloom 2003):

Burrowing Owls have disappeared or declined in many regions of the western United States, including several southern California and San Francisco Bay counties and coastal areas (DeSante et al. 1997, Klute et al. 2003). As of 1992, 16 (67 percent) out of 24 states and provinces polled reported Burrowing Owl population declines and none reported an increase (James and Espie 1997). As a result of widespread concern, this species was the subject of two recent international symposia (Lincer and Steenhof 1997, Wellicome and Holroyd 2001) as well as a state-level symposium, focusing on California (Barclay in prep.). Concern for this species is not just local or even regional; it has also declined in several large regions, notably the northeastern Great Plains and Canada (Klute et al. 2003).

The above trend was reflected by the data for San Diego County as a microcosm. Currently, there are perhaps 25-30 resident pairs of Burrowing Owls primarily located in the southern quarter of the county and on North Island (JLL pers. observ.). In the late 1970s and early 1980s, there may have been 250-300 pairs well distributed throughout the county in suitable habitat, including areas that now support no owls. Given the documented county trends in Burrowing Owl numbers and associated owl habitat loss, there could have been substantially more owls at the turn of the century.

Although lack of data prevented our exploring the historic wintering Burrowing Owl population and trends, we can assume that all or most of the resident pairs remain in the county during the winter (Unitt 1984; J. Lincer pers. observ.), which would mean that at least 50 to 60 local individuals winter in the county. These are, apparently, joined by a larger number of wintering birds from more northern latitudes. Based on field observations, approximately 50-100 Burrowing Owls winter in, or migrate through, Camp Pendleton and the adjacent Fallbrook Detachment (P. Bloom pers. observ.). It is not hard to imagine, given the distribution of suitable habitat and our knowledge of wintering owls that another 100 owls could winter in San Diego

County, for a total estimate of approximately 200 to 260 wintering owls. However, this may be a high estimate and data collected for the County Bird Atlas (Unitt 2004) suggests that the numbers may be lower.

Burrowing Owls are currently in some of the same places that they were historically observed (e.g., North Island, south San Diego coastal area, and Otay Mesa) although in much reduced numbers (Unitt 1984; WRI 2002, 2003). They are, however, clearly absent from many now-developed places where they were formerly found (e.g., north-central county and south to the Mexican border, coastal areas, including south of La Jolla, Point Loma, and the area around the City of San Diego). Surprisingly, even the relatively vast and pristine habitats of Camp Pendleton and the Warner Ranch currently support no breeding Burrowing Owls; although, some wintering and migrating individuals persist.

Burrowing owl distribution has changed and numbers have been drastically reduced from those that probably existed prior to the extensive development of southern California. Abbott (*in Bent* 1932) provided a picture of numerous Burrowing Owls still living on scattered vacant land amongst a growing City of San Diego in 1921. However, even when Grinnell and Miller wrote about this species in 1944, they noted that it was "...becoming scarce in settled parts of the state." Although Unitt (1984) reported that the Burrowing Owl was still present in the 1970s in many areas, by the time he reviewed the status of this species in 1984, he considered it an "Uncommon and declining resident in grassland, agricultural land, and coastal dunes" and went on to say, "...urbanization has greatly restricted the extent of suitable habitat [in San Diego County]." At that time, this species was known to have bred along San Diego's coast, in the Ramona Grasslands (Loy 1986, Bloom 1994 *in* BFMA 1997), and along a north-south line from El Cajon to just east of San Ysidro (see Map 30 of Unitt 1984). Their numbers have continued to decline since then. Burrowing Owls in San Diego County are experiencing the same kind of consistent population declines, as have been observed throughout the northeastern Great Plains and Canada. The reasons for declines in different regions often vary based on specific local and regional population stressors. It is not likely that exactly the same factors are responsible for declines in all affected populations. It is equally likely, however, that some key factors were/are important to many declining populations.

The 90 percent decrease in breeding Burrowing Owls in San Diego County since the late 1970s/early 1980s appears to have been in response to inadequate habitat and fragmentation of remaining suitable habitat, the lack of burrows in response to the disappearance of Ground Squirrels, perhaps due to poisoning, conflicts with the management of listed species, such as the California Least Tern and Western Snowy Plover, and human disturbance (including their pets and vehicles). In addition, owl predators (in, perhaps, unnatural numbers and species make-up), prey availability, and colony size are likely influencing factors, the relative importance of which is difficult to characterize at this point. Given local population declines and current threats, a comprehensive management program is essential to protect remaining habitat and birds. Such a multifaceted plan should include: public education; captive breeding and release; habitat protection, modification, and management; monitoring; and research. If such a plan is not implemented soon, extirpation of the Burrowing Owl in San Diego County is likely imminent.

### **Burrowing Owl Biology**

The Zuni Indians called the Burrowing Owl the "priest of the prairie dogs" (Haug, Millsap, and Martell 1993). It has also been called North American Burrowing Owl, Large-headed Burrowing Owl, Howdy Owl, Ground Owl, Prairie Dog Owl, Rattlesnake Owl, Dusky Burrowing Owl, Cuckoo Owl, Tunnel Owl, Gopher Owl, and Hill Owl. Its current genus *Athene* has, historically, been interchanged with *Speotyto*. There are at

least 18 geographic races of the Burrowing Owl distributed throughout its Western Hemisphere range (Clark 1997).

**Description.** This is a small ground-dwelling owl with a round head and no ear tufts. Its long legs, white eyebrows, and yellow eyes are prominent in the field. It is light brown colored on the head, back, and upper parts of the wings and white-to-cream with barring on the breast and belly, with a prominent white chin stripe. The young are brown on the head, back, and wings with a white belly and chest. Youngsters, typically, molt into an adult-like plumage during their first summer. The females are generally darker than the males. Approximate overall length is 19-25 cm and weight is approximately 150g (Haug, Millsap, and Martell 1993).

**Voice.** The main call is given only by adult males primarily when near the burrow to attract a female. A two-syllable "who-who" is given at the entrance of a potential or chosen burrow. This call is also associated with breeding and territorial defense. Other vocalizations, called the "rasp", "chuck", "chatter", and "scream," have also been described. Juveniles give a rattlesnake-like buzz when threatened in the burrow, and adults give a short, low-level "chuck" call to warn of approaching predators. This is usually accompanied by bobbing the head up and down (Haug, Millsap, and Martell 1993).

**Hunting and Prey.** Burrowing Owls feed on a wide variety of prey, depending on what is available. Beetles, earwigs, and grasshoppers comprise a substantial portion of this owl's diet (by number). However, small mammals (especially mice, rats, gophers, and perhaps small ground squirrels) are frequently more important prey items, by weight. They exhibit a range of hunting behaviors, such as chasing grasshoppers and beetles on the ground, using their talons to catch large insects in the air, hovering in anticipation of pouncing on prey, and hunting from perches. Burrowing Owls are primarily crepuscular (i.e., most active at and just after dawn and in the early evening) but they will hunt throughout the day and night, especially when they are feeding young.

**Breeding and Nesting.** The Burrowing Owl depends mainly on the abandoned burrows of fossorial (i.e., burrowing) mammals so Burrowing Owl sites often must have conditions that are attractive to these small mammals (i.e., soil that can be dug or surface opportunities, such as rock piles, that provide tunnels and other protected places). Within the MSCP, these mammals include Ground Squirrels, foxes, skunks, and perhaps Badgers and Coyotes. The owls will also use non-natural "burrows," such as piles of surface debris, including abandoned concrete and concrete pipes, and man-made nest boxes placed underground (J. Lincer, pers. observ., Henny and Blus 1981). They commonly perch on fence posts or on top of mounds outside the burrow, presumably, to watch for potential predators and prey. They often line their nest with an assortment of dry materials, including dung, which they will also scatter around the burrow entrance (Denman-Smith and Conway 2002). Adults usually stay at, or return to, the same burrow or a nearby area each year (Rich 1984, Feeny 1997). One or more "satellite" burrows can usually be found near the nest burrow, and are used by adult males during the nesting period and by juvenile owls for a few weeks after they emerge from the nest.

In Southern California, the peak of the nesting season is mid-April to mid-July (CDFG 1995). However, in San Diego County, as early as February, with first egg dates in San Diego County (based on 41 clutches) ranging from 5 April-8 June. Its nesting period is long; some pairs have been known to still have young (with some down) as late as 28 August (Unitt 1984).

Burrowing Owls have the appearance of being monogamous but recent DNA research indicates that this is not always the case. In fact, in 20 percent of the cases studied by Johnson (1997), genetically determined parent-offspring relationships differed from that implied by direct behavioral observations. Courtship displays include flashing white markings, cooing, bowing, scratching and nipping. The male performs display flights, rising quickly to 30 meters, hovering for 5 to 10 seconds, and then dropping 15 meters. This sequence is repeated and circling flights often occur. Six to nine (sometimes up to 12) white eggs are laid a day apart, which are incubated for 28-30 days by the female only. The male brings food to the female during incubation, and stands guard near the burrow by day. At about 14 days, the young may be seen at the entrance to the burrow, waiting for the adults to return with food. They leave the nest at about 44 days and begin chasing prey when 49-56 days old (Haug, Millsap, and Martell 1993).

**Mortality and Threats.** Burrowing Owls are known to live for at least 9 years in the wild and over 10 years in captivity. The greatest threats, over its entire range, are thought to be (1) habitat loss, (2) reduced burrow availability due to rodent control, and (3) pesticides (James and Espie 1997). They are sometimes killed by vehicles when they fly low across roads. They are also occasionally shot and have numerous natural enemies, including larger owls, other raptors, badgers, skunks, opossums, weasels, coyotes, bobcats, and snakes. Domestic and feral cats and dogs can also be a serious problem when Burrowing Owls are found near human habitation.

**Habitat.** Burrowing Owls are found in open, annual and perennial grasslands, agricultural and range lands, desert habitats, and scrublands characterized by low-growing vegetation (Zarn 1974). Suitable habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface (CDFG 1995). When population numbers allow, they often nest in loose colonies. Such groupings may be a response to a local abundance of burrows and food and/or an adaptation for mutual predator awareness. During the nesting season, adult males forage over a home range of 2 to 3 square kilometers. Ranges of neighboring males may overlap considerably. A small area around the nest burrow is aggressively defended against intrusions by other Burrowing Owls and predators.

**Distribution.** Burrowing Owls are present in North America, and breed (although in decreasing numbers) across the grassland regions of western Canada (Wellicome and Holroyd 2001). They occur in all states west of the Mississippi Valley and breed throughout the western and mid-western States. A separate subspecies is found in Florida. They extend south into Mexico, Central America and South America but populations have declined in many areas due to many causes, including habitat loss or alteration and the control/elimination of ground-dwelling mammals, such as ground squirrels and prairie dogs. Burrowing Owls from the northern part of the U.S. and Canada are migratory and some go as far south as Mexico to spend the winter (Haug, Millsap, and Martell 1993). Burrowing Owls breeding within the MSCP, and southern California generally appear to be resident all year long. In the winter, they are joined by individuals that have migrated from more northern latitudes (Haug, Millsap, and Martell 1993) or have dispersed from nearby areas. For more information on the distribution of Burrowing Owls in San Diego County, see WRI (2003) and Unitt (2004)

**Additional Information.** For additional information on the biology of the Burrowing Owl, see Haug, Millsap, and Martell (1993) for the most recent comprehensive review but others have provided good, but more location-specific, coverage (see Bent 1938, Thomsen 1971, Coulombe 1971, and other references in the Literature Cited and Other Relevant References section).

## THE PROJECT

The City of San Diego's Burrowing Owl Receiver Sites Project is intended to benefit the San Diego Multiple Species Conservation Plan (MSCP). The MSCP is an important component of the State's Natural Communities Conservation Planning (NCCP) Program of which the City of San Diego (City) is a participating member and the lead agency. The City adopted the MSCP on March 18, 1997 and entered into a binding contract on July 16, 1997 with CDFG and the United States Fish and Wildlife Service (USFWS) to implement the MSCP. This project is the result of the City of San Diego's successful application for an NCCP Local Assistance Grant and subsequent contract to WRI. The objectives of this project are to:

1. Identify City-owned lands with historic or potential burrowing owl habitat;
2. Develop parameters for site analysis;
3. Conduct a comparative analysis of the sites;
4. Modify habitable site and install artificial burrows [Note: Initial modification (the construction and installation of artificial burrows) will be accomplished under the WRI contract while additional and future modifications will be recommended]; and
5. Develop a *Management and Monitoring Plan*, which will identify necessary management measures (to maximize the potential of the site(s) attracting and supporting Burrowing Owls) and a monitoring plan, which will track the site(s)' success at attracting and/or supporting Burrowing Owls.

## METHODS

**Prioritizing Sites.** Before any on-site work could be accomplished, several potential City-owned sites had to be examined and prioritized as to their potential for supporting Burrowing Owls. This work included the process of reviewing numerous potential sites (Moreno Valley, Otay Mesa, Pamo Valley, Lower Otay Lake, San Pasqual Valley, Proctor Valley, Spring Canyon, Brown Field, Otay River Valley, and East Otay Mesa). We also looked at lands not owned by the City for comparative purposes and with an eye to potential future use. These included: the Ramona Grasslands, Rancho Jamul, Dennerly Canyon, and the Warner Ranch. These lists do not, necessarily, include all potential City-owned parcels and certainly not all the potential parcels owned by private and other non-City entities. The next step was to reduce the field to a short list (i.e., Moreno Valley, Otay Mesa, Pamo Valley, and Lower Otay Lake), which were visited and analyzed for appropriateness. The fact that several of the above parcels didn't make it to the short list doesn't mean that they didn't have the potential to support Burrowing Owls; they may have been cut temporarily because of timing, political, or other reasons.

In order to establish a set of criteria for site appropriateness, a "White Paper" was drafted, reviewed by peers, and provided to the City, CDFG, and the USFWS for further input. As an overview, the parameters that were considered important for a site to be able to support Burrowing Owls were: burrows and/or fossorial mammals, short vegetation/open space, a reasonably normal predator population, an adequate prey base, minimal disturbance, lack of conflict with the management of listed species, and lack of features that would facilitate predation by other raptors (e.g., nearby hunting perches). The following is a brief overview of the logic train that was used to analyze the selected Management Area:

- Short Grass/Open Space. This site is located on the south side of the eastern arm of Lower Otay Lake. Short grass and open space are available and, currently, maintained by, apparently unpermitted, grazing in many areas. [Recent observations indicate that grazing is not currently occurring, which means that vegetation may not be kept as short as necessary.]
- Burrows/Fossorial Mammals. Burrows would have to be provided although some natural burrows exist [lack of Ground Squirrels was noted. In addition, extensive rocks amongst a clayey soil matrix may limit natural habitation by Ground Squirrels and other fossorial mammals.]
- Prey. Prey appears to be plentiful, based on sign and the array of raptors, and other predators, already foraging in the area. Based on scat content, striped skunks (*Mephitis mephitis*) that forage in the area feed extensively on Coleoptera (beetles) that are a size that would be appropriate for burrowing owls to feed on. [On-site visits on March 24 and 29, 2005 revealed that insects, reptiles, and small mammals were already taking advantage of the artificial burrows and rock piles.]
- Conflicts With Listed Species Management. None known but peregrine falcons are known to winter in same area, feeding on shorebirds (J. Lincer, pers. observ.).
- Disturbance. Disturbance would appear to be minimal because of this site's remote location and gated access.
- A "Normal" Predator Population. Because of this site's remote location, and the lack of nearby development, pet and/or feral dogs and/or cats, should not to be an issue. Regarding other meso predators, sign (scat, prints, and kill remains) suggest that they are present in fair numbers. Extensive evidence of striped skunks was observed during our on-site investigations. As to whether they, or other meso predators, pose a level of predation, which is greater than normal, is unknown at this juncture.
- Predation "Facilitation." Although an extensive riparian area occurs at the far eastern end of Otay Lake's eastern arm, these trees appear to be too far from the subject site to create a predation facilitation issue [they have since burned in the 2003 fires]. There are extensive treeless areas immediately surrounding the site, which would provide substantial safety from aerial predators.
- Population and Colony Size. There appears to be adequate space/resources available to establish a reasonably large colony.
- Additional Management Issues.
  - a. Security. Because of the gated access, and frequent Border Patrol presence, security should not be an issue.
  - b. Location. It is remote from the City offices, which would make visits to the site somewhat time-consuming. However, it is conveniently located relative to the San Diego Water Department's offices at Otay Lake. If maintenance and monitoring were to be conducted by a contractor, then proximity to that contractor's base may be the more relevant issue.
  - c. Access. Convenient [since the 2003 fires and the extensive erosion that followed, access has become more challenging but the site is still accessible with a 4-wheel drive vehicle].
  - d. Land Use. Site is illegally grazed by cattle that presumably come from adjacent ranches. Whether this will continue to keep the grasses at an adequately short level, which is necessary for burrowing owls, is an unknown. An alternative strategy to keeping the grass short will need to be in place should grazing not continue at the necessary intensity. [Since this writing, illegal grazing appears to have been reduced and *Erodium* has taken over the Management Area and surrounding habitat.]

- e. Historical Presence. Burrowing Owls have historically occurred at Otay Lakes (Unitt 1984), which suggests that the habitat, and other conditions, were at least appropriate in the general area at that time.
- f. Other Management Considerations: Given the nature of this site (somewhat of a grassland monoculture, surrounded by and interspersed with scrub), the addition of brush piles and rock piles could substantially add to the carrying capacity for small prey items (especially small rodents, insects, and reptiles), which could increase both the attractiveness of the site to burrowing owls and the site's ability to support a breeding population.

**Artificial Burrow Installation and Other Initial Site Modification.** An artificial burrow design was developed (Figure 1), which was based on several other designs, discussions with knowledgeable biologists and wildlife managers, and our previous experience. Each burrow complex consists of a central breeding chamber, made of two combined plastic 5-gallon buckets, with two 8-foot access tunnels, constructed of perforated flexible drainage pipe. The two independent accesses allow the owls to escape should a predator enter one of them. In addition, the first one-foot of each burrow (starting at the ground surface) is 6 inches, in diameter. This is designed to maximize the chances of multiple owls being able to quickly get away from a predator and yet restrict access to the larger predators before they can get into the nest chamber. The lid to the breeding chamber is the bucket lid, which is slightly counter-sunk from the ground surface and covered with a cement slab, which is larger than the lid. This discourages predators and protects the lids from being crushed by foot traffic or livestock. The burrow entrances are also armored with a cement collar for similar protection and surrounded by large rocks (see photographs in Appendix B) that further protect the entrance and make it more obvious from a distance (to increase chances of attracting the attention of an owl moving through the area).

We installed 22 burrows (11 breeding chambers) and created several rock piles for the owls and their prey (Figure 2 and Appendix B). After installation, the waypoint for each artificial nest chamber was recorded for future locating and management needs (Table 1). The specific location for the artificial burrow complex was chosen based on the evidence of prey, habitat openness/distance to raptor hunting perches, and slope. By locating the mouths to the burrows on a slope, lower than the nest chamber, drainage problems should be avoided or at least substantially minimized. Artificial burrows were divided into three groups, each a cluster of 8, 8, and 6 artificial burrows, respectively (each pair leading to a common nest chamber). The distance between burrow openings (of different chambers within a cluster) was approximately 20-25 feet while the distance between the closest burrows of different groups ranged from 55 to 65 feet. By distributing burrows this way (similar to how one might envision the "typical" natural Ground Squirrel colony), the owls have multiple options for burrows to occupy (based on aspect, slope, and a variety of variables, which may not be obvious to humans) and multiple nearby burrows for predator avoidance.

**Management and Monitoring Plan.** The development of this plan is based on experience, discussions and presentations at the First and Second International Burrowing Owl Symposium (Lincer and Steenhof 1997; Wellicome and Holroyd 2001, respectively) and the California Burrowing Owl Symposium (Barclay in prep.), the literature (both peer-reviewed and "gray"), and discussions with other Burrowing Owl experts. A draft was provided to the City of San Diego, CDFG, and USFWS for review before it was finalized.

**Figure 1**



**Figure 2**



**TABLE 1. Lower Otay Lake Burrowing Owl Management Area (1) - Artificial burrow (breeding chamber) waypoints (UTM)**

<b>Waypoint ID (2)</b>	<b>Zone &amp; Easting (mE)</b>	<b>Northing (mN)</b>	<b>Elevation (ft.)</b>	<b>Date Surveyed</b>
AB030	11S 507875	3609397	540	3/24/2005
AB031	11S 507887	3609394	555	3/24/2005
AB032	11S 507894	3609393	559	3/24/2005
AB033	11S 507902	3609392	562	3/24/2005
AB034	11S 507910	3609402	558	3/24/2005
AB035	11S 507927	3609417	569	3/24/2005
AB036	11S 507930	3609414	575	3/24/2005
AB037	11S 507930	3609419	568	3/24/2005
AB038	11S 507945	3609406	567	3/24/2005
AB039	11S 507953	3609405	572	3/24/2005
AB040	11S 507963	3609413	559	3/24/2005

(1) Center of artificial burrow clusters : 11S 507917 / 3609408.

(2) AB = Artificial burrow location.

## **SITE DESCRIPTION**

The Lower Otay Lake Burrowing Owl Management Area (Management Area) is located on the south side of the eastern arm of Lower Lake (UTM: 11S 507917/3609408) at an elevation of approximately 560 feet above mean sea level. Current land use is as part of a functional watershed that supplies the Otay Lakes for drinking water. Past land use includes grazing and, until recently cattle grazed in the Management Area. We have not identified limits of critical or important habitat within the management area but, if as suggested by the California Burrowing Owl Consortium, an average of 6.5 acres were to be allocated for each Burrowing Owl pair (CBOC 1997), and all 11 of the nest complexes were occupied, 71.5 acres would, theoretically, have to be dedicated to owl management. This assumes no overlap in use areas. Until owls either adopt the site or are translocated there, and their use areas are known, it is premature to create an artificial boundary of the Management Area.

### **Status of Burrowing Owls On Site**

At the current time, no Burrowing Owls are known to nest at Otay Lakes. Between 2001 and the present, WRI has conducted numerous raptor surveys on and around this site, including a total of eight surveys of Lower Otay Lake and the surrounding uplands during the breeding season (WRI 2003). Although we have never documented any Burrowing Owls at or around this site, they have, apparently, been noted in the general area in the past (Unitt 1984). Mr. Joe Caruso, Otay Lakes Manager, indicated that he had seen a single individual as recently as 2001 or 2002 at the south end of Upper Lake. According to Dr. James Hannan, WRI Senior Research Associate and Professor at Mesa College, Burrowing Owls have been observed within Proctor Valley, to the northeast of Otay Lakes as recently as 1999; but since dirt bikers have started using the area no owls have been seen. Rolling Hills Ranch development, just to the northwest of Otay Lakes, historically, supported Burrowing Owls and recent efforts to try to attract or keep them, through artificial burrows placed on the adjacent Otay Water District property, have met with some success (one pair was observed, which may have been in the area prior to development), although coyote predation and maintaining suitable vegetative structure are management challenges (D. Mayer, pers. comm.).

### **Biological Features**

This area and the surrounding area burned in the 2003 fire. At the time of burrow installation (March 2005), the sites where the artificial burrows and breeding chambers were placed were primarily unvegetated. The surrounding Management Area was dominated (at least 90%) by Storksbill (*Erodium* sp.), with scattered Wishbone Plant (*Mirabilis laevis*), Bush Mallow (*Malacothamnus* sp.), and charred, but basal sprouting, Chamise (*Adenostoma fasciculatum*) and Laurel Sumac (*Malosma laurina*).

Some natural burrows exist but they are few in number and small in size, perhaps reflecting the constraints of the rocky and clay-based soil. Although a small number of Ground Squirrels do exist approximately one mile to the east, no squirrels were observed on the Management Area.

As indicated by our initial site analysis, prey appears to be plentiful, based on sign and the array of raptors, and other predators, already foraging in the area. During previous surveys, we have documented American Kestrel (*Falco sparverius*), Cooper's Hawk (*Accipiter cooperii*), Golden Eagle (*Aquila chrysaetos*), Northern Harrier (*Circus cyaneus*), Osprey (*Pandion haliaetus*), Peregrine Falcon (*Falco peregrinus*), Red-shouldered

Hawk (*Buteo lineatus*), Red-tailed Hawk (*Buteo jamaicensis*), White-tailed Kite (*Elanus leucurus*) Great-horned Owl (*Bubo virginianus*), Western Screech Owl (*Otis kennicottii*), Loggerhead Shrike (*Lanius ludivicianus*), Greater Roadrunner (*Geococcyx californianus*), and Coyote (*Canis latrans*). Based on scat content, striped skunks (*Mephitis mephitis*) that forage in the area feed extensively on Coleoptera (beetles) that are a size that would be appropriate for Burrowing Owls to also feed on.

## **MANAGEMENT ISSUES**

### **Key Issues**

*The most critical management issue is keeping the vegetation low (no higher than 6 inches).* Cattle previously grazed the Management Area; however, this practice has presumably been stopped. Because there is currently no apparent grazing, an alternative strategy to keeping the grass short will need to be in place. Since Quino Checkerspot Butterflies (*Euphydryas editha quino*) are known to be present nearby (J. Di Gregoria, pers. comm.), planting the right species of low vegetation could meet the low plant height requirements of the owl and also provide host plant(s) for the butterfly. Two other important issues are the need for adequate prey and fossorial mammals to provide long-term burrows. These key management issues are discussed below.

### **Other Management Considerations**

There are no obvious conflicts with listed species management. Disturbance and security would not appear to be issues because of this site's remote location and gated access. A "normal" predator population appears to characterize the Management Area (see above). Because of this site's remote location, and the lack of nearby development, pet and/or feral dogs and/or cats, should not to be an issue and none were observed. Predation "facilitation" through the presence of hunting perches is not an issue. Although an extensive riparian area occurs at the far eastern end of Otay Lake's eastern arm, these trees appear to be too far from the Management Area to create a predation facilitation issue. In addition, this Southern Willow Scrub burned extensively and the removal of these burned trees is, allegedly, being sought (A. Whitcomb, Manager, Sunset Skydiving, pers. comm.) on the basis of safety for planes and fishermen. There are extensive treeless areas immediately surrounding the site, which should provide substantial safety from aerial predators. The Management Area is remote from the City offices, which will make visits to the site somewhat time-consuming. However, it is conveniently located to the San Diego Water Department's offices at Otay Lake. However, access has been made more difficult because of the extensive erosion that followed the 2003 fires.

## **PLAN IMPLEMENTATION**

This plan envisions the management and monitoring of the Lower Otay Lake Burrowing Owl Management Area to be performed by the City or a contracted Qualified Burrowing Owl Biologist (QBOB; Barclay 2004), as funds are available. A QBOB should have a minimum of a B.S. in Wildlife or Vertebrate Zoology/Biology or the equivalent in experience, and have conducted and reported on a minimum of three Burrowing Owl Habitat Assessments and/or Burrowing Owl Surveys in California, within the last five years, following acceptable protocol guidelines (CDFG 1995, CBOC 1997). It is anticipated that CDFG and USFWS will provide technical input.

Although no formal monitoring reporting is required pursuant to the grant under which this plan was prepared or under the MSCP, reports of any monitoring activities should be standardized (see below) and would be critical for successful long-term adaptive management and tracking the success of the Management Area.

Regarding potential funding of management of this or potentially other Burrowing Owl Management Areas, the City of San Diego Subarea Plan's condition of coverage for Burrowing Owls (City of San Diego MSCP Subarea Plan, Appendix A), states, "During the environmental analysis of proposed projects, burrowing owl surveys (using appropriate protocols) must be conducted in suitable habitat to determine if this species is present and the location of active burrows. If burrowing owls are detected, the following mitigation measures must be implemented: outside the MHPA, impacts must be avoided to the maximum extent practicable; any impacted individuals must be relocated out of the impact area using passive or active methodologies approved by the wildlife agencies; mitigation for impacts to occupied habitat (at the Subarea plan specified ratio) must be through conservation of occupied burrowing owl habitat or conservation of lands appropriate for restoration, management and enhancement of burrowing owl nesting and foraging requirements." For projects that impact Burrowing Owls on non-MHPA lands, funding of management activities at the Lower Otay Lake Management Area (including the installation of additional burrows) could be considered toward partial mitigation if the installations are occupied by Burrowing Owls. Such mitigation proposals could be considered on a case-by-case basis and would be subject to City, State, and Federal wildlife agency approval.

Regarding a schedule, artificial burrows were installed on March 12, 2005. To maximize the chances of this Management Area attracting Burrowing Owls, the following vegetation and burrow management should begin immediately.

## **Vegetation Management**

**Objective.** The objective of vegetation management is to maintain vegetation height and diversity at a level that is appropriate for year-round Burrowing Owl support, including nesting, wintering, and foraging. This owl typically inhabits open, annual and perennial grasslands, agricultural and range lands, desert habitats, and scrublands characterized by low-growing vegetation (Zarn 1974). Suitable habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface (CDFG 1995). Trulio, in her Santa Clara County study, found that occupied habitat averaged less than 6 inches high around occupied burrows but more than 10 inches high in similar unoccupied habitat (Trulio 1994 *in* Barclay 2004). Similarly, Green and Anthony (1989) reported that habitat vegetation greater than approximately 8 inches was likely to restrict visibility of these owls to the point that it was likely to reduce habitat suitability. It is not uncommon for Burrowing Owls to leave previously occupied and grazed habitat after cattle were removed and the grass increased in height (J. Lincer, pers. observ.).

**Compliance Schedule and Standards.** A recommended schedule for inspecting vegetation height and cutting, as necessary, is as follows:

- Early February
- Mid-May (or earlier, depending on rain)
- Mid-June to early July

The reason for the above three time periods is as follows: By checking vegetation height in early February and cutting, if necessary, within two weeks, vegetative height will be appropriate when owl pairs start inspecting and guarding chosen burrows. If vegetative height is allowed to get too high at this time, some pairs will, likely, move to other areas, which may or may not be safe and ecologically appropriate. The mid-May inspection and cutting is meant to coincide with when many chicks will be emerging from the burrow and will need a maximum visibility to detect predators and the adult owls will need that same visibility to spot both predators and prey. By checking vegetation height in early mid-June to early July and cutting vegetation after it has gone dormant, it will be the appropriate height through the rest of the summer (when some pairs will still be feeding young) and fall until the winter rains instigate new vegetative growth.

Using the Effective Height approach, as described by Green and Anthony (1989), vegetation (within an approximately 50-foot radius of the burrow) should be no higher than five (5) inches in early February and mid-May and no taller than four (4) inches at the end of the growing season (mid-June to early July). Approximate dates are provided since the actual height and status of the vegetation will depend on species composition, temperature and the timing of rains.

City, State, or Federal agency biologists, or another QBOB should measure Effective Height of the vegetation in the Management Area at the above times each year. Effective Height should be measured at a minimum of one location per acre of vegetation, which is representative of vegetation type in the Management Area. Once owls are using the area, an emphasis should be placed on monitoring that habitat, which the owls are using most. The average of these measurements will be used to determine compliance with the above Effective Height standard. It is important to recognize that different Burrowing Owl Management Areas may require somewhat unique vegetation sampling plans, depending on the size and the heterogeneity of the habitat. With a 70+ acre homogeneous Management Area, like this has the potential for being, perhaps the area around the burrows should be sampled more intensely and the rest sampled at a lower frequency. However, the owls' ability to see predators and catch prey will be affected by height of vegetation, where it hunts, which will not be limited to the area around the burrows. Even if the management were to be limited to weed whacking right around the burrows, it would be valuable to sample outside the intensively managed burrow areas. Site success will need to be analyzed if adaptive management is to be an option. An important variable will be vegetation height, and perhaps make-up, in *all* areas used by the owls.

**Corrective Action.** The particular management site often limits corrective action. Biological resources, past, current, and planned land uses, and real or perceived impacts to neighbors often limit management choices. To achieve compliance with the above vegetation objectives and standards, corrective action could include grazing, burning, mowing, or any other mechanical method of reducing vegetation height that does not disturb the soil surface. Burning is a politically difficult option to implement and mowing is limited by the distribution of numerous large rocks throughout much of the subject Management Area. Disking, plowing, scraping, or other mechanical means that disturb the soil surface may have negative ecological impacts that would be undesirable and/or be unacceptable to the City Water Department that manages the property. Spraying with an herbicide is also not recommended at this point. It is, however, conceivable that a well-thought-out revegetation plan could be developed that would require selective use of any of these and/or other techniques. At that time, ecological impact assessments would have to be conducted and resource priorities made on a case-by-case basis.

For this particular Burrowing Owl Management Area, two management techniques, to keep the vegetation at an appropriate height, are recommended: (1) grazing (e.g., by cattle, sheep, goats, etc.) and (2) weed whacking. If grazing can be allowed within the approximately 70 acres around the burrows (excluding any sensitive resource areas, like the vernal pools to the north), that could be an effective vegetation management tool. Some grazers, like cattle, also tend to increase and/or concentrate certain beetles and other prey with their dung. Dung is also used by these owls in the nesting process (Denman-Smith and Conway 2002). Portable, electric fencing is recommended since it can be moved easily and does not present a large management task to remove, when necessary. The vegetation would have to be monitored and reduced in height as necessary, according to the above schedule. If grazing could not be fine-tuned to the point of total effectiveness, a mechanical approach, such as weed whacking, could be used, especially within a radius of 50 feet directly around the burrows. If the area or burrows are occupied by Burrowing Owls, any areas of high owl use (e.g., lookout posts/rock piles and hunting areas) should be considered for priority vegetation management. In the absence of grazing as an acceptable land use, weed whacking may be the next most practical alternative. In this case, a radius of 50 *meters* directly around the burrows and any high use areas (if owls are occupying the area) should be maintained at the appropriate vegetation height.

## **Burrow Management**

**Objective.** The objective of burrow management is to maintain burrows (either artificial burrows or those created by fossorial mammals) in a condition that will allow adequate escape alternatives and nesting. The initial installation of 22 burrows (11 breeding chambers), divided into three groups in proximity to each other, mimics the distribution of a natural Ground Squirrel colony and provides for the above escape alternatives. This initial layout also provides for alternative nesting locations, should some burrows/burrow complexes be more attractive to the owls, based on aspect, orientation, elevation, or some other factor(s) that are not obvious to the human eye.

**Compliance Schedule and Standards.** The above schedule for vegetation management can also be used for burrow management.

Maintain the functionality of all 22 artificial burrows and 11 breeding chambers. This includes:

- Maintaining a pile of large rocks around the entrance to each burrow. These piles were created to provide a visual queue to attract owls and, by creating a small labyrinth with the rocks, it also provides alternative escape routes and hiding places for both owls and their prey.
- Keeping the entrances clear of obstructions and repair any entrances/burrows collapsed by human or grazing animal activities.
- Making sure that the burrows are clear of obstructions from the burrow entrance to the breeding chamber. If fossorial mammals inhabit the burrow, they may introduce soil and vegetation, which can block access to the breeding chamber. Inspections can be made with a remote video camera (e.g., a Peeper Scope by Sandpiper Industries) and then clearing any observed obstruction with a plunger designed for this function.
- Checking the breeding chamber to assure that the plastic buckets that make up the chamber are not damaged or distorted.
- Checking the breeding chamber at ground surface to make sure that the lid fits well and the cement stepping stone that covers the lid (to discourage predators and protect the lid from being crushed by foot or grazing animal traffic) is in a proper position and not resting directly on the lid but supported by rocks around the lid.

Encourage fossorial mammals (see Recommended Site Improvements, below). Ground Squirrel control should not be an option within the Management Area.

**Corrective Action.** The following should be included in a check-off list:

- Add/rearrange rocks at burrow entrances to meet or exceed above standards.
- Clear/restructure burrow entrances and the portion between the entrances and the breeding chamber to allow easy access.
- Correct bucket deformities or, in extreme cases, replace them.
- Replace breeding chamber lid and/or re-set/replace cement stepping stone, if necessary.
- Communicate with Land Management agency if nearby land uses or management approaches have the potential to negatively impact the Management Area or its ability to attract and/or maintain Burrowing Owls.

## RECOMMENDED SITE IMPROVEMENTS

Establishing the initial burrows and breeding chambers is an important first step. It will be important to follow up on these initial site improvements with additional action. The following are recommended:

- **Mulch.** To supplement, and perhaps even replace, regular vegetation control around both artificial and natural burrows, spread mulch (bark, chipped wood, gravel, decomposed granite, clay, etc.) around the burrows to keep the vegetation down. Effective depth will vary with material but a minimum of 2-3 inches would probably be effective. Keep in mind that within reason, the deeper the mulch, the less frequently re-application, and potential owl disturbance, would be necessary. Potential for attracting Argentine ants with mulch should be explored, since their presence could be problematic for a number of species, including the owl.
- **Rock Piles.** Install 2-3 rock piles per nest chamber, for an initial total of 22-33 piles. Rocks should be *relatively large* so as to produce a matrix of openings for potential owl burrows and escape routes as well as encourage a wide variety of prey, including small mammals, reptiles, small birds, and invertebrates. Rock piles should be at least 4-5 feet tall and located within 50 feet of a burrow entrance. To provide some habitat diversity, which could increase the potential prey species diversity and biomass, cover roughly half of these rock piles with approximately one foot of clean soil.
- **Brush Piles.** Install 2-3 brush piles per nest chamber, for an initial total of 22-33 piles. Brush should contain a substantial amount of large natural material (tree limbs greater than 3 inches in diameter, cord wood-sized wood, etc.) but some smaller natural material will contribute to the effectiveness of the pile by providing nesting material and food for insects and some small mammals. Brush piles should be at least 4-5 feet tall and located within 50 feet of a burrow entrance. To provide some habitat diversity (see above), cover roughly half of these brush piles with approximately one foot of clean soil.
- **Alternative Materials.** Meeting the objectives of encouraging fossorial mammals and providing habitat for a variety of Burrowing Owl prey can also be met with other materials. These owls find almost any structure attractive so materials like discarded cement culverts, irregular cement blocks, timber removed because of fire or to lessen the potential for fire, large cement or steel pipes, etc. are potential alternative materials, subject to the authorization of the land managing agency. Two notes

of caution: (1) avoid using materials that are potentially toxic (e.g., painted or creosoted wood) and (2) keep piles relatively low (4-5 feet) so as not to facilitate predation by other raptors, which use the higher features to hunt from.

- **Ground Squirrels.** Investigate the potential for translocating Ground Squirrels to the Management Area. The owls are clearly tied to the squirrels from an ecological standpoint. Without these, and other fossorial mammals, the management of Burrowing Owls will be totally dependent on artificial burrows, which is probably not a good long-term strategy. Some squirrels occur within a mile to the east (and south of the eastern arm of the lake) and it is possible that they are present closer to the Management Area. They appeared to be more widespread before the 2003 fires. It could be important to note that the evidence of fossorial mammals, in general, appeared to be greater before these fires in the Management Area (J. Lincer, pers. observ.). The soil, in the area immediately around where the burrows were installed, is quite hard, consisting of numerous rocks distributed throughout a clayey matrix. This may be a limitation for Ground Squirrels that can be mitigated with the above rock and brush piles. In addition, it may be advantageous to plant vegetation that these squirrels commonly eat if the current *Erodium* weedy plant species are not palatable by these squirrels.
- **Revegetation.** Revegetation may at some point be possible, result in a reduced maintenance effort, and be beneficial to the owls. However, any revegetation should be planned within the context of well-thought-out land use and vegetation plans. Choices in a native vegetation pallet should be made considering all the resources of the area. It may, for instance, be possible to choose a low-growing plant species that would not only be advantageous to the Burrowing Owl and the Ground Squirrel but also the Quino Checkerspot Butterfly, etc.
- **Access.** The recent rains have caused extensive erosion because the 2003 fires removed much of the vegetative cover. The jeep trail that provides access to the Management Area is wrought with potential hazards and impediments to travel, even with a 4-wheel drive vehicle. There is at least one major drainage crossing, a smaller but significant crossing that is working its way across the trail with continued drainage, a portion of eroded trail that has to be bypassed through vegetation next to the old trail, a number of deep, muddy trail sections that approach a kind of quicksand consistency after rains, and some sizable boulders that have become more exposed due to erosion and traffic, which limits access alternatives and challenges vehicular undercarriages.
- **Signage.** Install signs in locations that would be seen by potential site users/trespassers that indicate “Authorized Entry Only-Sensitive Wildlife and Habitat Area.” It may not be advisable to, specifically, mention the owl at this time as this could increase curiosity and disturbance. Locations to be considered for these signs are: along the shore (which may also discourage entry into vernal pool area); at the base of the slope and south of the artificial burrow installation; farther to the south but along the north side of the access road; and along the north side of the access road, where the path starts that leads to the Management Area. Should this area ever be opened up for public use, and have proper security, interpretive/educational signs, indicating why the Management Area was established, how it is being managed, and fundamental information about the Burrowing Owl’s natural history, should be considered, in order to enhance the public’s appreciation of the owl and management efforts.
- **Fencing.** No fencing is recommended at this juncture *unless* it is necessary to implement another management action. Should the above signage be insufficient to keep people out of the Management Area, or should grazing animals need to be restricted to an area around the artificial burrows, fencing would be a logical tool to consider. If fencing is needed, a temporary, movable, electric fence should be considered (vs. a more permanent, conventional fence). It is possible that a permanent perimeter

fence, in combination with movable interior fences, would be an effective combination for proper management.

## **HUMAN ACCESS AND USES**

Human activity, other than that necessary to manage and monitor the Management Area, should be prohibited within 50 m (approximately 160 feet) of artificial burrows (Figure 2). Destruction and/or degradation of foraging habitat within 100m (320 feet) of an occupied burrow should be avoided. These protective buffers should also apply to any natural burrows that might be occupied by Burrowing Owls (CDFG 1995, CBOC 1997).

Unauthorized activities in the Management Area:

- Dogs
- Fishermen wandering/exploring away from the lake
- Hunting
- Installation of structures that would facilitate raptor predation on the owls (e.g., poles, tall trees, Barn Owl nest boxes)
- Other activities/actions that would promote or provide human access or disturbance within 50 m of installed or natural burrows.

## **OWL MONITORING**

Owl monitoring is not technically required for this Management Area, as it would be for a mitigation area. However, if possible, monitoring should be conducted on a regular basis. It is an important task and one that is necessary if the effectiveness of wildlife management is to be gauged, documented, and improved through adaptive management. The Management Area should be monitored for Burrowing Owls, vegetation height, and burrow maintenance in early February, mid-May, and mid-June to early July. Thus, the area can be initially monitored for owls at the same time it is checked for vegetation management and burrow maintenance.

If owls are noted at any of these times, a revised schedule should be established to (a) document actual owl numbers, behavior, etc. (see “Reporting” below) and (b) minimize vegetation control and other human activities during critical breeding stages (especially, the early phases of burrow inspection by owls and the initial establishment of site fidelity; mid-January to late March).

A qualified contracted, City, State, or Federal QBOB should conduct all Burrowing Owl monitoring (see above for qualifications). Protocol methods should be followed (CDFG 1995, CBOC 1997); although, the current guidelines are being reviewed for potential changes in order to be more specific to Southern California (J. Pagel, pers. comm.). At the time of these surveys, the following should be documented at a minimum: numbers of owls (pairs vs. singles), sex (if known), behavior, presence of any bands or other markers, productivity, potential/actual predators, and habitat use areas, timing, weather conditions, observer(s). A suggested field form is attached (Appendix C).

## **REPORTING**

Like monitoring, reporting is not, technically, required for this Management Area but, again, monitoring and reporting will be important to the success of this pro-active effort if adaptive management is to be implemented and success maximized. A reporting schedule that is recommended is: The City should be informed of owl presence immediately (within 24 hours) and vegetation management or other management needs, within a week of any relevant on-site inspection. A short memorandum for each on-site inspection should be produced, which documents what was observed, management opportunities and management problems/needs. An Annual Report should be submitted by September 30 of each year, which includes and summarizes the individual memoranda and other observations. This report should be submitted to MSCP Biological Resources Monitoring Coordinator, 202 C Street, MS 5A, City of San Diego, 92101. We recommend that the City provide copies to CDFG and USFWS. The Annual Report should include:

- All Burrowing Owl observations, indicating the observer, etc. (see above Owl Monitoring)
- Evidence of Burrowing Owl mortality or attempted predation
- Presence of ground squirrels and other fossorial mammals
- Incidence of vandalism or other evidence of illegal or inappropriate use of the Management Area
- Record of management actions taken
- Recommendations
- Attached memoranda of individual site visits/inspections

## **SUCCESS CRITERIA**

Since this is not a mitigation site, and the issue of success was not included in the contract for the NCCP Local Assistance Grant, no formal success criteria are required. However, the installation would certainly be considered successful if it attracted Ground Squirrels and/or other fossorial mammals to the burrows or other habitat created (i.e., rock and brush piles, etc.). This, in fact, is a desired first step. Ultimately, the Management Area would be considered a success if it attracted and supported Burrowing Owls or it supported owls that were translocated to the Management Area.

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# **Appendix**

## Sample Field Observation Form



**(Back of form)**

**BuOw Observations**

**BIRDS**

**OTHER WILDLIFE**

**Date:** \_\_\_\_\_

**Observer(s):** \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**OTHER COMMENTS**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_