

MANAGEMENT GUIDELINES FOR BURROWING OWLS AT NAVAL AIR FACILITY EL CENTRO

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Executive Summary

The Imperial Valley is famous for the density and diversity of its bird life. It is also the location of one of the largest remaining populations of burrowing owls (*Athene cunicularia*) in North America (DeSante et al. 2004). Burrowing owls have undergone range contractions in recent decades, and concern for their persistence has led to a listing of federally endangered in Canada (Wellicome and Haug 1995) and a recent status review by the U.S. Fish and Wildlife Service (Klute et al. 2003). They have been listed as a Species of Special Concern by the State of California (DeSante et al. 1997), and are considered threatened or endangered in a number of other states (James and Espie 1997). Although the Imperial Valley population appears to be thriving, rapid changes in regional land use and overall concern for the species require special management considerations.

Burrowing owls can demonstrate remarkable tolerance to human activity; this is likely the major reason for their success in the agricultural landscape of the Imperial Valley. In addition, burrowing owls have long been noted for their propensity to live in or around active airfields (Thomsen 1971, Rosenberg et al. 1998). This presents a special challenge to management in a situation such as NAF El Centro, which is surrounded by high densities of burrowing owls.

Unlike other airfields such as Moffett Federal Airfield in San Jose or NAS Lemoore in the San Joaquin Valley, NAF El Centro does not provide critical habitat in a matrix of unsuitable or poor quality habitat for the burrowing owl. Management therefore does not need to be focused on maintaining a resident

population, but primarily on preventing owl occupancy of areas where the birds potentially pose a threat to human safety due to bird aircraft strike hazard (BASH). Maintenance of owl populations in parts of NAF El Centro away from the airfield will still be desirable in terms of regional conservation, given the potential changes to the irrigation system that currently provides most of the burrow habitat in the Imperial Valley.

Although burrowing owls appear to pose only a small hazard to aircraft relative to other avian species in the region such as egrets and gulls, risk due to burrowing owl presence in the airfield is more easily reduced than for these other species. The primary method for reducing risk is through reducing the attractiveness of the airfield to nesting owls, particularly in the middle section where aircraft altitude is low but engines are at full power for takeoff. This is most easily accomplished by reducing the opportunities for owls to inhabit existing structures such as culverts and conduit boxes. A second strategy is to reduce the likelihood that owls will dig their own natural burrows either under concrete slabs, in tire ruts, into mounds of dirt, or other micro-topographic features that may encourage digging. Maintenance or construction activities within the air operations area that generate piles of dirt, or debris with interstitial spaces greater than 2" in diameter can be conducted to reduce the likelihood that owls will utilize these inadvertently created habitats. Dirt piles should be leveled after inspection to verify that no owls have dug burrows into them, and piles of concrete rubble or other debris should not be left within the airfield area for more than a few days, or covered securely to prevent owl access.

Due to the high densities of owls in the region around NAF El Centro, and because agricultural areas and airfields clearly constitute acceptable foraging habitat (Gervais et al. 2003), it will not be possible to eliminate owl occurrences within the air operations area. However, several of the guidelines already suggested in the NAF El Centro Bird Aircraft Strike Hazard Plan of August 2000 should be effective in reducing burrowing owl presence within the airfield, particularly with regards to vegetation management, maintenance of bare ground or covering bare soil with coarse gravel. In addition, barriers to perching on airfield structures such as signboards may be employed if these structures appear to be used by burrowing owls.

Once a burrow has been created or a human-made structure such as a culvert or debris pile occupied, management must recognize the need to protect individual owls and their nests from harassment or harm at all times of the year. The burrowing owl is protected by both federal and state laws, although the most pertinent law for NAF El Centro is the Migratory Bird Treaty Act. Removal of burrows should only occur outside of the nesting season, if it is reasonably certain that the burrow is not an active nest, and once precautions have been taken to avoid trapping an owl inside. In addition, mitigation in the form of artificial burrow installation or maintenance of suitable habitat elsewhere on the facility is recommended.

The best strategy is that of prevention, and enough is known about the ecology of this species in the Imperial Valley to suggest prudent and effective measures. Careful management should not only prevent conflicts between owls and aircraft safety,

but also reduce the need to list the species under the Endangered Species Act.

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Photo: Clair de Beauvoir

1. Introduction

1.1 Motivation for a Burrowing Owl Management Plan for NAF El Centro

Managing bird aircraft strike hazard (BASH) is a major concern for air facilities with local high densities of birds. Although flocks of low-flying, large-bodied birds are considered one of the greatest risks, collisions with single, smaller birds have also damaged aircraft and caused accidents. NAF El Centro must contend with large populations of

white-faced ibis, white pelicans, gulls, and other high-risk species that use the surrounding agricultural landscape (Figure 1). However, it also must contend with birds that use its air operations area and air space as nesting and foraging habitat. Although burrowing owls (*Athene cunicularia*) are much less likely to precipitate a strike incident, they are present within the Air Operations at NAF El Centro, and therefore the risk they pose is more amenable to direct control than the avian species whose movements are dictated by land and water management beyond the boundaries of NAF El Centro.



Figure 1. NAF El Centro is surrounded by agricultural habitat used by a variety of bird species.

The western burrowing owl is considered a federal national Bird of Conservation Concern (USFWS 2002). It is also listed as a Bird of Conservation Concern in the Southwest Region of U.S. Fish and Wildlife Service (USFWS 2002). The U.S. Fish and Wildlife Service undertook a status review due to increasing concern about the species' viability within the United States. Although the agency declined to list the species, the Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States clearly indicated that there still exists reason for serious concern, although the review panel concluded there was insufficient evidence upon which to base a listing at that time (Klute et al. 2003).

Within the state of California, the burrowing owl is a Species of Special Concern (California Department of Fish and Game 2004) and the Natural Heritage Status lists it as imperiled for California (Klute et al. 2003). A recent petition to list the species as Endangered or Threatened at the state level was denied by California Department of Fish and Game, but some parts of the state have witnessed substantial declines of burrowing owl populations (e.g., DeSante et al. 1997).

Despite the range-wide concern for burrowing owl persistence, the Imperial Valley of California is home to the highest densities of burrowing owls ever recorded (Rosenberg and Haley 2004), and accounts for roughly 70% of the statewide population (DeSante et al. 2004). In addition, it is wintering habitat for owls from populations that appear to be declining. Range-wide patterns of decline and state and federal statutes dictate that management of the species should minimize risk to individual owls and their burrows.

A management plan for the burrowing owl at NAF El Centro will help to systematically minimize the risk of BASH with this species, while helping to meet the overall need for conservation of the owl within the region. Formal management should not only help reduce the risk the owls pose to aircraft, but help reduce the need to list the species under the Endangered Species Act.



Photo: D. K. Rosenberg

1.2 Goals and Objectives

The goal of this document is to provide a preliminary management plan to minimize conflicts between burrowing owls and Navy operations. Specifically, its objectives are to:

- Recommend management procedures to minimize the likelihood of owl occupancy within the Air Operations of NAF El Centro;
- Outline a survey design to locate owls in areas where they must be removed;
- Provide a protocol for the removal of owls from areas where they are considered a risk to aircraft;
- Suggest mitigation that may be undertaken to enhance habitat for owls in areas where the owls' presence will not conflict with Navy operations.

2. Relevant Life History Traits of the Burrowing Owl

Management of any species will be greatly enhanced if its biology is understood. Fortunately, much is known about burrowing owl behavior and ecology, and this information is vital to implementing effective measures to both prevent conflicts with aircraft and to conserve the species.

2.1 Breeding Behavior

Burrowing owls in the Imperial Valley nest in high densities, exceeding 8 pairs of owls per hectare along irrigation ditches and drains in some agricultural lands (Rosenberg and Haley 2004). Although this species is sometimes referred to as “colonial”, they nest successfully as isolated pairs, and antagonistic interactions occur among pairs during the breeding season, including the predation of each other’s young (J.A. Gervais and D.K. Rosenberg, unpublished data). This suggests that burrowing owls are not socially colonial in the strict sense and that groups of owls occur at least in part due to the patchy distribution of resources, particularly burrow sites. Most importantly, individual owls or pairs will successfully establish themselves in the absence of other owls.

The vast majority of nesting occurs between mid- April and late July (Haley 2002, Catlin 2004, Rosenberg and Haley 2004), consistent with current guidelines suggesting that burrows should not be disturbed between February 1 and August 31 (Burrowing Owl Survey and Mitigation Guidelines, California Department of Fish and Game). However, a nest with eggs has been discovered in December in the Imperial Valley (Rosenberg and Haley

2004). Clutch sizes in the Imperial Valley were typically between 4 and 8 eggs, from which an average of 2.5 young survived to 3 to 4 weeks of age (Haley 2002). Clutches appear to be smaller than elsewhere in the range, but numbers of young are similar (Haug et al. 1993, Ronan 2002, Klute et al. 2003, Gorman et al. 2003).



Figure 2. Owls dug these active burrows at NAF El Centro. Note pellets, prey remains, and fecal deposits. Photo: J. A. Gervais

Unlike in most other parts of their range, including other regions of California, the owls in the Imperial Valley will dig their own burrows (Figure 2). This appears to be due to the local soil characteristics, which allow owls to successfully dig. They seem to do so most often when some other animal, such as a round-tailed ground squirrel, provides a burrow that the owls can modify for themselves, but it appears that this is not required (D. H. Catlin, Oregon State University, J. A. Gervais, personal observations). Owls will also utilize culverts, rubble piles, pipes, and other human-made structures for roosting and nesting when natural burrows are not available. At NAS Lemoore, owls within the Air Operations area frequently nested under the concrete slabs associated with runway equipment (J. A. Gervais, personal observation).

Although burrowing owls are known to exhibit fairly high nest site fidelity (Haug et al. 1993, Rosenberg and Haley 2004), adults will relocate during the breeding season, both as individuals and as mated pairs (Catlin 2004). Adults in the Imperial Valley traveled up to 14 kilometers within the breeding season between nesting attempts, although such events were rare (Catlin 2004).

In addition, juvenile owls within the Imperial Valley begin dispersing away from their natal nests in early July (K. L. Haley, D. H. Catlin, and D. K. Rosenberg, Oregon State University, unpublished data). Although some young owls remain close to their natal nests, it appears that most juveniles emigrate from the natal area (Rosenberg and Haley 2004). Distances traveled by these individuals have ranged up to 12 km from the natal nest (D. H. Catlin and D.K. Rosenberg, Oregon State University, unpublished data). These young owls will be seeking suitable unoccupied habitat, and it is likely that NAF El Centro will experience increased owl activity at this time.

2.2 Foraging Ecology and Diet

Burrowing owls are the quintessential opportunists, feeding on insects and other arthropods, small mammals, amphibians and reptiles, birds, carrion, and occasionally each other (Green et al. 1993, Haug et al. 1993, Gervais et al. 2000, York et al. 2002). Within the Imperial Valley, the owls appear to consume mostly insects, particularly grasshoppers and crickets in the order Orthoptera (Figure 3; York et al. 2002), although songbirds, scavenged waterbird carcasses, and crustaceans and bivalves associated with drains were taken as well (Rosenberg and Haley 2004).



Figure 3. A young burrowing owl consumes a grasshopper. Photo: Clair de Beauvoir.

Although owls will forage by day, particularly during the nesting season when energy demands by a growing brood of owlets are greatest, most of the foraging occurs between dusk and dawn (Haug and Oliphant 1990, Gervais et al. 2003). Owls will travel up to two miles from their nest burrows (Haug and Oliphant 1990, Gervais et al. 2003, Rosenberg and Haley 2004). However, most foraging occurs within 2000 feet of nests during the breeding season (Gervais et al. 2003, Rosenberg and Haley 2004). Of particular relevance to NAF El Centro, owls inhabiting NAS Lemoore were frequently detected foraging within the Air Operations Area, even if they nested elsewhere (J.A. Gervais, unpublished data). They are also attracted to lights, where they prey on the insects that congregate there (J.A. Gervais, personal observation).

Burrowing owls are small, weighing on average about 5.3 ounces when adults. They typically fly low to the ground, and foraging also occurs at low altitudes, typically below 50 feet (Coulombe 1971). Often owls hunt by running along the

ground. They are solitary when foraging, and occur in groups only when in family units near a nest burrow. These traits minimize the risk to aircraft.

2.3 Winter Ecology

The breeding population of owls within the Imperial Valley is composed of year-round residents. In addition, California in general and the Imperial Valley in particular appear to support substantial numbers of winter migrants from more northerly parts of the species' range (Coulombe 1971). Although data on the movements of these birds is sparse, owls begin leaving the Canadian provinces by late August or September (Todd 2001, Todd et al. 2003) and likely begin to arrive on their wintering grounds by early October. Northern breeders begin to return to their nesting sites by early April (Poulin et al. 2001).

Owls appear to be less active in the winter, although they will still be seen standing outside their burrows in daylight hours. Some young owls will continue to be associated with their natal burrow, delaying dispersal to burrows of their own until the spring (D.H. Catlin, Oregon State University, unpublished data). Burrows are utilized by owls of all ages during all parts of the year.

Diet of burrowing owls in the Imperial Valley in winter was examined through stomach content analysis of 53 individuals killed on high-voltage fences surrounding the Calipatria State Prison (York et al. 2002). Orthoptera were the dominant prey items, and the vast majority of prey was invertebrates (York et al. 2002).

2.4 Summary

Burrowing owls breed at high densities in the region around NAF El Centro, particularly in agricultural lands that surround the Air Operations area. Owls may attempt to live within the Air Operations area at any time of year due to movements of resident adults, dispersing juveniles, and the influx of wintering migrant owls. Although burrowing owls rely on other animals to provide burrows in most other parts of their range, they can dig their own burrows in the soft soils of the Imperial Valley, and frequently accept human-made structures such as irrigation pipes, culverts, and rubble piles when burrows are not available (Figure 4).

Foraging owls will fly distances of up to 3 kilometers from their nest burrows, and under at least some conditions, airfields seem to provide preferred foraging habitat (J. A. Gervais unpublished data). Owls may be attracted to artificial lighting at night and the insects that congregate there. Even if no owls are residing or breeding within the Air Operations area, it is entirely possible that owls from outlying areas will enter it while foraging.



Figure 4. Burrowing owls use a wide variety of structures for shelter, including airfield infrastructure at NAF El Centro. Photo: J. A. Gervais

3. Previous Burrowing Owl Use of NAF El Centro's Air Operations

3.1. Previous Locations of Owl Burrows within Air Operations at NAF El Centro

Burrowing owls have nested along the flight lines at NAF El Centro in the past. Surveys performed in the spring and fall of 2003 determined that owls were not only utilizing structures already present within the Air Operations, but digging their own burrows as well. A total of 18 burrows were located that showed signs of owl use, and 10 of these were associated with human structures such as culverts (Figures 5 and 6). Natural burrows were concentrated near taxiways G and F (six burrows) and the hot fueling pits (two burrows). Regions that showed signs of standing water (the southwestern area bounded by Runway 1230, taxiway D, and the helipad) had no owls; standing water makes the ground unsuitable for burrows. Owls readily used culverts and open wire conduit boxes throughout the Air Operations.

3.2 Temporal Dynamics of Owl Numbers Within Air Operations

The 2003 fieldwork indicated that owl populations in Air Operations are extremely dynamic from season to season. At the beginning of the nesting season in April, only three active nests were found; two were natural burrows located between taxiways G and F, and the third was in a wire conduit box. No culverts showed any sign of owl use. By September, however, a number of additional nest burrows were found, owls had bred within man-made

structures, and single owls were occupying culverts and conduit boxes as roost sites. Presence of owls within the Air Operations will be influenced by regional population dynamics and land management practices, and also by patterns of migration and overwintering by owls from as far away as Canada. Of particular relevance is the rapid change in agricultural practices within the Imperial Valley; this may result in short-term increases in the number of owls utilizing the Air Operations as they are displaced from water conveyance structures in surrounding farmland. These movements are likely to be the most important in terms of owls colonizing areas near aircraft, as they may occur at any time of year and include both breeding and non-breeding owls.



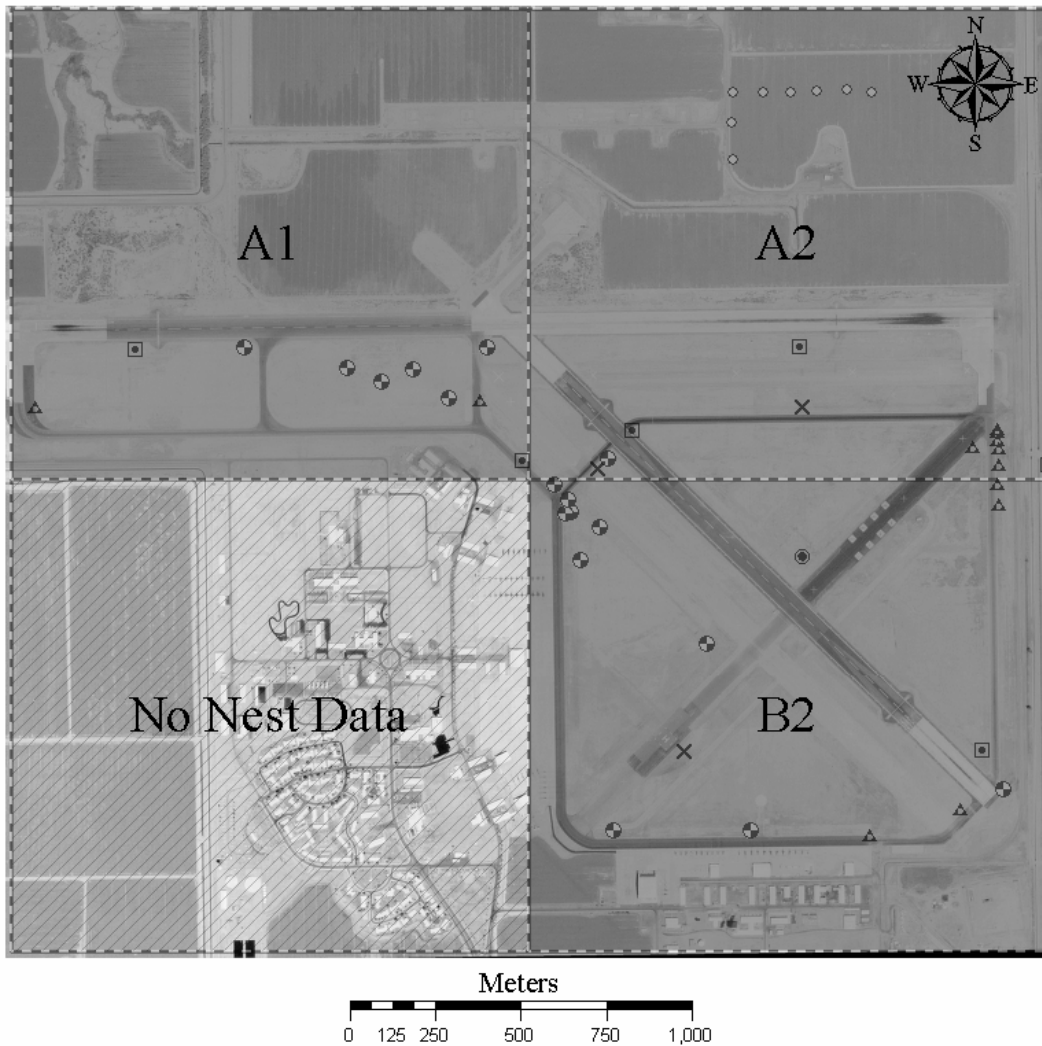
Figure 5. A pair of burrowing owls used this culvert under taxiway D in 2003.

4. Legal Status of the Burrowing Owl

4.1 Federal Protection

The burrowing owl is primarily protected at the federal level by the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711, Appendix A), which lists the burrowing owl in 50 C.F. R. Part 10. Additional clarification regarding the role of federal agencies in protecting migratory

Figure 6. Site map of burrowing owl burrow locations in NAF El Centro Air Operations that were removed in the fall of 2003 (black and white dots), artificial burrows that were installed to the north of the Air Ops area as mitigation (white circles), and locations of structures or features within the Air Operations area that require maintenance to prevent burrowing owls from using these as burrows in the future.



bird populations under the MTBA was provided by Executive Order 13186 in 2001 (Appendix B). The MBTA makes it unlawful to take any parts of the protected species, including feathers, nests, or eggs. Exceptions to this prohibition on take are listed in 50 C.F.R. 21, which include depredation orders for certain species of birds capable of being injurious to agriculture; any control measures must be done under the authority of the California Commissioner of Agriculture (50 C. F. R. 21.44). These exemptions will not apply to burrowing owls.

The protection afforded to burrowing owls under the MTBA means that any activities that threaten individual owls, their nest burrows, or their eggs must be avoided. Exceptions to this Act require special purpose permits to be issued (50 C. F. R. 21.27, Appendix C). State agency permission for the activity must be obtained as part of the application procedure.

The National Environmental Protection Act (NEPA) is also relevant to the management of burrowing owls at NAF El Centro. A Finding of No Significant Impact for the natural resources at NAF El Centro and target areas was determined based on the Integrated Natural Resources Management Plan completed in October 2001. The Integrated Management Plan includes BASH precautions that were outlined initially in the BASH Plan of August 2000. These management guidelines do not include the removal of burrows, however. Construction or maintenance activities that may impact burrowing owls (and by extension, their burrows) should be dealt with using current guidelines to protect biological resources under NEPA.

4.2 Protection Granted by California

Burrowing owls are protected by California Fish and Game Code and the California Environmental Quality Act, and they are listed as a Species of Special Concern within the state. Although these statutes do not apply on a federal facility, coordination with California Department of Fish and Game on management issues is recommended, and their permission for activities that impact nest burrows is required for Special Permit Approval under the Migratory Bird Treaty Act.

5. Burrowing Owl Survey and Burrow Removal Guidelines

Management of burrowing owls at El Centro should focus on preventive measures, as these will be the most effective and least expensive. An annual survey conducted in the fall will locate burrows that should be considered for removal based on perceived threats to air operations, and identify structures on the airfield requiring maintenance to prevent use by owls. Creation of owl habitat as mitigation can be completed at any time of year, although new habitat that coincides with the beginning of the breeding season or the fall dispersal of young owls and arrival of winter migrants is likely to be occupied most quickly.

5.1 Identification of Critical Areas of Management Concern

The regions most critical to safe operations and reduction of BASH involving burrowing owls are those where aircraft are operating at low elevations, when maneuverability is at a minimum but speed

is great enough to preclude avoidance behavior on the part of the owl. Runways should therefore be the primary focus of management, in particular the middle sections where aircraft are moving quickly but are not yet at an altitude sufficient to be out of danger. This zone should extend 300 feet or more from the runway edge, thus minimizing the likelihood that any young owls will stray onto the runway before they are capable of sustained flight. In addition, the fueling area may be considered a critical zone, as aircraft are maneuvering near the edges of the tarmac and may accidentally draw burrowing owls into the engines from the adjacent infield. Hangar areas are less prone to this risk due to the fact that there is little nesting substrate near the aircraft. Figure 7 depicts the critical zones in relation to Air Operations features.



Burrowing owl observes an F-18 fighter jet at NAS Lemoore. Photo: V. Franke

5.2 Obtaining Information on the Presence of Burrowing Owls

Although the annual survey should focus on areas of greatest concern, it may be worthwhile to track the occurrence of owls in other parts of the airfield. Navy personnel involved with ground operations can be educated to identify burrowing owls, and a standardized reporting protocol can ensure that this information is relayed

to the Environmental and Natural Resources Division. In particular, owls in culverts or other structures are likely to be seen by personnel working out along the flight line. This information will help document trends in owl numbers utilizing the Air Operations, and identify structures or features that should be modified to prevent owl occupancy.

Because owl numbers are likely to vary widely from season to season, and no removals should occur during the breeding season, autumn surveys will allow the identification of burrows that should be removed at a time when immediate action can be undertaken.

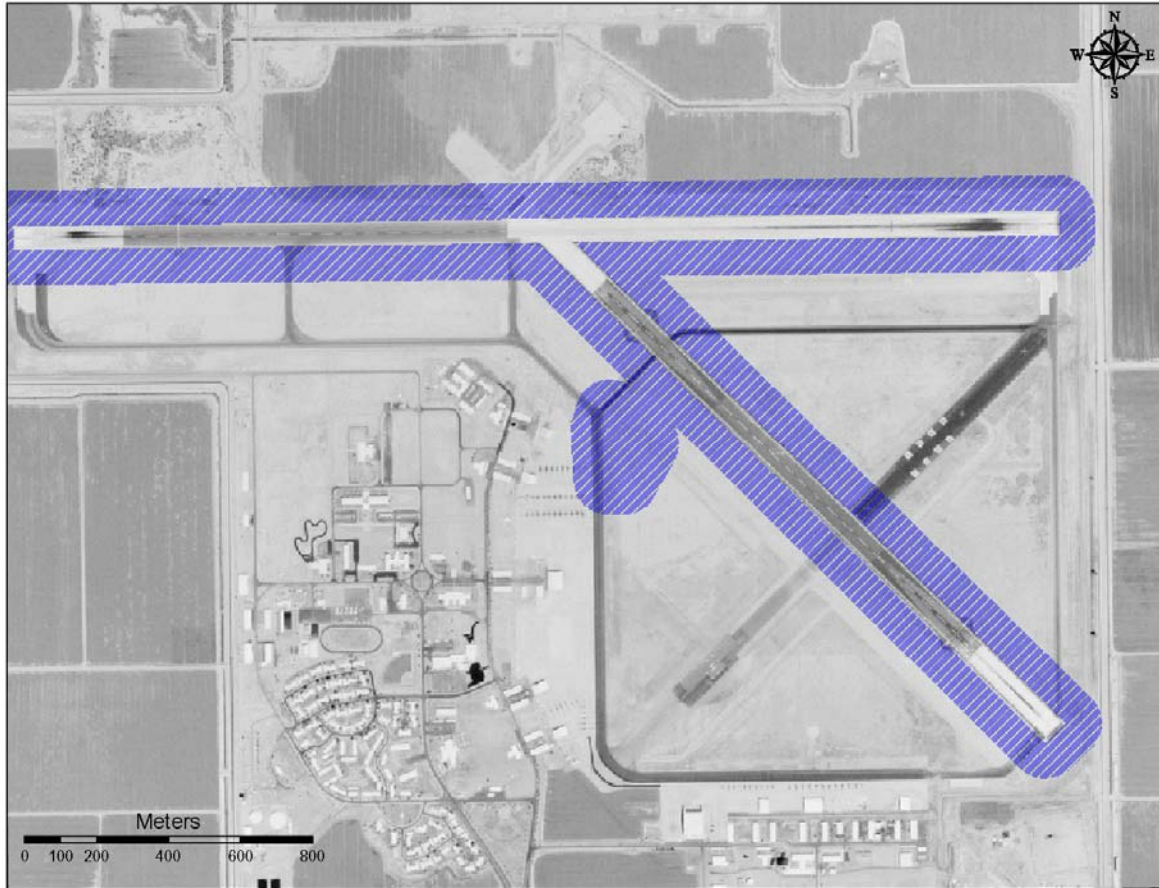
5.3 Survey Protocols

5.3.1 Annual Surveys to Locate Burrows and Structures Used by Burrowing Owls

Surveys can be conducted by one person, but two or more people are more likely to note burrows and owl sign. Observers should walk in parallel back and forth across the area to be surveyed. The distance between them should not exceed 100 feet, and the distance considered “covered” on either side should not exceed 50 feet. Although the very flat terrain would seem to allow a wider interval, burrows dug by owls are shallow and lack obvious “doorstep” mounds, making them harder to locate (Figure 2 above). In addition, particular care should be taken to examine every culvert, signboard, and other structure within the critical zones. Owl use should be noted, and these structures identified for possible management action.

Surveys should ideally be conducted in the morning or evening, within three hours of sunrise and sunset. Visibility must be

Figure 7. Critical zones at NAF El Centro. These zones are 100 meter buffers around active runways and the refueling area, shown in blue. They should be surveyed regularly to assess Burrowing Owl use and presence, and management actions taken as appropriate.



good and wind should be low. Observers should be familiar with burrowing owls, their burrows, and sign for proper identification. Previous survey experience is highly recommended. Although surveys for burrows may be conducted at any time of day, the likelihood of seeing the owls themselves is greatest within an hour of dawn or two hours prior to sunset through nightfall.

Although a survey can be done at any time of year, locating burrows in the fall after the nesting season will allow for immediate removal in critical areas provided burrows show no sign of nesting activity (see Section 5.3.3 below). In particular, late fall surveys and burrow removals (late October through early December) should serve to evict young of the year and wintering owls as well as pairs that have occupied burrows throughout the previous breeding season. No occupied burrows should be disturbed between February 1 and August 31 unless there is a critical need, and an exemption to the Migratory Bird Treaty Act will need to be obtained.

5.3.2 Surveys Prior to Construction or Maintenance Activities

Surveys should also be performed prior to construction or maintenance in areas where burrows or owls may be present. This is particularly critical during the breeding season. Surveys of the proposed construction site should be conducted within one hour of dawn and two hours prior to sunset through nightfall. Burrows may be located at any time of day, but verification of owl presence is best done at dawn and dusk, when owls are most likely to be visible. If a burrow is located or a structure that could shelter an owl is present, four separate visits should be

made during conditions conducive to detecting owls (low wind, clear visibility) before a determination of no owls present can be made according to guidelines adopted by California Department of Fish and Game (Appendix D). Although these guidelines are not legally binding for NAF EL Centro, it would be prudent to follow them during the nesting season to avoid discovery of a nest burrow after it has been disturbed by construction activities.

Contractors conducting maintenance or construction activities in the Air Operations area should be aware that burrowing owls may occur on the site, and be familiar with identifying them (Appendix E). Any sighting of owls or discovery of sign should be reported to the Environmental and Natural Resources Division, and evaluated so that appropriate actions may be taken to avoid harm to the owls and potential nest burrows.

Burrows without any sign of owl activity should still be treated as if an owl might be present during burrow destruction. This will also help prevent accidental harm to the owls.

5.3.3 Identification of Nesting and Roosting Burrows

Occupied burrows (or culverts and other structures) will show one or more signs of owl use. "Whitewash" outside the entrance is a good indicator, although other birds such as larks will perch on small mounds and leave fecal deposits (Figure 7). Occupied burrows will have regurgitated pellets strewn about the entrance. Burrowing owl pellets are 1-1.5 inches long and 0.5-0.75 inches in diameter, and are usually made up of insect chitin and other invertebrate parts. They are dark brown in color. Occasionally



Figure 7. Culvert showing fecal deposits and pellets near the refueling pits at NAF El Centro. Photo: J. A. Gervais

pellets will be composed primarily of fur and small bones; these will be gray and somewhat larger than pellets composed of invertebrate matter. The presence of owls either at the burrow or in the immediate vicinity is a clear indication of use. Nest burrows may be marked by the presence of livestock dung or bits of rubbish; these are almost certain indicators of nesting activity, but not all active nests are so marked. Owl behavior suggesting a nesting attempt include reluctance to flush until observers are very close, alarm calling and bobbing, and when flushed, breeding owls will typically fly only a short distance before landing and giving additional alarm calls and bobs. Burrows suspected of being nests must not be disturbed until the nesting attempt has been completed. They are most likely to be found in the spring, but breeding can occur year round in the Imperial Valley.

5.3.4 Permitting Process for Nest Burrow Removal

If burrows must be removed during the breeding season, these should be considered nests if any owl sign is present, as nest burrows are not always obvious. The Migratory Bird Treaty Act stipulates that a permit must be obtained from the Regional Director of the US Fish and Wildlife Service before any disturbance to the burrow is initiated. Further information on permits can be found at <http://permits.fws.gov/mbpermits/regulations/part21.pdf>, in particular 50 C. F. R. 21.27, the section on special purpose permits (Appendix C). In addition, the California Department of Fish and Game should be notified of the intended actions.

5.3.5 Removal of Burrows

Burrows in critical areas may be removed once owls have been evicted. Shallow burrows (those with small entrance mounds) may be excavated to verify no owls are trapped inside, and filled in. Burlap sacks or sections of plastic drainpipe can be used to avoid tunnel collapse onto an owl until it is certain that the burrow is empty. If burrows appear to be deep, extend under concrete, or are man-made structures such as culverts, excluder doors must be used. These are wire screens with a hole 3-4" in diameter cut out, and a rectangular flap is attached over the hole using pipe ties or wire (Figure 8).

Owls are able to exit by pushing the flap away, but cannot get back in. Excluder doors should be firmly staked over burrows and checked twice daily to verify that owls do not manage to circumvent them by either digging or pushing the door



Figure 8. Excluder mounted in natural burrow entrance.
Photo: J. A. Gervais

aside. Excluders should be left in place a minimum of three days following the last evidence of disturbance by the owls. Burrow entrances may then be filled in, or if a culvert, pipe, or other structure, a permanent barrier may be installed over the entrance.

6. Managing Critical Areas to Avoid Owl Use and Occupancy

6.1 Discouraging Breeding and Roosting in Critical Areas

The most successful strategy to reduce the BASH risk of burrowing owls in the Air Operations area is to prevent the owls from inhabiting it. The airfield has a number of characteristics that are attractive to owls and these can be managed to prevent or at least sharply reduce the likelihood of owl occupancy.

First, there are numerous buried structures within the Air Operations of NAF El Centro, including wire conduits, drains, culverts, and pipes. Owls will readily adopt these as either nesting or roosting burrows (Figure 9). All such structures should be maintained such that lids and

other covers are kept tightly closed when maintenance is not being performed. If covers are left off for more than a few hours, care should be taken to ensure that no owls are inside, and the lids replaced.

Culverts may be made owl-proof by the addition of wire screens that will allow the passage of runoff water while preventing access to the birds. Screening with wires no greater than 2" apart should be sufficient for both purposes. These screens should be checked regularly to ensure that they fit tightly against culvert openings and that the screens are still sound. A space of no more than 2 inches can be left at the bottom to allow for the passage of debris in storm water runoff without allowing owls to enter the culvert.



Figure 9. Opened structures such as this wire conduit access point can provide shelter to burrowing owls.
Photo: J. A. Gervais

Second, burrowing owls in the region of El Centro, and on the airfield itself, are able to dig their own burrows even without a starter burrow provided by some fossorial mammal. They are particularly likely to do so under the concrete pads that serve as the base for equipment such as runway signboards; owls commonly nest under such structures at Naval Air Station Lemoore (J. A. Gervais, personal observation). These concrete pads should be checked regularly to ensure that no dips,

small holes, or other micro-topography are present that might encourage an owl to dig a burrow. If a burrow large enough to shelter a burrowing owl is found, it must be treated as if an owl might indeed be present, and should not be tampered with if found during the breeding season unless absolutely necessary and no sign of owls is seen over a series of surveys. If there is owl sign during the breeding season, an exemption to the Migratory Bird Treaty Act must be obtained.

Owls at NAF El Centro have also created their own burrows along drain ditches near culvert entrances, and out in the center of the airfield, where apparently a tire rut from a vehicle provided enough relief to attract an owl and encourage digging (Figure 10). If airfield maintenance



Figure 10. This burrow was apparently started by an owl digging into the side of a tire rut at NAF El Centro. Photo: J. A. Gervais

requires that heavy machinery move across the infields, removing the tracks as soon as possible by grading would help prevent owls from finding sites that encourage them to try to dig. If construction or maintenance activities require digging that generates piles of dirt, these should be inspected frequently for the duration of the project and smoothed flat at its conclusion to discourage owl occupancy.

Finally, any rubble or debris piles with interstitial spaces greater than 2” of diameter should not be allowed to accumulate along the margins of the airfield. Burrowing owls will readily adopt concrete rubble piles and other human debris as nesting and roosting habitat, and they are nearly impossible to evict from such sites due to the many possible points of entry. If construction or maintenance activities create such rubble piles, they should be removed to a remote location as soon as possible, and a further precaution would be to cover the pile with fine netting, heavy plastic, tarp, or other covering to prevent owl access.

6.2 Discouraging Foraging in Critical Areas

Burrowing owls will fly up to two miles from their burrows while foraging in the Imperial Valley (Rosenberg and Haley 2004). Although agricultural fields clearly provide good foraging habitat, based both on the densities of burrowing owls present in the agricultural regions of the Imperial Valley and on radio-telemetry studies (Gervais et al. 2003, Rosenberg and Haley 2004), burrowing owls were also frequently detected in the Air Operations area of Naval Air Station Lemoore, even when their burrows were located over a half mile away (J.A. Gervais, unpublished data). It is therefore extremely probable that burrowing owls will continue to occur within the NAF El Centro Air Operations area even if no nests or roost sites are located there. Surveys for owls conducted within a mile of the station along irrigation canals will give some indication of the magnitude of the problem.

Burrowing owls were frequently observed at NAS Lemoore running along the interface of asphalt and the grass that

comprised the infield ground cover (Gervais et al. 2003). The lack of vegetation on the airfield at NAF El Centro may help reduce the available prey base and make the area less attractive to foraging owls. Although there is considerable vegetation on the north side of the airfield, this is composed of shrubby vegetation that is typically avoided by burrowing owls. Maintaining the current pattern of vegetation management will help reduce the attractiveness of the Air Operations as foraging habitat.

Artificial lighting at night attracts insects, and burrowing owls will utilize these food sources (J.A. Gervais, personal observation). However, because lighting color is a critical component of NAF El Centro's configuration, changing lights from white to a less attractive color such as orange will not generally be acceptable. Given that it seems unlikely that more than an occasional owl will utilize this resource, no management strategy is necessary.

Lights have also been suggested as a deterrent to birds near active runways, but lights mounted on aircraft to haze birds were found to be largely unsuccessful (Blackwell and Bernhardt 2004). Because the aircraft using NAF El Centro are transient, they cannot be expected to be carrying such equipment; this method is not recommended for NAF El Centro.

Perches are not required by burrowing owls, but they will readily use them. Airfield structures such as runway signboards, lights, and fences will all serve as vantage points for foraging or dispersing owls (Figure 11). Signboards, fence lines, and other structures should be periodically checked for perching activity, which will be indicated by the presence of droppings and regurgitated pellets. Owls can be



Figure 11. Burrowing owls readily use signboards for perches and nesting. The arrow on this NAS Lemoore signboard points to the burrow entrance. Photo: J. A. Gervais

discouraged from perching by the addition of a thin wire strung at least 5" above the surface of the object used as a perch, and if the object is wider than a few inches, several parallel wires should be used. In addition, spikes such as those used to discourage pigeons can be deployed. More information regarding discouraging perching and suppliers of various equipment can be found in the NAF El Centro Bird Aircraft Strike Hazard Plan of August 2000; the most cost-effective and time-effective strategy would be to employ methods already in use elsewhere on the facility.

7. Management of Burrowing Owl Habitat at NAF El Centro

Executive Order 13186 (Appendix B) requires that any federal agency conducting activities that harm migratory bird populations must develop a Memorandum of Understanding with the US Fish and Wildlife Service that promotes the conservation of bird populations. Although the burrowing owls that occupy NAF El Centro do not constitute a separate population, steps

taken to help conserve the species in the region are still recommended. Conservation for this species can be best achieved by protecting nesting habitat, and providing artificial burrows in suitable areas.

7.1 Identification of Suitable Burrowing Owl Habitat

Burrowing owls will utilize many different habitats for nesting and foraging, but all will be characterized by low, sparse vegetation. Owls will also readily use heavily modified habitats such as parking lots, residential areas, and recreational fields. This means that maintaining habitat for burrowing owls can be done in conjunction with other primary land uses. However, there are some characteristics that make some parcels better suited for maintaining owls than others.



Photo: D. K. Rosenberg

Areas selected for artificial burrow installation must be free from periodic flooding or disking; farm fields in production are not appropriate even if temporarily fallowed, as nests are commonly used year after year. In addition, artificial burrows should be at least 300 feet from roads, and further if possible, to prevent collisions with vehicles. Surrounding site characteristics

include low or no vegetation, at least 150 feet from buildings, and proximity to areas that could be used for foraging, such as open recreational fields, low-density housing, and agricultural lands.

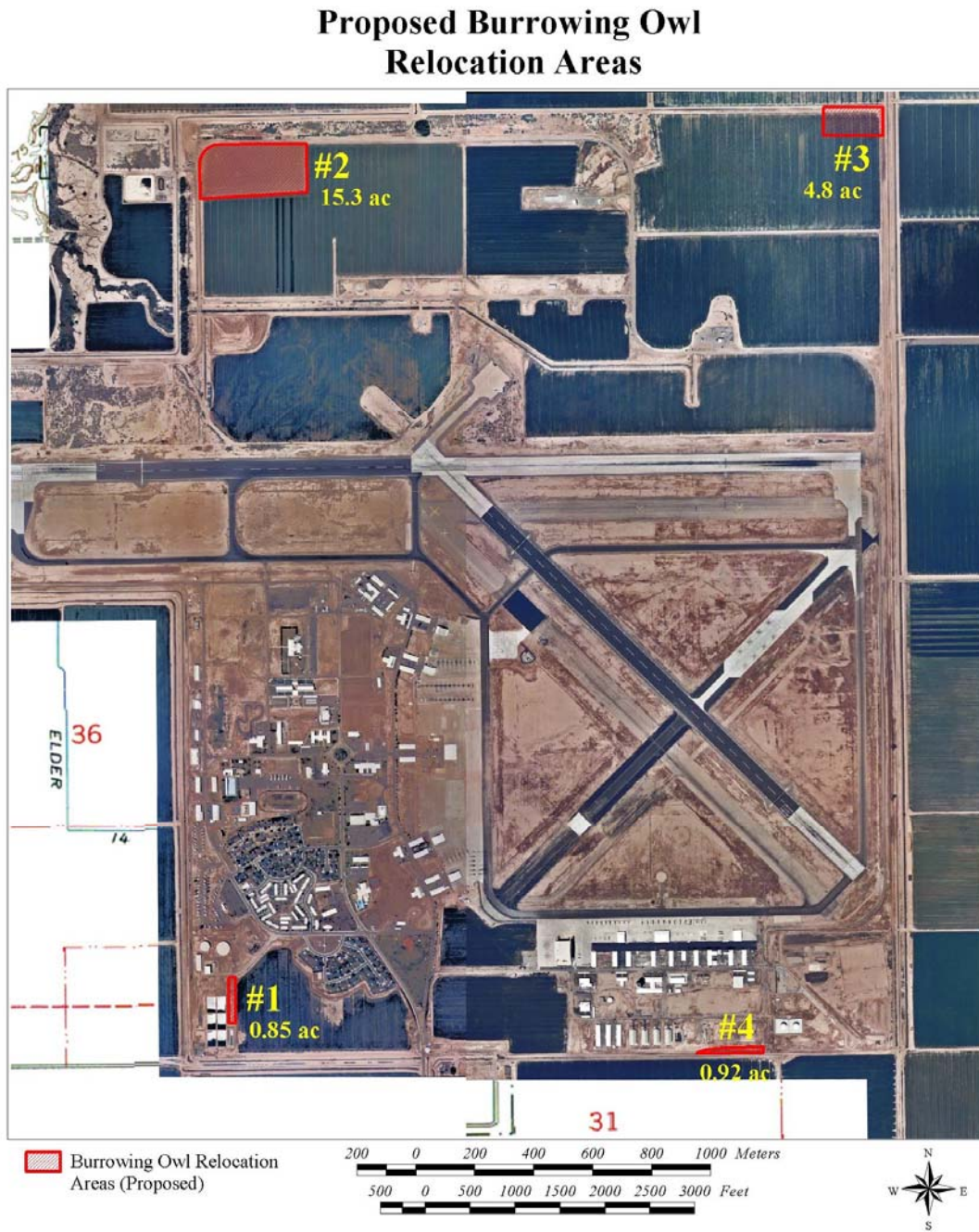
Artificial burrows should not be placed in areas of high ground squirrel activity. California ground squirrels were observed to do considerable damage to artificial burrows at NAS Lemoore by digging them up, although these burrows were placed on the surface of the ground and covered with a mound of dirt. If there is a good deal of fossorial mammal presence, there are already suitable burrows for owls.

Habitat management around nest burrows should focus on keeping vegetation short (ideally under 6 inches in height), and preventing disturbance of the burrows, particularly by disking. Artificial burrow clusters should be sufficiently strong enough to withstand mowing equipment, however (Appendix F). Annual artificial burrow checks are recommended, and unoccupied burrows should be maintained at least once a year to maintain suitability.

The edges of agricultural outlease fields should not be considered for artificial nest burrow placement although these fields will provide acceptable foraging habitat. Agricultural areas do support high densities of owls within the region, but management of water conveyance structures that have owl burrows in them poses a difficult problem, and deliberately attracting owls to areas that must be periodically disturbed is not recommended.

Four regions on El Centro have been identified for burrowing owl conservation (Figure 12). These are outlined below.

Figure 12. Proposed areas on NAF El Centro suitable for burrowing owl conservation.



7.1.1 Site 1

This 0.85 acre parcel is located to the southwest of the airfield, between the drinking water treatment facility and a fallow field. Burrowing owls have been active in this general area in the past (R. Palmer, personal communication). Three artificial burrow clusters could be installed in this area. Currently, there is no vegetation to manage at this site, and it is likely that any owls utilizing the burrows will forage beyond base boundaries to the south and west.

7.1.2 Site 2

This site is located to the northwest of the airfield in an agricultural area. This site is also currently fallow, and owls are likely to forage more to the north and west beyond station boundaries than within areas that may bring them into conflict with aircraft. This 15 acre site has room for multiple burrows, which should be placed around the edges of the site unless future management plans preclude disturbance of the ground in the central part of the site. If burrows are installed around the edge, up to six clusters may be accommodated. Depending on future management plans, an additional row of burrows may be installed around the southeastern edge of the site as well.

7.1.3 Site 3

This 4.8 acre parcel is located to the north of the airfield's northeastern corner. It is also a fallow agricultural field. If burrows are installed on the outer edge of the site, three clusters may be accommodated. The parcel is too narrow for a second line of burrows to be installed. Burrows should be installed a sufficient distance from the existing canal to avoid conflicts with

maintenance activities by heavy equipment.

7.1.4 Site 4

This 0.92 acre site to the south of the airfield is suitable for three clusters set along the perimeter fence. Owls will likely use agricultural lands to the south for foraging activities.

7.2 Artificial Burrow Installation and Monitoring

Artificial burrows may be created inexpensively using valve cover boxes, drain pipe, and a length of rope (Figure 13). The most successful method is to bury the artificial burrows 2-3 feet below the surface, which requires heavy equipment. A perch is optional, but will be used by the owls. This can help verify occupancy, and perches also aid in relocating the burrows. Full instructions for constructing artificial burrows are given in Appendix F.



Figure 13. An artificial burrow under construction. Photo: D. K. Rosenberg

Artificial burrows should be checked at least in the early fall and early spring to ensure that tunnels appear to be open and available. If owl sign is present, no further maintenance is needed, and the burrow should be left alone. Mice and other small rodents will occasionally backfill tunnels

and burrow boxes; in this case, burrows should be excavated and cleared of debris. This problem may be lessened considerably by attaching a piece of plywood onto the bottom of the box to prevent small mammals from burrowing up into the chamber.

Although presence of owls or their sign is an obvious indicator of a successful conservation project, structures that do not immediately attract owls should not be considered a waste of effort or a failure. NAF El Centro is unique in that it is in the middle of a very large, dense population of owls, indicating that the agricultural lands surrounding the facility are adequate owl habitat under current land management practices. This means that there are many choices for owls searching for places to live. In addition, habitat patches that are required for the long-term persistence of a larger population may still occasionally be empty; lack of use cannot be interpreted as definitive evidence that management has failed in the absence of additional supporting information. Finally, habitat patches not necessarily needed by the population at present may become very important in the near future as the Imperial Valley agriculture system shifts.

The Imperial Valley's land use patterns are beginning to change dramatically, and these will have substantial impact on the birds of the region that depend on agriculture for habitat. Burrowing owl populations may redistribute themselves dramatically as foraging areas are lost due to fallowing of now-productive fields. Evaluating the success of NAF El Centro's conservation efforts must be done in the context of the regional changes in owl populations. Small-scale habitat improvement projects such as a row of artificial nest burrows are likely to become

important to the species in the near future. Fortunately for the burrowing owl, its flexible behavior and generalist diet should allow it to persist in the changing landscape of the Imperial Valley with even moderate attempts at conserving it.



Photo: K. L. Haley

8. Summary

NAF El Centro is surrounded by high densities of birds of many species that pose a potential threat to aircraft. Burrowing owls are well-known occupants of airfields in other parts of the state, and they occur in NAF El Centro's Air Operations as well. Due to the high densities of owls surrounding the station, it is not likely that they can be prevented from venturing onto the airfield. However, their low flight patterns and solitary habits should reduce the risk they pose to aircraft. In addition, management that concentrates on reducing potential burrow sites within Air Operations, preventing owls from occupying culverts and wire conduits, and discouraging perching on airfield structures should also effectively manage the risk. Current procedures outlined in NAF El Centro's BASH Plan for managing vegetation and preventing perching will also be effective against burrowing owls.

Burrowing owls are protected from harassment or harm primarily by the Migratory Bird Treaty Act. Burrows should not be disturbed during the February 1-August 31 nesting season, or at any time the burrow appears to be an active nest. Nest burrows in the way of construction or maintenance activities can only be removed once a special purpose permit has been acquired from the US Fish and Wildlife Service, which will also require permission from the California Department of Fish and Game. Outside of the nesting season, burrows showing no signs of nesting activity may be removed once it has been verified that no owls are present, or following eviction procedures.

The best strategy is one of prevention. Construction and maintenance activities of Air Operations should be done in such a manner as to not create potential burrow sites, culverts should be protected by

screens, and at the least, the current practice of maintaining bare ground or thick shrub cover near the runways should be maintained. Fortunately, these strategies are not only likely to be successful, they will be far more cost-effective than simply removing burrows on a regular basis in winter.

Ensuring that personnel responsible for reporting BASH incidents are collecting remains to identify the species involved will also aid in determining the level of threat that burrowing owls do pose to aircraft, and will therefore also inform the level of management that is appropriate. To date, there does not appear to be any information available to quantify the risk burrowing owls might pose, despite the fact that they occur on a number of active airfields. Better estimates of actual risk will allow better cost-benefit analysis of management alternatives.



Photo: D. K. Rosenberg

9. Literature Cited

- Blackwell, B. F., and G. E. Bernhardt. 2004. Efficacy of aircraft landing lights in stimulating avoidance behavior in birds. *Journal of Wildlife Management* 68:725-732.
- California Department of Fish and Game. 2004. Special Animals. Unpublished Report of the Wildlife and Habitat Data Analysis Branch, California Department of Fish and Game, Sacramento, CA. 47 pages, appendices.
- Catlin, D. H. 2004. Factors affecting within-season and between-season breeding dispersal of burrowing owls in California. M.S. Thesis, Oregon State University, Corvallis, OR.
- Coulombe, H. N. 1971. Behavior and population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. *Condor* 73:162-176.
- 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. Pages 38-48 in J. L. Lincer and K. Steenhof, editors. *The burrowing owl, its biology and management*. Raptor Research Report No. 9.
- DeSante, D. F., E. D. Ruhlen, and D. K. Rosenberg. 2004. Density and abundance of burrowing owls in the agricultural matrix of the Imperial Valley, California. *Studies in Avian Biology* 27:116-119.
- Gervais, J. A., D. K. Rosenberg, and R. G. Anthony. 2003. Space use and pesticide exposure risk of male burrowing owls in an agricultural landscape. *Journal of Wildlife Management* 67:156-165.
- 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* 19:337-343.
- Gorman, L., D. K. Rosenberg, N. A. Ronan, K. L. Haley, J. A. Gervais, and V. Franke. 2003. Estimation of reproductive rates of burrowing owls. *Journal of Wildlife Management* 67:493-500.
- 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.
- Haley, K. L. 2002. The role of food limitation and predation on reproductive success of burrowing owls in southern California. MS Thesis, Oregon State University, Corvallis, OR.

- Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing owl (*Speotyto cunicularia*). Pages 1-20 in A. Poole and F. Gill, editors. The birds of North America, No. 61. The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, DC.
- 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. Steenhof, editors. The burrowing owl, its biology and management. Raptor Research Report No. 9.
- Klute, D. S., L. W. Ayers, M. T. Green, W. H. Howe, S. L. Jones, J. A. Shaffer, S. R. Sheffield, and T. S. Zimmerman. 2003. Status assessment and conservation plan for the western burrowing owl in the United States. US Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, DC.
- Poulin, R. G., T. I. Wellicome, and L. D. Todd. 2001. Synchronous and delayed numerical responses of a predatory bird community to a vole outbreak on the Canadian prairies. *Journal of Raptor Research* 35:288-295.
- 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, CA. Publication No. 95.
- Rosenberg, D. K., and K. L. Haley. 2004. The ecology of burrowing owls in the agroecosystems of the Imperial Valley, California. *Studies in Avian Biology* 27:120-135.
- Ronan, N. A. 2002. Habitat selection, reproductive success, and site fidelity of burrowing owls in a grassland ecosystem. MS Thesis, Oregon State University, Corvallis, OR.
- Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland Municipal Airport. *Condor* 73:177-192.
- Todd, L. D. 2001. Dispersal patterns and post-fledging mortality of juvenile burrowing owls in Saskatchewan. *Journal of Raptor Research* 35:282-287.
- Todd, L. D., R. G. Populin, T. I. Wellicome, and R. M. Brigham. Post-fledging survival of burrowing owls in Saskatchewan. *Journal of Wildlife Management* 67:512-519.

US Fish and Wildlife Service. 2002. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, VA.
(<http://migratorybirds.fws.gov/reports/bcc2002.pdf>)

Wellicome, T. I., and E. A. Haug. 1995. Second update of status report on the burrowing owl (*Speotyto cunicularia*) in Canada. Committee on the status of endangered wildlife in Canada, Canadian Wildlife Service, Environment Canada, Ottawa, Ontario.

York, M., D. K. Rosenberg, and K. Sturm. 2002. Diet and food-niche breadth of burrowing owls (*Athene cunicularia*) in the Imperial Valley, California. *Western North American Naturalist* 62:280-287.

APPENDICES:

Appendix A: Summary of the Migratory Bird Treaty Act (MBTA)

Migratory Bird Treaty Act (<http://ipl.unm.edu/cwl/fedbook/mbta.html>)

16 U.S.C. §§ 703-712, July 3, 1918, as amended 1936, 1960, 1968, 1969, 1974, 1978, 1986 and 1989.

Overview. The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful.

Prohibited Acts. Unless permitted by regulations, the Act provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the Act, the Secretary of the Interior (Secretary) may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns. Regulations are effective upon Presidential approval. §§ 703 and 704.

The Act makes it unlawful to: ship, transport or carry from one state, territory or district to another, or through a foreign country, any bird, part, nest or egg that was captured, killed, taken, shipped, transported or carried contrary to the laws from where it was obtained; import from Canada any bird, part, nest or egg obtained contrary to the laws of the province from which it was obtained. § 705.

Arrests/Search Warrants. To enforce the Act, authorized Department of Interior employees may: without a warrant, arrest a person violating the Act in the employee's presence or view; execute a warrant or other process issued by an officer or court to enforce the Act; search any place with a warrant. All birds, parts, nests or eggs that are captured, killed, taken, offered or sold, bartered, purchased, shipped, transported, carried, imported, exported or possessed contrary to the Act will be seized and, upon conviction of the offender or upon court judgment, be forfeited to the U.S. and disposed of by the Secretary. § 706.

Violations/Penalties. According to the Act, a person, association, partnership or corporation which violates the Act or its regulations is guilty of a misdemeanor and subject to a fine of up to \$500, jail up to six months, or both. Anyone who knowingly takes a migratory bird and intends to, offers to, or actually sells or barter the bird is guilty of a felony, with fines up to \$2,000, jail up to two years, or both. (Permissible fines are increased significantly by the Sentencing Reform Act of 1984, as amended in 1987, which is summarized separately in this Handbook.)

All guns, traps, nets, vessels, vehicles and other equipment used in pursuing, hunting, taking, trapping, ensnaring, capturing, killing, or any attempt on a migratory bird in violation of the Act with the intent to sell or barter, must be forfeited to the U.S. and may be seized and held pending prosecution of the violator. The property is to be disposed of and accounted for by the Secretary. § 707.

Miscellaneous. The Act should not be construed to prevent states and territories from making or enforcing laws or regulations not inconsistent with the Act or which give further protection to migratory birds, nests and eggs, if such laws and regulations do not extend open seasons. § 708.

The Act cannot be construed to prevent the breeding of migratory game birds on farms and preserves, and the sale of birds lawfully bred to increase the food supply. § 711.

In accordance with the various migratory bird treaties and conventions, the Secretary is authorized to issue regulations to assure that the taking of migratory birds and their eggs by the indigenous inhabitants of Alaska is permitted for their nutritional and other essential needs during established seasons. § 712.

Appendix B: Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

2001. Federal Register 66(11):3853-3856

<http://migratorybirds.fws.gov/EO/migbrdeo.pdf>

Presidential Documents

Executive Order 13186 -- Responsibilities of Federal Agencies To Protect Migratory Birds

January 10, 2001

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in furtherance of the purposes of the migratory bird conventions, the Migratory Bird Treaty Act (16 U.S.C. 703-711), the Bald and Golden Eagle Protection Acts (16 U.S.C. 668-668d), the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c), the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347), and other pertinent statutes, it is hereby ordered as follows:

Section 1. Policy. Migratory birds are of great ecological and economic value to this country and to other countries. They contribute to biological diversity and bring tremendous enjoyment to millions of Americans who study, watch, feed, or hunt these birds throughout the United States and other countries. The United States has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds. Such conventions include the Convention for the Protection of Migratory Birds with Great Britain on behalf of Canada 1916, the Convention for the Protection of Migratory Birds and Game Mammals-Mexico 1936, the Convention for the Protection of Birds and Their Environment-Japan 1972, and the Convention for the Conservation of Migratory Birds and Their Environment-Union of Soviet Socialist Republics 1978.

These migratory bird conventions impose substantive obligations on the United States for the conservation of migratory birds and their habitats, and through the Migratory Bird Treaty Act (Act), the United States has implemented these migratory bird conventions with respect to the United States. This Executive Order directs Executive departments and agencies to take certain actions to further implement the Act. Sec. 2. Definitions. For purposes of this Order:

- (a) "Take" means take as defined in 50 C.F.R. 10.12, and includes both "intentional" and "unintentional" take.
- (b) "Intentional take" means take that is the purpose of the activity in question.
- (c) "Unintentional take" means take that results from, but is not the purpose of, the activity in question.
- (d) "Migratory bird" means any bird listed in 50 C.F.R. 10.13.
- (e) "Migratory bird resources" means migratory birds and the habitats upon which they depend.
- (f) "Migratory bird convention" means, collectively, the bilateral conventions (with Great Britain/Canada, Mexico, Japan, and Russia) for the conservation of migratory bird resources.

(g) "Federal agency" means an Executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104.

(h) "Action" means a program, activity, project, official policy (such as a rule or regulation), or formal plan directly carried out by a Federal agency. Each Federal agency will further define what the term "action" means with respect to its own authorities and what programs should be included in the agency-specific Memoranda of Understanding required by this Order. Actions delegated to or assumed by nonfederal entities, or carried out by nonfederal entities with Federal assistance, are not subject to this Order. Such actions, however, continue to be subject to the Migratory Bird Treaty Act.

(i) "Species of concern" refers to those species listed in the periodic report "Migratory Nongame Birds of Management Concern in the United States," priority migratory bird species as documented by established plans (such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas), and those species listed in 50 C.F.R. 17.11.

Sec. 3. Federal Agency Responsibilities. (a) Each Federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations is directed to develop and implement, within 2 years, a Memorandum of Understanding (MOU) with the Fish and Wildlife Service (Service) that shall promote the conservation of migratory bird populations.

(b) In coordination with affected Federal agencies, the Service shall develop a schedule for completion of the MOUs within 180 days of the date of this Order. The schedule shall give priority to completing the MOUs with agencies having the most substantive impacts on migratory birds.

(c) Each MOU shall establish protocols for implementation of the MOU and for reporting accomplishments. These protocols may be incorporated into existing actions; however, the MOU shall recognize that the agency may not be able to implement some elements of the MOU until such time as the agency has successfully included them in each agency's formal planning processes (such as revision of agency land management plans, land use compatibility guidelines, integrated resource management plans, and fishery management plans), including public participation and NEPA analysis, as appropriate. This Order and the MOUs to be developed by the agencies are intended to be implemented when new actions or renewal of contracts, permits, delegations, or other third party agreements are initiated as well as during the initiation of new, or revisions to, land management plans.

(d) Each MOU shall include an elevation process to resolve any dispute between the signatory agencies regarding a particular practice or activity.

(e) Pursuant to its MOU, each agency shall, to the extent permitted by law and subject to the availability of appropriations and within Administration budgetary limits, and in harmony with agency missions:

(1) support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions;

(2) restore and enhance the habitat of migratory birds, as practicable;

(3) prevent or abate the pollution or detrimental alteration of the Environment for the benefit of migratory birds, as practicable;

(4) design migratory bird habitat and population conservation principles, measures, and practices, into agency plans and planning processes (natural resource, land management, and environmental quality planning, including, but not limited to, forest and rangeland planning, coastal management planning, watershed planning, etc.) as practicable, and coordinate with other agencies and nonfederal partners in planning efforts;

(5) within established authorities and in conjunction with the adoption, amendment, or revision of agency management plans and guidance, ensure that agency plans and actions promote programs and recommendations of comprehensive migratory bird planning efforts such as Partners-in-Flight, U.S. National Shorebird Plan, North American Waterfowl Management Plan, North American Colonial Waterbird Plan, and other planning efforts, as well as guidance from other sources, including the Food and Agricultural Organization's International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries;

(6) ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern;

(7) provide notice to the Service in advance of conducting an action that is intended to take migratory birds, or annually report to the Service on the number of individuals of each species of migratory birds intentionally taken during the conduct of any agency action, including but not limited to banding or marking, scientific collecting, taxidermy, and depredation control;

(8) minimize the intentional take of species of concern by: (i) delineating standards and procedures for such take; and (ii) developing procedures for the review and evaluation of take actions. With respect to intentional take, the MOU shall be consistent with the appropriate sections of 50 C.F.R. parts 10, 21, and 22;

(9) identify where unintentional take reasonably attributable to agency actions is having, or is likely to have, a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. With respect to those actions so identified, the agency shall develop and use principles, standards, and practices that will lessen the amount of unintentional take, developing any such conservation efforts in cooperation with the Service. These principles, standards, and practices shall be regularly evaluated and revised to ensure that they are effective in lessening the detrimental effect of agency actions on migratory bird populations. The agency also shall inventory and monitor bird habitat and populations within the agency's capabilities and authorities to the extent feasible to facilitate decisions about the need for, and effectiveness of, conservation efforts;

(10) within the scope of its statutorily-designated authorities, control the import, export, and establishment in the wild of live exotic animals and plants that may be harmful to migratory bird resources;

(11) promote research and information exchange related to the conservation of migratory bird resources, including coordinated inventorying and monitoring and the collection and assessment of information on environmental contaminants and other physical or biological stressors having potential relevance to migratory bird conservation. Where such information is collected in the course of agency actions or supported through Federal financial assistance, reasonable efforts shall be made to share such information with the Service, the Biological Resources Division of the U.S. Geological Survey, and other appropriate repositories of such data (e.g, the Cornell Laboratory of Ornithology);

(12) provide training and information to appropriate employees on methods and means of avoiding or minimizing the take of migratory birds and conserving and restoring migratory bird habitat;

(13) promote migratory bird conservation in international activities and with other countries and international partners, in consultation with the Department of State, as appropriate or relevant to the agency's authorities;

(14) recognize and promote economic and recreational values of birds, as appropriate; and

(15) develop partnerships with non-Federal entities to further bird conservation.

(f) Notwithstanding the requirement to finalize an MOU within 2 years, each agency is encouraged to immediately begin implementing the conservation measures set forth above in subparagraphs (1) through (15) of this section, as appropriate and practicable.

(g) Each agency shall advise the public of the availability of its MOU through a notice published in the Federal Register.

Sec. 4. Council for the Conservation of Migratory Birds. (a) The Secretary of Interior shall establish an interagency Council for the Conservation of Migratory Birds (Council) to oversee the implementation of this Order. The Council's duties shall include the following: (1) sharing the latest resource information to assist in the conservation and management of migratory birds; (2) developing an annual report of accomplishments and recommendations related to this Order; (3) fostering partnerships to further the goals of this Order; and (4) selecting an annual recipient of a Presidential Migratory Bird Federal Stewardship Award for contributions to the protection of migratory birds.

(b) The Council shall include representation, at the bureau director/administrator level, from the Departments of the Interior, State, Commerce, Agriculture, Transportation, Energy, Defense, and the Environmental Protection Agency and from such other agencies as appropriate.

Sec. 5. Application and Judicial Review. (a) This Order and the MOU to be developed by the agencies do not require changes to current contracts, permits, or other third party agreements.

(b) This Order is intended only to improve the internal management of the Executive branch and does not create any right or benefit, substantive or procedural, separately enforceable at law or equity by a party against the United States, its agencies or instrumentalities, its officers or employees, or any other person.

William J. Clinton
The White House,
January 10, 2001.

Appendix C. Text of 50 CFR 21.27 Special Purpose Permits under the MTBA

<http://permits.fws.gov/mbpermits/regulations/part21.pdf>

21.27 Special purpose permits.

Permits may be issued for special purpose activities related to migratory birds, their parts, nests, or eggs, which are otherwise outside the scope of the standard form permits of this Part. A special purpose permit for migratory bird related activities not otherwise provided for in this Part may be issued to an applicant who submits a written application containing the general information and certification required by [Part 13](#) and makes a sufficient showing of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or other compelling justification.

(a) Permit requirement. A special purpose permit is required before any person may lawfully take, salvage, otherwise acquire, transport, or possess migratory birds, their parts, nests, or eggs for any purpose not covered by the standard form permits of this Part. In addition, a special purpose permit is required before any person may sell, purchase, or barter captive-bred, migratory game birds, other than waterfowl, that are marked in compliance with [21.13\(b\)](#) of this Part.

(b) Application procedures. Applications for special purpose permits shall be submitted to the appropriate issuing officer (see [13.11\(b\)](#) of this Subchapter). Each such application must contain the general information and certification required by [13.12\(a\)](#) of this Subchapter plus the following additional information:

(1) A detailed statement describing the project or activity which requires issuance of a permit, purpose of such project or activity, and a delineation of the area in which it will be conducted. (Copies of supporting documents, research proposals, and any necessary State permits should accompany the application);

(2) Numbers and species of migratory birds involved where same can reasonably be determined in advance; and

(3) Statement of disposition which will be made of migratory birds involved in the permit activity.

(c) Additional permit conditions. In addition to the general conditions set forth in [Part 13](#) of this Subchapter B, special purpose permits shall be subject to the following conditions:

(1) Permittees shall maintain adequate records describing the conduct of the permitted activity, the numbers and species of migratory birds acquired and disposed of under the permit, and inventorying and identifying all migratory birds held on December 31 of each calendar year. Records shall be maintained at the address listed on the permit; shall be in, or reproducible in English; and shall be available for

inspection by Service personnel during regular business hours. A permittee may be required by the conditions of the permit to file with the issuing office an annual report of operation. Annual reports, if required, shall be filed no later than January 31 of the calendar year following the year for which the report is required. Reports, if required, shall describe permitted activities, numbers and species of migratory birds acquired and disposed of, and shall inventory and describe all migratory birds possessed under the special purpose permit on December 31 of the reporting year.

(2) Permittees shall make such other reports as may be requested by the issuing officer.

(3) All live, captive-bred, migratory game birds possessed under authority of a valid special purpose permit shall be physically marked as defined in [21.13\(b\)](#) of this Part.

(4) No captive-bred migratory game bird may be sold or bartered unless marked in accordance with [21.13\(b\)](#) of this Part

(5) No permittee may take, purchase, receive or otherwise acquire, sell, barter, transfer, or otherwise dispose of any captive-bred migratory game bird unless such permittee submits a Service form 3-186A (Migratory Bird Acquisition/Disposition Report), completed in accordance with the instructions on the form, to the issuing office within five (5) days of such transaction.

(6) No permittee, who is authorized to sell or barter migratory game birds pursuant to a permit issued under this section, may sell or barter such birds to any person unless that person is authorized to purchase and possess such migratory game birds under a permit issued pursuant to this Part and [Part 13](#), or as permitted by regulations in this Part.

(d) Term of permit. A special purpose permit issued or renewed under this Part expires on the date designated on the face of the permit unless amended or revoked, but the term of the permit shall not exceed three (3) years from the date of issuance or renewal.

Appendix D. Survey and Mitigation Guidelines Adopted by the California Department of Fish and Game

These survey and mitigation guidelines were adopted by California Department of Fish and Game in 1985, and were revised in 1993. Although legally nonbinding, these guidelines should be followed whenever possible if burrowing owls or burrows are potentially in the way of proposed construction or maintenance activities.

INTRODUCTION

The California Burrowing Owl Consortium developed the following Survey Protocol and Mitigation Guidelines to meet the need for uniform standards when surveying burrowing owl (*Speotyto cunicularia*) populations and evaluating impacts from development projects. The California Burrowing Owl Consortium is a group of biologists in the San Francisco Bay area who are interested in burrowing owl conservation. The following survey protocol and mitigation guidelines were prepared by the Consortium's Mitigation committee. These procedures offer a decision-making process aimed at preserving burrowing owls in place with adequate habitat.

California's burrowing owl population is clearly in peril and if declines continue unchecked the species may qualify for listing. Because of the intense pressure for development of open, flat grasslands in California, resource managers frequently face conflicts between owls and development projects. Owls can be affected by disturbance and habitat loss, even though there may be no direct impacts to the birds themselves or their burrows. There is often inadequate information about the presence of owls on a project site until ground disturbance is imminent. When this occurs there is usually insufficient time to evaluate impacts to owls and their habitat.

The absence of standardized field survey methods impairs adequate and consistent impact assessment during regulatory review processes, which in turn reduces the possibility of effective mitigation.

These guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or the resources that support them. The process begins with a four-step survey protocol to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures are followed to minimize impacts to burrowing owls, their burrows and foraging habitat on the site.

These guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site. Each project and situation is different and these procedures may not be applicable in some circumstances. Finally, these are not strict rules or requirements that must be applied in all situations. They are guidelines to consider when evaluating burrowing owls and their habitat, and they suggest options for burrowing owl conservation when land use decisions are made.

Section 1 describes the four phase Burrowing Owl Survey Protocol. Section 2 contains the Mitigation Guidelines. Section 3 contains a discussion of various laws and regulations that protect burrowing owls and a list of references cited in the text.

We have submitted these documents to the California Department of Fish and Game (CDFG) for review and comment. These are untested procedures and we ask for your comments on improving their usefulness.

California Burrowing Owl Consortium
April 1993

SECTION 1 BURROWING OWL SURVEY PROTOCOL

PHASE I: HABITAT ASSESSMENT

The first step in the survey process is to assess the presence of burrowing owl habitat on the project site including a 150-meter (approx. 500 ft.) buffer zone around the project boundary (Thomsen 1971, Martin 1973).

Burrowing Owl Habitat Description

Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat: both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures, such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

Occupied Burrowing Owl Habitat

Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by an observation of at least one burrowing owl, or, alternatively, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeney 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

The Phase II burrow survey is required if burrowing owl habitat occurs on the site. If burrowing owl habitat is not present on the project site and buffer zone, the Phase II

burrow survey is not necessary. A written report of the habitat assessment should be prepared (Phase IV), stating the reason(s) why the area is not burrowing owl habitat.

PHASE II: BURROW SURVEY

1. A survey for-burrows and owls should be conducted by walking through suitable habitat over the entire project site and in areas within 150 meters (approx 500 ft.) of the project impact zone. This 150-meter buffer zone is included to account for adjacent burrows and foraging habitat outside the project area and impacts from factors such as noise and vibration due to heavy equipment which could impact resources outside the project area.
2. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.), and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To efficiently survey projects larger than 100 acres, it is recommended that two or more surveyors conduct concurrent surveys. Surveyors should maintain a minimum distance of 50 meters (approx. 160 ft.) from any owls or occupied burrows. It is important to minimize disturbance near occupied burrows during all seasons.
3. If burrows or burrowing owls are recorded on the site, a map should be prepared of the burrow concentration areas. A breeding season survey and census (Phase III) of burrowing owls is the next step required.
4. Prepare a report (Phase IV) of the burrow survey stating whether or not burrows are present.
5. A preconstruction survey may be required by project-specific mitigations no more than 30 days prior to ground disturbing activity.

PHASE III: BURROWING OWL SURVEYS, CENSUS AND MAPPING

If the project site contains burrows that could be used by burrowing owls, then survey efforts should be directed towards determining owl presence on the site. Surveys in the breeding season are required to describe if, when, and how the site is used by burrowing owls. If no owls are observed using the site during the breeding season, a winter survey is required.

Survey Methodology

A complete burrowing owl survey consists of four site visits. During the initial site visit examine burrows for owl sign and map the locations of occupied burrows. Subsequent

observations should be conducted from as many fixed points as necessary to provide visual coverage of the site using spotting scopes or binoculars. It is important to minimize disturbance

near occupied burrows during all seasons. Site visits must be repeated on four separate days. Conduct these visits from two hours before sunset to one hour after or from one hour before to two hours after sunrise. Surveys should be conducted during weather that is conducive to observing owls outside their burrows. Avoid surveys during heavy rain, high winds (> 20 mph), or dense fog.

Nesting Season Survey. The burrowing owl nesting season begins as early as February 1 and continues through August 31 (Thomsen 1971, Zam 1974). The timing of nesting activities may vary with latitude and climatic conditions. If possible, the nesting season survey should be conducted during the peak of the breeding season, between April 15 and July 15. Count and map all burrowing owl sightings, occupied burrows, and burrows with owl sign. Record numbers of pairs and juveniles, and behavior such as courtship and copulation. Map the approximate territory boundaries and foraging areas if known.

Survey for Winter Residents (non-breeding owls). Winter surveys should be conducted between December 1 and January 31, during the period when wintering owls are most likely to be present. Count and map all owl sightings, occupied burrows, and burrows with owl sign.

Surveys Outside the Winter and Nesting Seasons. Positive results, (i.e., owl sightings)-outside of the above survey periods would be adequate to determine presence of owls on site. However, results of these surveys may be inadequate for mitigation planning because the numbers of owls and their pattern of distribution may change during winter and nesting seasons. Negative results during surveys outside the above periods are not conclusive proof that owls do not use the site.

Preconstruction Survey. A preconstruction survey may be required by project-specific mitigations and should be conducted no more than 30 days prior to ground disturbing activity.

PHASE IV: RESOURCE SUMMARY, WRITTEN REPORT

A report should be prepared for CDFG that gives the results of each Phase of the survey protocol, as outlined below.

Phase I: Habitat Assessment

1. Date and time of visit(s) including weather and visibility conditions; methods of survey.
2. Site description including the following information: location, size, topography, vegetation communities, and animals observed during visit(s).
3. An assessment of habitat suitability for burrowing owls and explanation.
4. A map of the site.

Phase II: Burrow Survey

1. Date and time of visits including weather and visibility conditions; survey methods including transect spacing.
2. A more detailed site description should be made during this phase of the survey protocol including a partial plant list of primary vegetation, location of nearest freshwater (on or within one mile of site), animals observed during transects.
3. Results of survey transects including a map showing the location of concentrations of burrow(s) (natural or artificial) and owl(s), if present.

Phase III: Burrowing Owl Surveys, Census and Mapping

1. Date and time of visits including weather and visibility conditions; survey methods including transect spacing.
2. Report and map the location of all burrowing owls and owl sign. Burrows occupied by owl(s) should be mapped indicating the number of owls at each burrow. Tracks, feathers, pellets, or other items (prey remains, animal scat) at burrows should also be reported.
3. Behavior of owls during the surveys should be carefully recorded (from a distance) and reported. Describe and map areas used by owls during the surveys. Although not required, all behavior is

valuable to document including feeding, resting, courtship, alarm, territorial, parental, or juvenile behavior.

4. Both winter and nesting season surveys should be summarized. If possible include information regarding productivity of pairs, seasonal pattern of use, and include a map of the colony showing territorial boundaries and home ranges.

5. The historical presence of burrowing owls on site should be documented, as well as the source of such information (local bird club, Audubon society, other biologists, etc.).

Burrowing: Owl Survey Protocol

April 1993

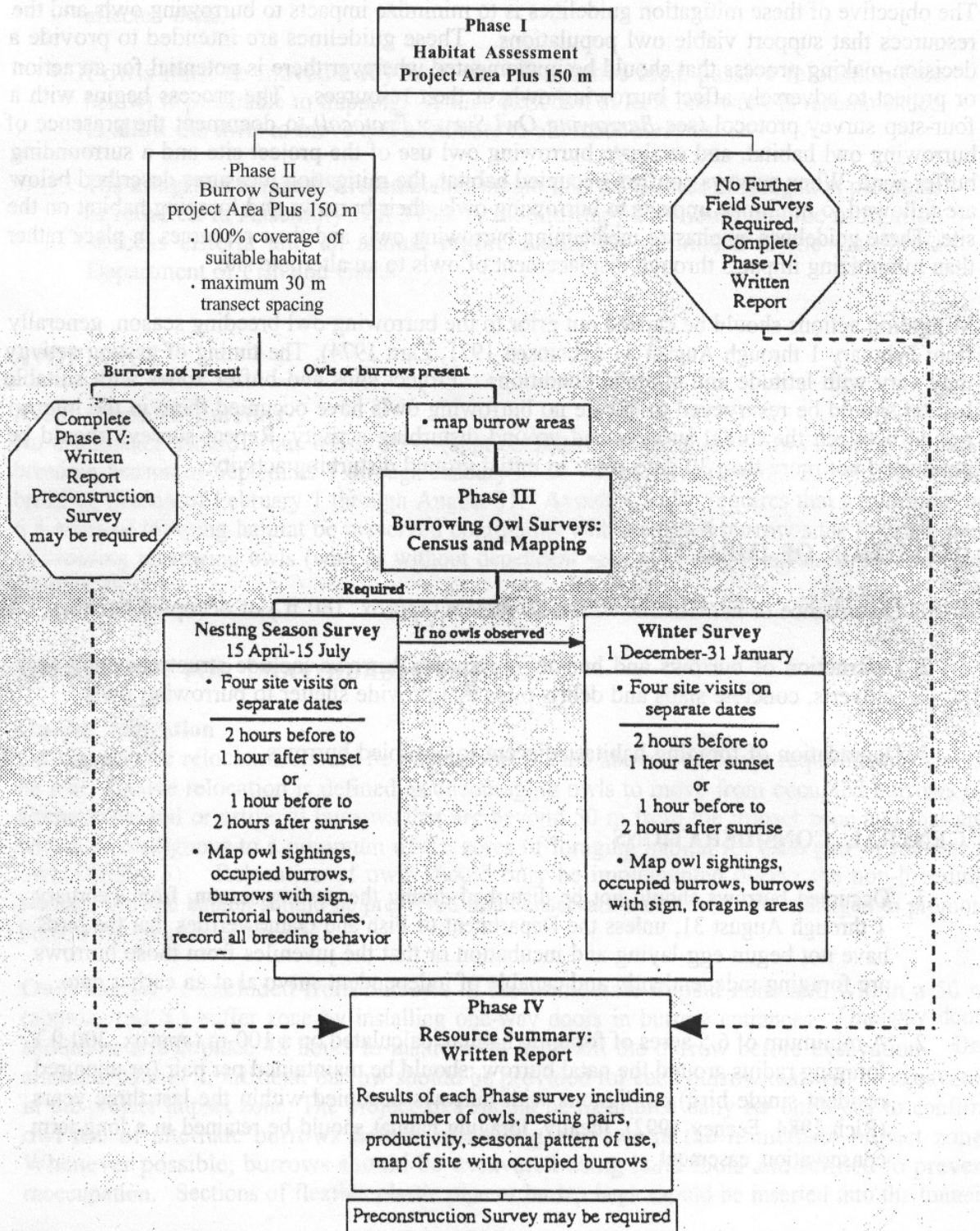


Figure 1.

SECTION 2 BURROWING OWL MITIGATION GUIDELINES

The objective of these mitigation guidelines is to minimize impacts to burrowing owls and the resources that support viable owl populations. These guidelines are intended to provide a decision-making process that should be implemented wherever there is potential for an action or project to adversely affect burrowing owls or their resources. The process begins with a four-step survey protocol (see Burrowing Owl Survey Protocol) to document the presence of burrowing owl habitat, and evaluate burrowing owl use of the project site and a surrounding buffer zone. When surveys confirm occupied habitat, the mitigation measures described below are followed to minimize impacts to burrowing owls, their burrows and foraging habitat on the site. These guidelines emphasize maintaining burrowing owls and their resources in place rather than minimizing impacts through displacement of owls to an alternate site.

Mitigation actions should be carried out prior to the burrowing owl breeding season, generally from February 1 through August 31 (Thomsen 1971, Zarn 1974). The timing of nesting activity may vary with latitude and climatic conditions. Project sites and buffer zones with suitable habitat should be resurveyed to ensure no burrowing owls have occupied them in the interim period between the initial surveys and ground disturbing activity. Repeat surveys should be conducted not more than 30 days prior to initial ground disturbing activity.

DEFINITION OF IMPACTS

1. Disturbance or harassment within 50 meters (approx. 160 ft.) of occupied burrows.
2. Destruction of burrows and burrow entrances. Burrows include structures such as culverts, concrete slabs and debris piles that provide shelter to burrowing owls.
3. Degradation of foraging habitat adjacent to occupied burrows.

GENERAL CONSIDERATIONS

1. Occupied burrows should not be disturbed during the nesting season, from February 1 through August 31, unless the Department of Fish and Game verifies that the birds have not begun egg-laying and incubation or that the juveniles from those burrows are foraging independently and capable of independent survival at an earlier date.

2. A minimum of 6.5 acres of foraging habitat, calculated on a 100-m (approx. 300 ft.) foraging radius around the natal burrow, should be maintained per pair (or unpaired resident single bird) contiguous with burrows occupied within the last three years (Rich 1984, Feeney 1992). Ideally, foraging habitat should be retained in a long-term conservation easement.
3. When destruction of occupied burrows is unavoidable, burrows should be enhanced (enlarged or cleared of debris) or created (by installing artificial burrows) in a ratio of 1:1 in adjacent suitable habitat that is contiguous with the foraging habitat of the affected owls.
4. If owls must be moved away from the disturbance area, passive relocation (see below) is preferable to trapping. A time period of at least one week is recommended to allow the owls to move and acclimate to alternate burrows.
5. The mitigation committee recommends monitoring the success of mitigation programs as required in Assembly Bill 3180. A monitoring plan should include mitigation success criteria and an annual report should be submitted to the California Department of Fish and Game.

AVOIDANCE

Avoid Occupied Burrows

No disturbance should occur within 50 m (approx. 160 ft.) of occupied burrows during the nonbreeding Season of September 1 through January 31 or within 75 m (approx. 250 ft.) during the breeding Season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird (Figure 2).

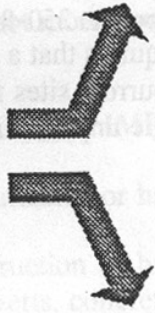
MITIGATION FOR UNAVOIDABLE IMPACTS

On-site Mitigation

On-site passive relocation should be implemented if the above avoidance requirements cannot be met. Passive relocation is defined as encouraging owls to move from occupied

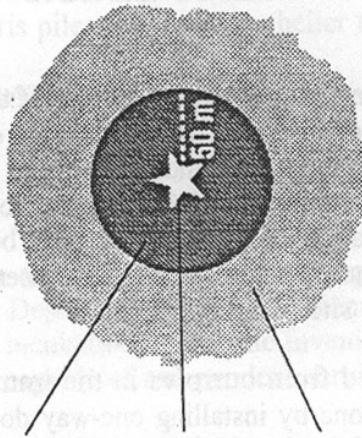
burrows to alternate natural or artificial burrows that are beyond 50 m from the impact zone and that are within or contiguous to a minimum of 6.5 acres of foraging habitat for each pair of relocated owls (Figure 3). Relocation of owls should only be implemented during the non-breeding season. On-site habitat should be preserved in a conservation easement and managed to promote burrowing owl use of the site. Owls should be excluded from burrows in the immediate impact zone and within a 50 m (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances: One-way doors should be left in place 48 hours to insure owls have left the burrow before excavation. One alternate natural or artificial burrow should be provided for each burrow that will be excavated in the project impact zone. The project area should be monitored daily for one week to confirm owl use of alternate burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe or burlap bags should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

AVOIDANCE



Non-breeding season

1 Sept. - 31 Jan.



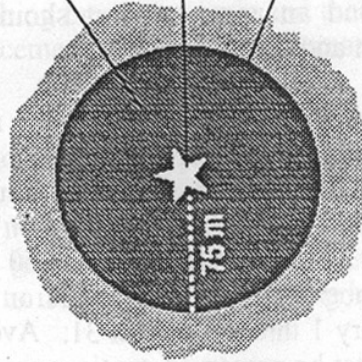
No impacts within 50 m of occupied burrow

Occupied burrow

Maintain at least 6.5 acres foraging habitat

Breeding season

1 Feb. - 31 Aug.



No impacts within 75 m of occupied burrow

Occupied burrow

Maintain at least 6.5 acres foraging habitat

Figure 2. Burrowing owl mitigation guidelines.

**ON-SITE MITIGATION
IF AVOIDANCE NOT MET**

(More than 6.5 acres suitable habitat available)

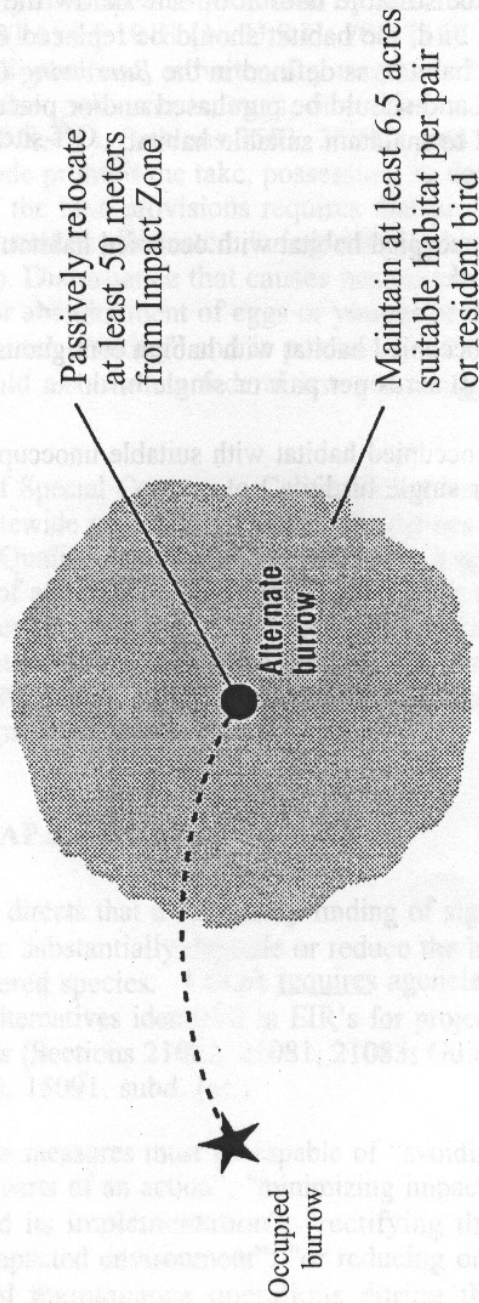


Figure 3. Burrowing owl mitigation guidelines.

Off-site Mitigation

If the project will reduce suitable habitat on-site below the threshold level of 6.5 acres per relocated pair or single bird, the habitat should be replaced off-site. Off-site habitat must be suitable burrowing owl habitat, as defined in the Burrowing Owl Survey Protocol, and the site

approved by CDFG. Land should be purchased and/or placed in a conservation easement in perpetuity and managed to maintain suitable habitat. Off-site mitigation should use one of the following ratios:

1. Replacement of occupied habitat with occupied habitat: 1.5 times 6.5 (9.75) acres per pair or single bird.
2. Replacement of occupied habitat with habitat contiguous to currently occupied habitat: 2 times 6.5 (13.0) acres per pair or single bird.
3. Replacement of occupied habitat with suitable unoccupied habitat: 3 times 6.5 (19.5) acres per pair or single bird.

SECTION 3 LEGAL STATUS

The burrowing owl is a migratory bird species protected by international treaty under 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, 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 (50 C.F.R. 21). Sections 3503, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs. Implementation of the take provisions requires that project-related disturbance at active nesting territories be reduced or eliminated during critical phases of the nesting cycle (March 1 - August 15, annually). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) or the loss of habitat upon which the birds depend is considered “taking” and is potentially punishable by fines and/or imprisonment. Such taking would also violate federal law protecting migratory birds (e.g., MBTA).

The burrowing owl is a Species of Special Concern to California because of declines of suitable habitat and both localized and statewide population declines. Guidelines for the

Implementation of the California Environmental Quality Act (CEQA) provide that a species be considered as endangered or “rare” regardless of appearance on a formal list for the purposes of the CEQA (Guidelines, Section 15380, subsections b and d). The CEQA requires a mandatory findings of significance if impacts to threatened or endangered species are likely to occur (Sections 21001(c), 21083. Guidelines 15380, 15064, 15065). Avoidance or mitigation must be presented to reduce impacts to less than significant levels.

CEQA AND SUBDIVISION MAP ACT

CEQA Guidelines Section 15065 directs that a mandatory finding of significance is required for projects that have the potential to substantially degrade or reduce the habitat of, or restrict the range of a threatened or endangered species. CEQA requires agencies to implement feasible mitigation measures or feasible alternatives identified in EIR’s for projects which will otherwise cause significant adverse impacts (Sections 21002, 21081, 21083; Guidelines, sections 15002, subd. (a)(3), 15021, subd. (a)(2), 15091, subd. (a).).

To be legally adequate, mitigation measures must be capable of “avoiding the impact altogether by not taking a certain action or parts of an action”; "minimizing impacts by limiting the degree or magnitude of the action and its implementation"; "rectifying the impact by repairing, rehabilitating or restoring the impacted environment"; "or reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.” (Guidelines, Section 15.370).

Section 66474 (e) of the Subdivision Map Act states “a legislative body of a city or county shall deny approval of a tentative map or parcel map for which a tentative map was not required, if it makes any of the following findings:... (e) that the design of the subdivision or the proposed improvements are likely to cause substantial environmental damage or substantially and avoidably injure fish and wildlife or their habitat”. In recent court cases, the court upheld that Section 66474(e) provides for environmental impact review separate from and independent of the requirements of CEQA (*Topanga Assn. for a Scenic Community v. County of Los Angeles*, 263 Cal. Rptr. 214 (1989)). The finding in Section 66174 is in addition to the requirements for the preparation of an EIR or Negative Declaration.

LITERATURE CITED

- Feeney, L. 1992. Site fidelity in burrowing owls. Unpublished paper presented to Raptor Research Annual Meeting, November 1992. Seattle, Washington.
- Haug, E. A. and L. W. Oliphant. 1990. Movements, activity patterns, and habitat use of burrowing owls in Saskatchewan. *J. Wildlife Management* 54:27-35.
- Henny, C. J. and L. J. Blus. 1981. Artificial burrows provide new insight into burrowing owl nesting biology. *Raptor Research* 15:82-85.
- Martin, D. J. 1973. Selected aspects of burrowing owl ecology and behavior.

- Condor 75:446- 456.
- Rich, T. 1984. Monitoring burrowing owl populations: Implications of burrow re-use. Wildlife Society Bulletin 12: 178- 180.
- Thomsen, L. 1971. Behavior and ecology of burrowing owls on the Oakland Municipal Airport. Condor 73: 177-192.
- Zam, M. 1974. Burrowing owl. U. S. Department of Interior, Bureau of Land Management. Technical Note T-N 250. Denver, Colorado. 25pp.

Appendix E. Identification of Burrowing Owls

Adult burrowing owls are brown spotted with white on the backs and wings, and their breasts are buff-colored with brown streaks. They have long, featherless, yellowish legs and yellow eyes, and are about 9" tall. Burrowing owls will often be seen in daylight standing at the entrances of burrows or perched on fences or other objects. When startled, or if a burrow is approached, they may emit a loud, chattering call.



Most young owls will appear between May and July. They have plain brown backs and wings, and buffy breasts without streaks until they molt, usually in July. They will often stand at the entrance of the nest burrow when they are over 2 weeks of age.



Burrows used for roosting or nesting can be identified by the presence of pellets and whitewash at the entrance. Pellets are roughly 1 inch long by 1/2 inch wide, and usually are made up of chitin and other insect parts. Nests are sometimes marked by cow or coyote dung, cotton, assorted trash, or bits of natural debris such as insect wings; if these are present, it is almost certainly a nest burrow, but not all nests are decorated.



Burrows may be dug under concrete, or out in bare soil. Owls will use culverts, pipes, irrigation boxes, or wire conduit boxes for roosting and nesting; they have even used buried cars. The spots of whitewash and pellets at the entrance will be evidence of owl occupancy or use.



Burrowing owls will often be solitary outside of the breeding season, although mated pairs may be seen together during the winter. In general, owls are much more active and visible during daylight

hours in the spring and summer than they will be in the winter and fall. Therefore, extra care will be needed to ensure they are not present at a construction or maintenance site in those seasons.



At NAF El Centro, owls have been found using culverts in particular; evidence of owl use includes wash near the culvert entrance. Pellets are particularly clear indicators of owl presence.



Burrowing owls and their nests are protected by a number of laws, including the Migratory Bird Treaty Act, which

defines disturbance of a nest or killing of an owl a felony, and the California Environmental Quality Act and California Fish and Game Codes.



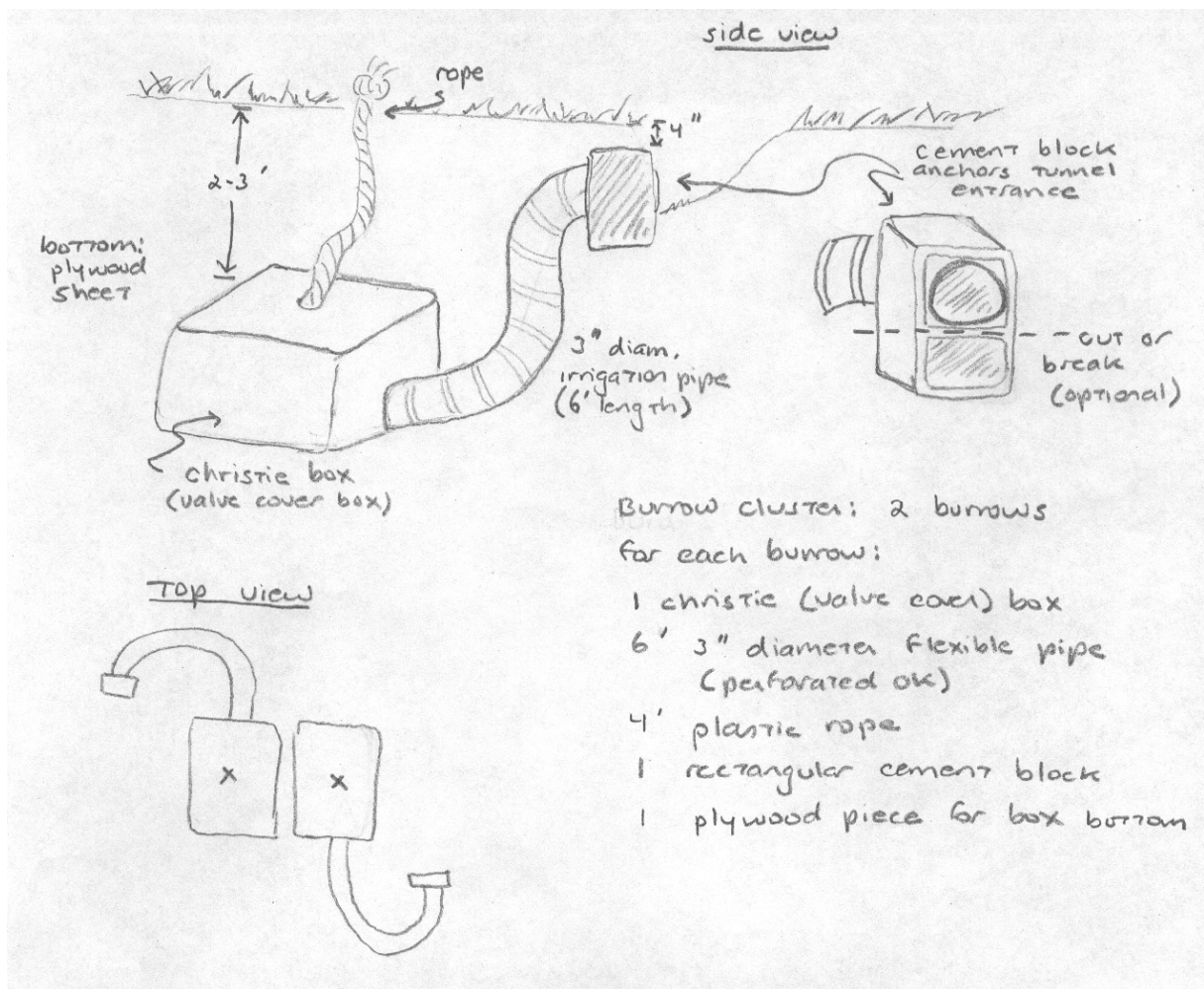
Burrowing owls are common in the Imperial Valley, but they do not appear to be thriving in many other parts of their range. Care must be taken to avoid harm to these birds, to ensure their continued survival.



Photo credits: Dan Rosenberg, Jennifer Gervais, and Lynne Trulio

Appendix F: Improved Artificial Burrow Design

This artificial burrow includes modifications to protect the entrance tunnel from impacts by heavy equipment such as the tires of tractor mowers. In addition, the cement block that protects the end of the tunnel tube also serves to secure it in the ground, preventing it from working its way above the surface over time. A hole is also drilled in the top of the cristie box, and a rope made of plastic or other durable material is knotted through the top. When the box is buried, the end of the rope lies on the surface of the ground, out of the way of mowing equipment. When the burrow must be excavated for maintenance or research, however, the rope allows easy location of the box buried below. The plywood bottom is optional, but helps prevent mice and fossorial rodents from digging into the box and filling it with dirt and debris.



Two artificial burrows should be buried in a cluster to maximize attractiveness to burrowing owls. They should be buried 2-3 feet below the surface to protect against thermal stress, and entrance tunnels should be curved to prevent light from entering the nest box. (*Design modifications courtesy of J. Barclay, Albion Environmental*).