Strategies for Protecting Western Burrowing Owls (Speotyto cunicularia hypugaea) from Human Activities

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Abstract.—Practitioners have been using numerous methods to protect Burrowing Owls (Speotyto cunicularia hypugaea) affected by human activities. Primary approaches include protecting birds and burrows in place, allowing birds to relocate within their nesting territory, allowing birds to colonize new patches, moving birds within the geographic region and moving birds outside the geographic region. Very little data are readily available on most of these. Preliminary information indicates that methods which keep birds near nest burrows may be more successful than those in which birds are relocated outside nesting territories. Adequate monitoring is necessary when using these methods and more data are required to ascertain which conditions will produce successful breeding populations.

The Western Burrowing Owl (Speotyto cunicularia hypugaea) is a semi-fossorial bird of the short-grass prairie which nests in burrows dug by other animals such as prairie dogs (Cynomys sp.), ground squirrels (Spermophilus sp.) and badgers (Taxidea taxus) (Haug et al. 1993). Owls are migratory throughout much of their range, but occur year round in central and southern California and south Arizona, New Mexico, and Texas. Burrowing Owls are very site tenacious and are not easily forced to move to a different burrow during the nesting season. Burrow fidelity is a widely recognized trait of Burrowing Owls, with owls reusing burrows from 1 year to the next (Green 1983, Martin 1973, Wedgwood 1976). Green (1983) found an average of 76 percent of burrows were reoccupied the next year. At a study site in northern California, an average of 73 percent of nest burrows or burrows within 100 m were reoccupied the next year over a 3 year time span (Trulio 1994).

This species is declining throughout much of its western North American range. It is endangered in Minnesota, Iowa, and throughout its distribution in Canada; it is a species of concern in six other western U.S. States. The extensive destruction of prairie dogs and ground squirrels, the use of pesticides and herbicides, and the conversion of grasslands to agriculture and urban uses have all resulted in this decline (Haug et al. 1993, Zarn 1974).

In California, recent research indicates that the Burrowing Owl population has declined by approximately 50 percent in the last 10 years (DeSante and Ruhlen 1995). One reason for this rapid decline is loss of habitat to human uses, especially urban development (DeSante and Ruhlen 1995, Trulio 1995). From a regulatory standpoint, the birds themselves are protected year round and nest burrows cannot be legally disturbed during the nesting season. Owl habitat can be legally destroyed outside nesting season, although compensation for this loss may be required. Numerous laws, including state and federal endangered species acts and environmental impact assessment laws, require mitigation for the destruction of Burrowing Owl habitat. A variety of approaches are being used in an attempt to protect owl populations from decline in the face of disturbance and destruction of their habitat.

Five common protection methods are: (1) protecting existing habitat, especially nest burrows, in place, (2) evicting owls and allowing them to move to a new burrow within their nest territory (passive relocation) (Trulio 1995), (3) allowing owls to move to newly created habitat patches, (4) actively moving birds to new burrows outside their nesting territory but

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within their geographic region (active relocation), and (5) actively moving birds to new burrows outside their geographic region into areas formerly occupied by Burrowing Owls (reintroduction).

Very little data exist in the published literature on most of these methods. This paper presents published information as well as preliminary data collected from researchers and consultants belonging to the California Burrowing Owl Consortium, an ad hoc group of researchers, consultants, agency personnel and citizens who are working to preserve Burrowing Owls in California. These data are far from complete, but they provide some indication of the effectiveness of the various methods. Important research needs for each method are identified.

RESULTS AND DISCUSSION

Protect in Place

Given the site tenacity and burrow fidelity of Burrowing Owls, this method is expected to be successful in protecting birds if disturbances are kept far enough away from occupied burrows. Protecting habitat in place allows birds to remain at the burrows they have chosen and also allows them to return to preferred sites in subsequent years. However, habitat protected in place may become surrounded by lands converted to human uses which may be detrimental to owl habitat quality.

Currently, no published information exists on protecting owls and their habitat in place on disturbance or development sites. No cases had been collected from Consortium members by the time this paper was submitted. To assess this method, results on the long-term use of protected burrows are needed, as are data on the effects of different adjacent land uses and habitat fragmentation on burrows. Burrowing Owls are somewhat tolerant of human activity and development (Trulio 1994, Weseman and Rowe 1987), but the maximum level of activity that will still allow long-term persistence of owls on a site must be determined.

Passive Relocation

Passive relocations are those in which owls are evicted from their occupied burrows. Owls are not allowed to return to the burrows from which they are evicted and they must choose a new burrow. Typically, artificial burrows are constructed as near to the eviction burrows as possible to provide acceptable unoccupied burrows for owl use. Data from six passive relocations in northern California were presented in Trulio (1995). Artificial burrows were created in each case and two to six owls were evicted from their original burrow. In five of the six cases, the artificial burrows were immediately occupied. In only one of these cases were the evicted owls banded and they were known to have moved into the artificial burrow created for them. That burrow supported successfully breeding birds for 3 consecutive years. In the other four cases the evicted owls were not banded and it is not certain they were the birds occupying the new burrows.

New burrows which were used by birds were within 75 m of the eviction site. In one of the six cases the new burrows were not used; those burrows had been placed 165 m from the original burrow. Results from an additional passive relocation in 1995 showed that the evicted birds did not occupy the new artificial burrows; these were 136 m from the eviction site. Researchers have found that the area of greatest activity around owl nest burrows extends from approximately 50 to 100 m from the burrow (Haug and Oliphant 1990, Thomsen 1971). Owls readily explore burrows within this radius. Placing artificial burrows more than 100 m from the eviction burrow may greatly reduce the chances that evicted birds will find the new burrows.

The rates of survival and reproduction of owls evicted to artificial burrows is not known. The long-term use of artificial burrows and the ability of these burrows to maintain populations requires study. Important questions relative to this method are: (1) What burrow conditions are most attractive to owls? (2) What is the greatest distance artificial burrows can be located from eviction burrows for owls to occupy them? (3) What is the reproductive rate of owls moving to artificial burrows? (4) Do owls use artificial burrows on a long-term basis?

New Habitat Patches

Creation of new habitat patches near occupied areas may provide increased areas for birds to colonize. This method for preserving population size has not yet been used on a regular basis to protect owl groups. In northern

California, a new habitat patch in the City of Palo Alto has recently been colonized by at least three pairs of owls. The site is a newly closed landfill with a healthy ground squirrel population. This new habitat patch is approximately 1 km from other occupied owl habitat. Creating new patches to protect or increase owl populations may become an attractive approach to mitigating for impacts to owl populations.

Conditions that may attract owls to new sites and facilitate owl dispersal to those sites are not well known. Prairie dog colonies may provide a model for conditions, such as distance between patches, which could result in the successful use of new habitat areas. In natural midwestern habitats, Burrowing Owls lived in the patchy habitat created by prairie dogs. Flath and Clark (1986) studied historic prairie dog colonies in Wyoming and found that the distances between patches occupied by the rodents in two "dog towns" averaged 2.9 km and 3.4 km. Groves and Clark (1986) measured an extant colony and found patches occupied by rodents were an average of 0.92 km apart. If prairie dog colonies are used as a model for spacing owl habitat, then newly created patches should not be more than about 3 km from an occupied owl colony. Habitat requirements, patch spacing, and proper habitat management are just a few of the many issues associated with this method that require research.

Active Relocation

A third method, active relocation, requires that birds be captured and moved to new burrows outside their nesting territory, but within the local range occupied by Burrowing Owls. Typically, temporary aviaries are placed over the new artificial burrows for some time (hacking), usually several weeks, then the aviaries are removed (Trulio 1995). Many active relocations have been conducted in California, often to move birds off sites which will be disturbed or developed. Much of the information on this method is in consultant reports and is not readily available. Information collected to date from Consortium members is presented in table 1.

Table 1.—Information on active Burrowing Owl (Speotyto cunicularia hypugaea) relocations in northern California.

Original site (City)	Number moved	Distance moved	Fate of birds
Santa Clara[1]	10 birds	30 km	• 2 birds bred successfully; in year 2, male stayed, was at site, but female had disappeared • 2 bred but nest was destroyed by predator; that season, male disappeared, female flew back to original location • 2 stayed one breeding season; female flew back to original location and male disappeared • 2 disappeared within 10 days of release; 4 birds, total, ultimately disappeared • 1 killed by predator • 1 flew immediately back to original site; 3 birds, total, ultimately returned to original site
Santa Clara	4 birds	0.8 km	• 2 disappeared that season • 2 flew back to original site
Winters[2]	7 birds	24+ km	• 7 disappeared within 1 year
Oakland[3]	4 birds	0.8 km	• 2 disappeared that season • 2 flew back to original site
Oakland[3]	2 birds	0.8 km	• 2 disappeared that season

[1] H. T. Harvey and Associates (1993).
[2] T. Schulz, pers. comm.
[3] L. Feeny, pers. comm.

Although incomplete, this list gives some preliminary results on the effectiveness of the method. Of the 27 birds relocated to new burrows, 17 disappeared (63 percent) within a year of release. One of these bred at the new site, but the nest was destroyed by predators. Seven birds (26 percent) flew back to their original site. Two bred successfully on site (7 percent). Two bred unsuccessfully (7 percent). One was a victim of predation (4 percent) and one stayed on the site for two breeding seasons (4 percent). The strong site tenacity of the birds is an obvious explanation for why many owls returned to their original location. The fate of most relocated owls is unknown as the majority disappeared.

These projects did not result in the retention of the majority of relocated birds on site as successfully breeding pairs. However, there may be circumstances under which active relocation may be successful. For example, two pairs of birds from the first Santa Clara relocation did breed on site the year they were moved there. More work to determine under what conditions birds will stay and reproduce at new sites is needed. Research on what conditions constitute good habitat, especially prey base needs and predator pressure limits, is very important. Our ability to find or establish good to excellent habitat is central to the success of this method, as well as for the patch creation and reintroduction methods.

Reintroduction

Reintroduction, another important type of relocation, generally requires moving animals long distances, well beyond their territory and the local geographic region, to parts of their range which they formerly occupied. This method has not yet been used to move birds from urbanizing areas, but it could be an attractive option if it is successful.

Three large scale reintroductions have been undertaken in Manitoba (De Smet 1997), Minnesota (Martell et al. 1994), and British Columbia (Dyer 1988). De Smet (1997) reported that 169 young and 85 adults were captured in South Dakota and released into temporary aviaries and artificial burrows in Manitoba. After release from the aviaries, only one of these birds, a juvenile, was seen the next year. Martell et al. (1994) reintroduced 104 fledgling owls from South Dakota to hack sites in Minnesota, distances of 450 and 600 km away. None of these birds were seen after the summer they were released. Beginning in 1983, owl families were relocated to British Columbia from Washington state. After over a decade of work, Dyer (pers. comm.) states that the program has not successfully established a self-sustaining population and new approaches to restoring the species are being attempted.

CONCLUSION

Various methods to preserve Burrowing Owl populations are being implemented. These techniques range from protection in place to long distance reintroductions. Very little information is easily available on the value of any of these methods for preserving owls affected by human activities. The preliminary data presented here suggest that keeping birds near their chosen nest territory and allowing them to chose their own burrows may be more successful than physically relocating birds to new sites. It is critical that projects employing techniques to protect owls from human activities be adequately monitored to determine their short and long-term effectiveness. Research is required on the conditions under which different methods may result in the preservation of breeding populations.

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