

MONITORING BURROWING OWLS IN ARTIFICIAL BURROWS

by

James R. Belthoff



Photos and diagrams in this Technical Bulletin can be found in color on the website.

**Idaho Technical Bulletins can be accessed through the Idaho BLM website as follows:
www.id.blm.gov (click on Information, scroll down to and click on Technical Bulletins)**

**Further information is available from the BLM, Idaho State Office,
1387 S. Vinnell Way, Boise, ID 83709. Telephone (208) 373-4018.**

**MONITORING BURROWING OWLS IN
ARTIFICIAL BURROWS**

FINAL REPORT

James R. Belthoff
Department of Biology and
Raptor Research Center
Boise State University
Boise, Idaho 83725

A Cooperative Project between Boise State University
and the Idaho Bureau of Land Management

September 2000



Young western burrowing owls (*Athene cunicularia hypugaea*)
at the entrance to an artificial burrow

PROJECT SUMMARY

This study was designed to monitor use of artificial burrows by nesting burrowing owls (*Athene cunicularia*) in and near the Snake River Birds of Prey National Conservation Area. My students and I have monitored nesting burrowing owls near Kuna Butte since 1994 and since 1996 in the Grand View area. This report summarizes information from the 1999 and 2000 breeding seasons.

In 1999, I captured 317 burrowing owls in the two study areas, of which 14 were owls originally banded in a previous year. I was able to obtain productivity estimates for 49 nests in artificial burrows (N = 10 in Kuna Butte and N = 39 in Grand View) in 1999. Clutch sizes (minimum) were 9.3 ± 1.4 (range: 7 - 11; N = 10) and 9.1 ± 1.6 (range: 3 - 11; N = 39) in Kuna Butte and Grand View, respectively. Overall in 1999, I banded 5.7 ± 3.0 young per nest (range: 0 - 10) at the 49 nests.

In 2000, I captured 145 burrowing owls in the two study areas, of which 16 were originally banded in a previous year. I monitored 49 nests in artificial burrows (N = 9 in Kuna Butte and N = 40 in Grand View). These nests in Kuna Butte and Grand View had minimum clutch sizes that averaged 6.4 ± 3.8 (range: 1 - 11; N = 9) and 8.5 ± 1.3 (range: 5 - 11; N = 40), respectively. I banded 1.9 ± 2.1 young per nest in the 49 nests during 2000 (Kuna Butte: 3.1 ± 2.5 , N = 9; Grand View: 1.7 ± 2.0 , N = 40).

Lower numbers of young banded in 2000 reflect very poor reproduction this year, presumably because of adverse weather conditions (hot, dry) and lower than usual prey populations. For example, almost half of all nests in Grand View failed to produce fledglings in 2000, and predation by badgers was higher than in any previous year. Moreover, there is a continuing trend for fewer nests in the Kuna Butte area that reflects increased development and destruction of both natural and artificial nest burrows. Nonetheless, artificial burrows continue to provide important habitat for burrowing owls in the Lower Snake River District and Snake River Birds of Prey National Conservation Area. Clearly, it is imperative to continue to monitor the health and reproduction of the southwestern Idaho burrowing owls and to seek opportunities to improve habitat and nesting opportunities when possible.

INTRODUCTION

Burrowing owls (*Athene cunicularia*) are declining throughout much of their range (Haug et al. 1993, James and Espie 1997), and the U.S. Fish and Wildlife Service currently is conducting a status review to determine whether official listing of this species under the Endangered Species Act is warranted. However, owl numbers in southwestern Idaho, and within the Snake River Birds of Prey National Conservation Area do not appear to be declining as precipitously as in other areas, although no systematic surveys have been published. Nonetheless, the southwestern Idaho population is becoming increasingly valuable for understanding the biology of burrowing owls. Ideally, information gained from this larger than average population not only will help manage it effectively, but it will aid wildlife managers throughout the species' range to slow population declines.

One essential component of endangered species management is to understand a species' requirements for successful reproduction. In the case of western burrowing owls, which can be considered secondary cavity nesters in Idaho because they cannot dig their own burrows, this means understanding their requirements for underground burrow systems used for nesting and roosting. While information on the above-ground features of burrowing owl nest sites has been available in the literature (Rich 1986, Plumpton and Lutz 1993, Belthoff and King, in review), there is virtually no information on below-ground features of burrows important to nesting owls. Our recent studies using artificial burrows (Belthoff and Smith 1999, Smith and Belthoff, in press a) have documented that burrowing owls prefer artificial burrows with large (68-L) chambers and small-diameter (10 cm) tunnels. These types of burrows are now being deployed in many areas for research and management of burrowing owls.

My objectives in the present study were to (1) continue color-banding burrowing owls in the Snake River Birds of Prey National Conservation Area to continue long-term studies of demography and movements, and (2) monitor nesting activities by burrowing owls in artificial burrows. This report summarizes results obtained during the 1999 and 2000 breeding seasons, during which time there were 99 nests in the clusters of artificial burrows originally placed in 1997 and 1998.

METHODS

Study Areas

I studied burrowing owls in and near the Snake River Birds of Prey National Conservation Area. The first general area, in which my students and I have monitored nesting burrowing owls since 1994, was located approximately 3.2 km south of Kuna and 23 km north of the Snake River Canyon, in Ada County (Fig. 1). This area is characterized by big sagebrush (*Artemisia tridentata*) shrubland, and disturbed grasslands dominated by cheatgrass (*Bromus tectorum*) and tumble mustard (*Sisymbrium*

altissimum). Surrounding areas contain irrigated agricultural fields (primarily alfalfa, mint, and sugar beets), scattered residential homes, and several large dairy farms. The topography is flat to rolling with elevations ranging from 841 m to 896 m. Rock outcrops and a few isolated buttes (e.g., Kuna Butte, elev. 986 m) exist in the region. Mean annual temperatures range from -20°C to 45°C, and annual precipitation averages less than 20 cm (NOAA 1985). In this area there is a relatively high density of burrows excavated by American badgers (*Taxidea taxus*), which burrowing owls use for nesting and shelter throughout the breeding season and during the post-fledging dispersal process (King and Belthoff, in press).

A second area is located approximately 8 km north-northeast of Grand View, in Elmore County, Idaho and adjacent to State Highway 67 (Fig. 2). This area was a mosaic of irrigated agriculture and disturbed grasslands. Elevations range from 853 m to 922 m. The area contains very few homes, several paved and dirt roads, and an electrical substation. The Snake River is located approximately 7 km south-southwest of this study area. Mean annual low and high temperatures are -29°C and 43°C, respectively, and precipitation averages 26 cm per year (NOAA 1985). My students and I have monitored burrowing owls in this area since 1996.

Artificial Burrow Placement

Before burrowing owls arrived from wintering areas in 1997 and 1998, clusters of two and three artificial burrow systems (ABSs) were buried in or around the two study areas (Belthoff and Smith 1998, 1999). The clusters of three artificial burrows, which were used to test for chamber size preferences, encircled natural burrows that were used for nesting in previous years. Within the clusters of three, each artificial burrow consisted of a 15 cm diameter tunnel made of flexible, perforated plastic pipe and a plastic nest chamber. Each cluster had chambers of three sizes: a 30 cm x 30 cm x 20 cm (17-L; 4.5 gal) plastic container, a 19 L (5 gal) bucket with a 30 cm diameter, and a 50 cm x 35 cm x 40 cm (68 L, 18 gal) plastic tub (Fig. 3a). All entrances within a cluster were equal distance (5 m) from, and were oriented in the same direction as the historical nest burrow entrance (Fig. 3b). Tunnel entrances were 120 degrees apart, and chamber size was randomly assigned within each cluster. All ABS tunnels were 2 m long with a 90 degree turn between the entrance and the ABS chamber. Each tunnel sloped downward (20-30 degrees) towards the chamber, within the range typical of nest burrows within both study areas (Belthoff and King 1997, in review). The tunnel inserted into the chamber on a level plane. The top of each ABS chamber was at least 30 cm underground. To increase the probability of ABS use, a wooden perch was placed in the center of the cluster as in King (1996). Additionally, all historical nest burrow entrances, and any suitable burrow within a 10 m radius, were blocked with large rocks to prevent their use during this study. The rocks were removed after juveniles fledged so the burrows could be used as refuge burrows (satellites) if desired.

Clusters of two artificial burrows were placed in areas where habitat appeared similar to those areas in which burrowing owls have nested and were designed to test for preference

of tunnel diameter. One artificial burrow had a 15 cm diameter tunnel, and the other had a 10 cm diameter tunnel. Chamber size was held constant by deploying 19-L plastic buckets for both chambers (Fig. 4a). The two burrows were buried adjacent to one another, with 3 m between each entrance (Fig. 4b). In the Kuna Butte study area, tunnel entrances were oriented in a south-southeast direction, which is typical for natural burrows used as nest sites in this area (Belthoff and King 1997). Entrances in the Grand View study area were oriented in a north-northeast direction, which is typical for most natural burrows in the area (Belthoff and King 1997). A wooden perch was placed between the tunnel entrances in all clusters of two. Tunnel lengths and slopes, chamber depths, and all other methods were similar to those used for deployment of clusters of three.

Locating and Capturing Burrowing Owls

We searched suitable habitat in each study area for burrowing owls both on foot and from automobiles. Most surveys were performed during daylight hours. After locating owls, we monitored their nesting activities on a regular basis. Also, historical nest sites were revisited to search for nesting owls.

To capture owls we used Havahart® traps and noose rods as described in Belthoff et al. (1995) and King (1996). We also used one-way basket traps to capture adults as they departed artificial burrows. These traps consisted of a 0.5 m section of flexible plastic pipe (10 cm diameter), a small piece of transparent Plexiglas, and an enclosure made of "chicken wire". The Plexiglas was fastened to one end of the pipe but could hinge upwards. This end of the pipe was inserted into the wire basket. The open end of the pipe was inserted into artificial burrow tunnels when the status of a nest in an ABS needed to be checked. Digging down to the artificial chamber caused any adults in the nest chamber to enter the basket, and the hinged door closed behind it and trapped the owl.

Upon capture, we recorded each owl's mass to the nearest gram, wing length, tarsus length, tail length, and length of exposed culmen (all to nearest 0.5 mm). We classified adult owls as females if they had well-developed brood patches. We were unable to discern sex of young owls based on appearance or morphological measurements, so they were classified as unknown sex. The classification of adult males was based on lack of a brood patch, their lighter plumage, and behavior near nests. We fitted owls with a U.S. Geological Survey aluminum leg band and up to three plastic, colored leg bands (National Band and Tag Co., Newport, KY) for future identification.

Owl Monitoring

Regular follow-up visits were made to each nest to determine minimum number of eggs produced, nestling survival, and number of banding age young produced. Successful

nests had at least one young owl survive to fledging age (> 28 days). Means \pm SD are presented throughout this report.

RESULTS AND DISCUSSION

Trapping and Banding

Between 17 April - 19 July 1999, I captured 317 burrowing owls in the two study areas. These included 1 adult male, 33 adult females, 1 adult of unknown sex, and 282 nestlings and fledglings. Fourteen of 35 (40.0%) adults captured were owls originally banded in a previous year. Appendix A contains band numbers, capture dates, color band combinations, age and sex information for owls initially captured or recaptured during 1999.

From 21 April - 27 June 2000, I captured 145 burrowing owls in the two study areas. These included 6 adult males, 45 adult females, and 94 nestlings and fledglings. Sixteen of 51 (31.4%) adults captured were owls originally banded in a previous year. Lower number of young banded in 2000 reflects very poor reproduction this year, presumably because of adverse prey supplies and weather conditions (see below). Appendix B contains band numbers, capture dates, color band combinations, age and sex information for owls initially captured or recaptured during 1998.

Reuse of Sites

Tables 1 and 2 summarize use and reuse of clusters of artificial burrows in the Kuna Butte and Grand View study areas, respectively, since 1997. In Kuna Butte, burrowing owls nested in 11 of 32 (34.4%) clusters monitored in 1999 and nine of 38 (23.7%) clusters monitored in 2000. In general, the number of nesting pairs in Kuna Butte has declined since 1997 - 1998 (Table 1). This decline may be related to increasing vegetation heights (which owls avoid), increased development (including dwellings, dairies, sewage treatment ponds), and a decline in the number of artificial burrows available because of destruction by construction and various agricultural activities. In contrast, burrowing owl use of artificial burrows has remained high in Grand View. Burrowing owls nested in 39 of 55 (70.9%) and 40 of 55 (72.7%) available clusters in Grand View in 1999 and 2000, respectively (Table 2). This area has remained virtually unchanged in terms of vegetation structure and agricultural activities since artificial burrows were initially installed.

Reproductive Success of Pairs

During 1999 - 2000, productivity estimates were available for 98 nests in artificial burrows (N = 19 in Kuna Butte and N = 79 in Grand View; one nest, John Hayes #2, in

Kuna Butte had a nest in 1999 but was not monitored sufficiently to record productivity). Following are annual productivity summaries for these nests.

1999 - I was able to obtain productivity estimates for 49 nests (N = 10 in Kuna Butte and N = 39 in Grand View) in 1999. Clutch sizes (minimum) were 9.3 ± 1.4 (range: 7 - 11; N = 10) and 9.1 ± 1.6 (range: 3 - 11; N = 39) in Kuna Butte and Grand View, respectively (Tables 3 and 4, Fig. 5). Some of these eggs (1 egg per nest at all but one nest where 3 were collected) were removed for an egg physiology study in collaboration with Dr. Del Kilgore at the University of Montana (Table 3). Number of young banded at artificial burrows in Kuna Butte and Grand View, which represent the estimated minimum productivity, were 5.4 ± 3.6 and 5.8 ± 2.9 , respectively (Tables 3 and 4, Figs. 6 and 7). Overall for 1999, I banded 5.7 ± 3.0 young per nest (range: 0 - 10) at the 49 nests.

2000 - I monitored 49 burrowing owl nests in artificial burrows (N = 9 in Kuna and N = 40 in Grand View) in 2000. Minimum clutch sizes averaged 6.4 ± 3.8 (range: 1 - 11; N = 9) in Kuna Butte (Table 3), although three nests were not monitored until young were present, so actual clutch sizes were probably much higher than these minimums. Clutch sizes in Grand View were 8.5 ± 1.3 (range: 5 - 11; N = 40; Table 4). Overall, I banded 1.9 ± 2.1 young per nest in the 49 nests during 2000 (Kuna Butte: 3.1 ± 2.5 , N = 9; Grand View: 1.7 ± 2.0 , N = 40; Tables 3 and 4).

As evident above, productivity was much lower in 2000 than in 1999. For example, 19 of 40 nests (47.5%) in Grand View failed to produce any young. American badgers depredated many of these nests, and others were abandoned for unknown reasons, although I presume the chicks starved and parents abandoned nesting attempts. Weather conditions were hot and very dry during 2000 following the time period when chicks initially hatched, and these conditions seemed to be combined with a reduction in the availability of mammalian prey. The latter point is supported by the facts that badgers were more on the move (presumably in search of prey) than in any previous year and that most prey remains in and near nests consisted of invertebrates (scorpions, beetles) or birds rather than voles at the time when chicks were hatching and growing.

SUMMARY AND CONCLUSIONS

Our ongoing, multiple-year studies of burrowing owls have yielded important information about the population dynamics, productivity, return rates, post-fledging and between-year movements of burrowing owls in southwestern Idaho (Belthoff et al. 1995, Belthoff and King 1997, Belthoff and Smith 1998, 1999, King and Belthoff, in press, Smith and Belthoff, in press b). In 1997, my students and I also initiated a field experiment to examine nest-site selection in burrowing owls using artificial burrow systems. These studies found that owls prefer artificial burrows with large chambers and small tunnels (Smith and Belthoff, in press a), and these results should and are changing

the way artificial burrow systems are deployed in owl management and mitigation activities. During 1999 and 2000 I continued to monitor burrowing owls breeding in the artificial burrows in Kuna Butte and Grand View. There were 99 nests in artificial burrows during these two years, of which 74 (74.7%) successfully produced young. Productivity was high during 1999 but plummeted in 2000 when almost half of the nests in Grand View produced no banding-age young, presumably because of weather extremes and low prey availability. Nonetheless, artificial burrows continue to provide important habitat for burrowing owls in the Lower Snake River District and Snake River Birds of Prey National Conservation Area (Fig. 8). Moreover, the southwestern Idaho population of burrowing owls continues to be a stronghold for this species, although recent declines in Kuna Butte are concerning and could signal future more widespread declines. Clearly, it is important to continue to monitor the health and reproduction of the southwestern Idaho burrowing owls and to seek opportunities to improve habitat and nesting opportunities when possible.

ACKNOWLEDGMENTS

I thank D. Arnold, T. Booms, D. Centili, M. Lynch, D. Kilgore, B. Smith, A. Staley, and Z. Wilcox for assistance with field work and B. Smith for helpful comments on this report. Financial and logistical support for this study was provided through a Challenge Cost Share grant from the Bureau of Land Management to J. Belthoff and by the Department of Biology and Raptor Research Center at Boise State University. J. Clark, J. Doremus, and J. Sullivan facilitated our work in the Boise District and Snake River Birds of Prey National Conservation Area.

LITERATURE CITED

- Belthoff, J.R., R.A. King, J. Doremus, and T. Smith. 1995. Monitoring post-fledging burrowing owls in southwestern Idaho. U.S. Bureau of Land Management, Idaho State Office, Tech. Bull. No. 95-8.
- _____, and _____. 1997. Between-year movements and nest burrow use by burrowing owls in southwestern Idaho. 1996 Annual Report. U.S. Bureau of Land Management, Idaho State Office, Tech. Bull. No. 97-3.
- _____, and _____. Nest-site characteristics of burrowing owls in the Snake River Birds of Prey National Conservation Area, Idaho. Western North American Naturalist: in review.
- _____, and B.W. Smith. 1998. Monitoring between-year movements and assessment of artificial burrow features useful in conservation and management of burrowing owls. 1997 Annual Report. U.S. Bureau of Land Management, Idaho State Office, Unpublished Technical Report.
- _____, and _____. 1999. Monitoring burrowing owls and assessment of artificial burrow features useful in conservation and management. Final Report. U.S. Bureau of Land Management, Idaho State Office, Unpublished Technical Report.
- Haug, E.A., B.A. Millsap, and M.S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*). In: The Birds of North America, No.61 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences: Washington, D.C.: The American Ornithologists' Union.
- James, P.C., and R.H.M. Espie. 1997. Current status of the burrowing owl in North America: an agency survey. In: J.L. Lincer and K. Steenhof, eds. Proceedings of the first international burrowing owl symposium. J. Raptor Res. Report 9:3-5.
- King, R.A. 1996. Post-fledging dispersal and behavioral ecology of burrowing owls in southwestern Idaho. Unpubl. M.S. Thesis, Boise State University, Idaho.
- King, R.A., and J.R. Belthoff. Post-fledging dispersal of burrowing owls in southwestern Idaho: characterization of movements and use of satellite burrows. Condor: in press.
- NOAA (National Oceanic and Atmospheric Administration). 1985. Climates of the States: 1951-1980. Vol. 1. 3rd ed. 758pp.
- Plumpton, D.L., and R.S. Lutz. 1993. Nesting habitat use by burrowing owls in Colorado. J. Raptor Res. 27:175-179.

Rich, T. 1986. Habitat and nest-site selection by burrowing owls in the sagebrush steppe of Idaho. *J. Wildl. Manage.* 50:548-555.

Smith, B.W., and J.R. Belthoff. Effects of chamber size and tunnel diameter on nest-site selection in burrowing owls: results of experiments using artificial burrows. *Journal of Wildlife Management*: in press a.

_____, and _____. Burrowing owls and development: results of short-distance nest relocations to avoid construction impacts. *Proceedings of the Second International Burrowing Owl Symposium*: in press b.

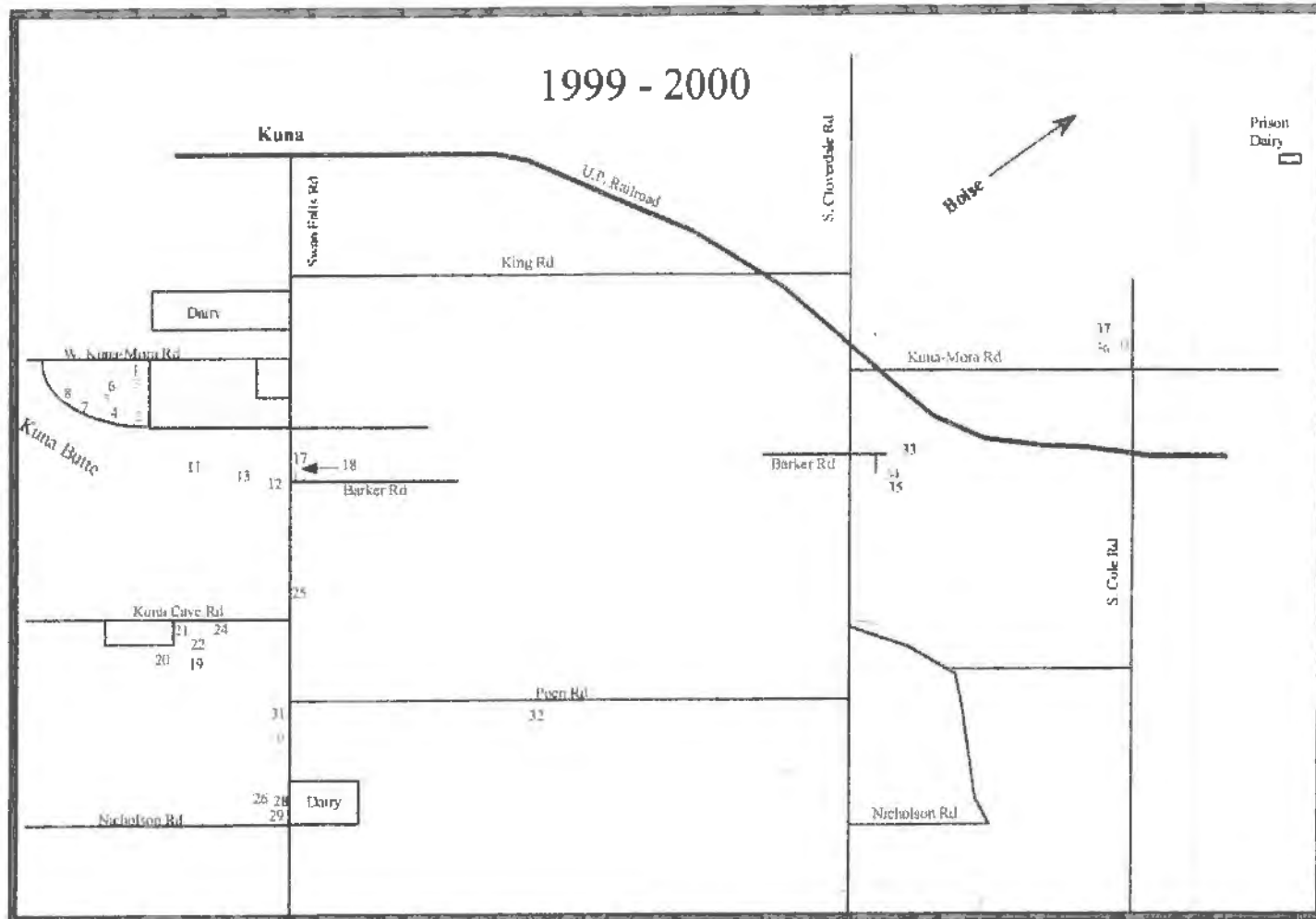


Figure 1. Schematic of Kuna Butte study area (1999 - 2000) located approximately 3.2 km south of Kuna, Ada County, Idaho. See page 11 for explanation of sites. Scale: 1 in. = approx. 0.8 mi.

Legend for Fig. 1. Numbers on map correspond to artificial burrow clusters in the Kuna Butte study area. Black numbers indicate that site was unoccupied, and red numbers indicate that owls attempted nesting at the site in either or both 1999 and 2000.

- | | |
|-----------------------------|----------------------------|
| 1 Junkyard #1 | 21 Kuna Cave Satellite #1 |
| 2 Kuna Butte #1b | 22 Kuna Cave Satellite #2 |
| 3 Kuna Butte #3 | 23 Kuna Cave Ag #1 |
| 4 Kuna Butte #5 | 24 Kuna Cave Ag #2 |
| 5 Kuna Butte #6 | 25 Swan Falls #1 |
| 6 Kuna Butte #7 | 26 Swan Falls #3 |
| 7 Kuna Butte Gravel #1 | 27 Swan Falls #4 |
| 8 Kuna Butte Gravel #2 | 28 Swan Falls Satellite #5 |
| 9 Kuna Butte Ag #1 | 29 Swan Falls #6 |
| 10 Kuna Butte Ag #2 | 30 Swan Falls #7 |
| 11 Kuna Butte Ag #3 | 31 Swan Falls Ag #1 |
| 12 Honeybee #1 | 32 Swan Falls Ag #2 |
| 13 Honeybee #2 | 33 Poen #1 |
| 14 Effluent Field North #2A | 34 J. Hayes #1 |
| 15 Effluent Field North #3A | 35 J. Hayes #2 |
| 16 Effluent Field South #1A | 36 J. Hayes #3 |
| 17 Effluent Field South #2A | 37 B. Stewart #1 |
| 18 Effluent Field South #3A | 38 B. Stewart #2 |
| 19 Kuna Cave #2 | 39 B. Stewart #3 |
| 20 Kuna Cave #3 | |

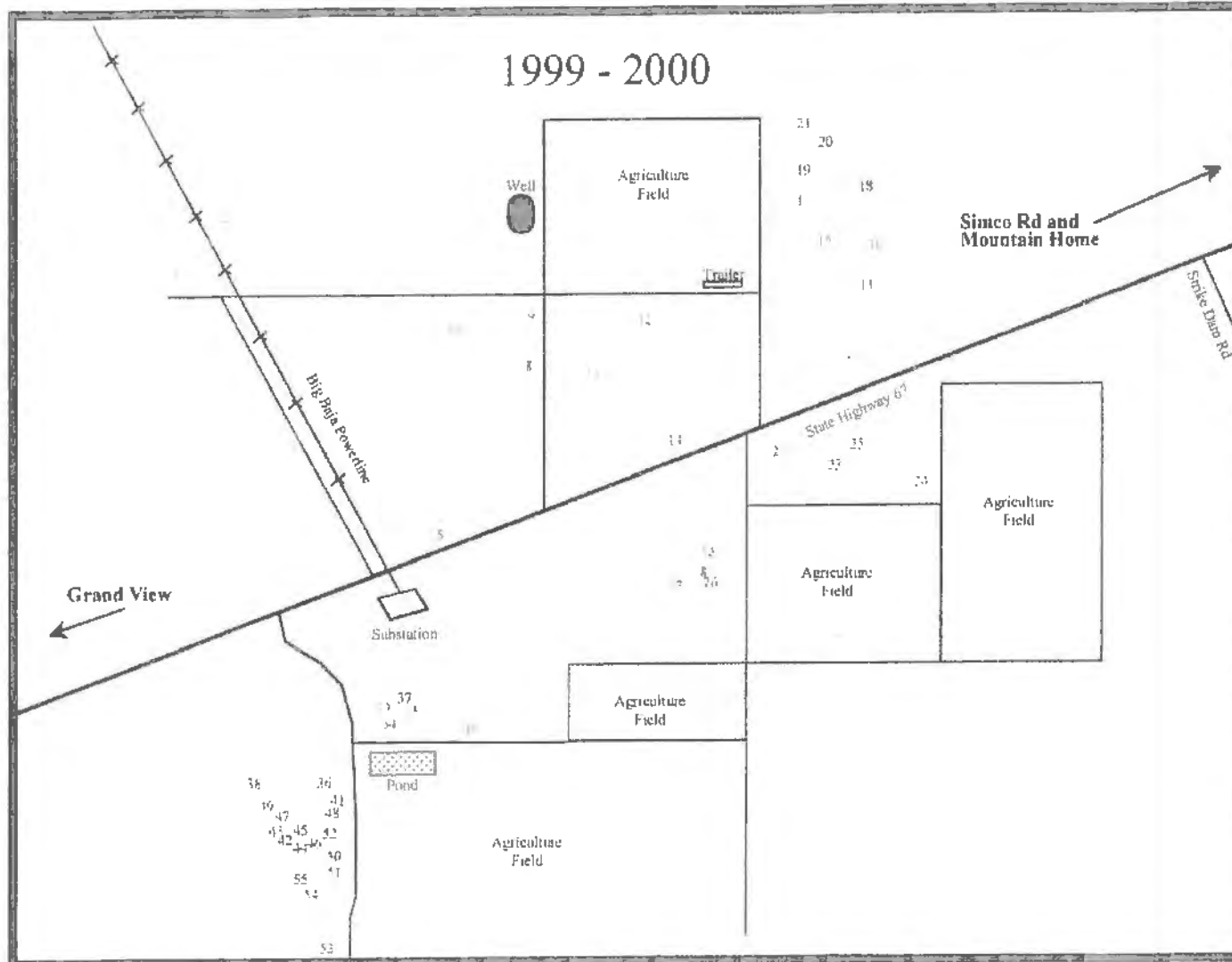


Figure 2. Schematic of Grand View study area (1999 - 2000) located approximately 8 km north-northeast of Grand View, Elmore County, Idaho. See page 13 for explanation of sites. Scale: 1 in. = approx. 0.25 mi.

Legend for Fig. 2. Numbers on map correspond to artificial burrow clusters within the Grand View study area (1999 - 2000). Black numbers indicate that site was unoccupied in both years, while red numbers indicate that a nesting attempt was made at that site in either or both 1999 and 2000.

- | | |
|--------------------|----------------------------|
| 1 Baha #1 | 30 Grand View #19 |
| 2 Baha #2 | 31 Substation East #1 |
| 3 Baha #3 | 32 Substation East #2 |
| 4 Baha #4 | 33 Highway #1 |
| 5 Baha #5 | 34 Highway #2 |
| 6 Baha #6 | 35 Substation Southeast #1 |
| 7 Baha #7 | 36 Substation South #1 |
| 8 Well #1 | 37 Substation South #2 |
| 9 Well #2 | 38 Substation South #4 |
| 10 Well #3 | 39 Substation South #5 |
| 11 Trailer #1 | 40 Substation South #6 |
| 12 Trailer #2 | 41 Substation South #7 |
| 13 Trailer #4 | 42 Baha Pole #19 |
| 14 Trailer #5 | 43 97-1 |
| 15 Trailer #6 | 44 Dirtmound #1 (97-2) |
| 16 Trailer #7 | 45 Dirtmound #2 |
| 17 Backyard #1 | 46 Dirtmound #3 (97-3) |
| 18 Backyard #2 | 47 Dirtmound #4 |
| 19 Backyard #3 | 48 Dirtmound #5 |
| 20 Backyard #4 | 49 Coyote Den #1 |
| 21 Backyard #5 | 50 Powerline #1 |
| 22 Backyard #6 | 51 Powerline #2 |
| 23 Backyard #7 | 52 Powerline #3 |
| 24 Trailer View #1 | 53 Powerline #4 |
| 25 Trailer View #2 | 54 Powerline #5 |
| 26 Trailer View #3 | 55 398-1 |
| 27 Trailer View #4 | 56 398-2 |
| 28 Grand View #2 | 57 398-3 |
| 29 Grand View #3 | |

a)



b)

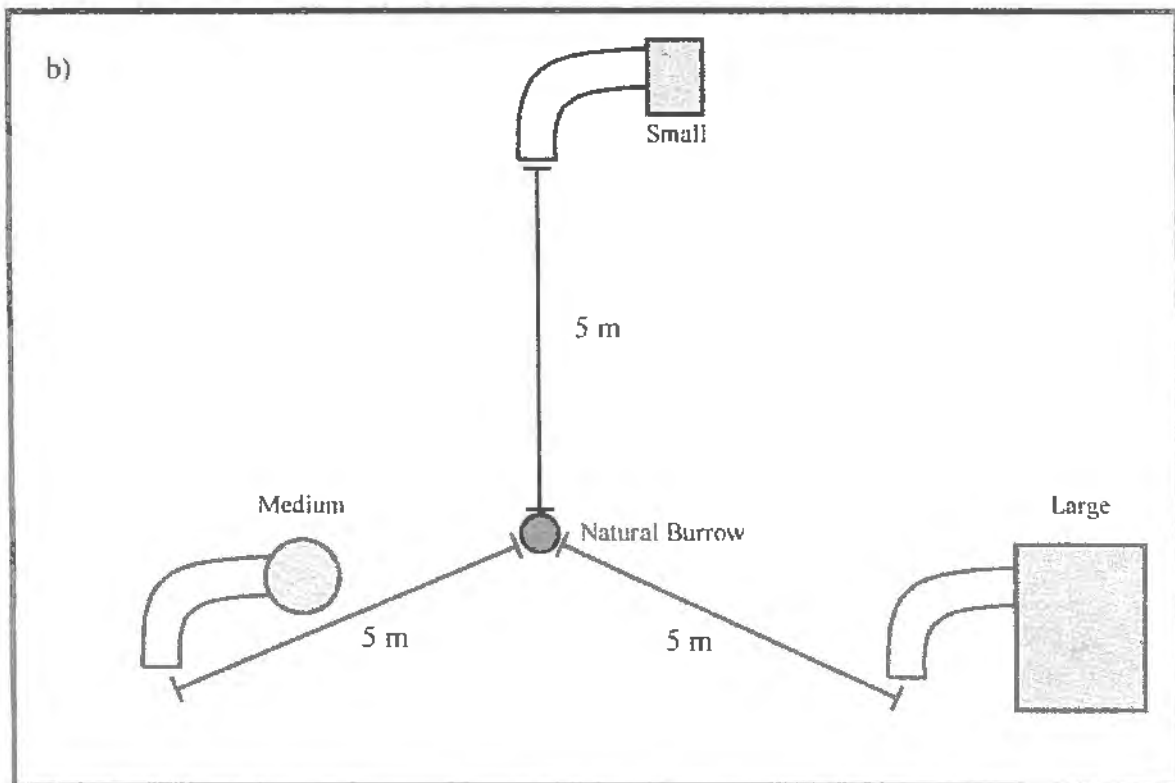


Figure 3. (a) Chamber materials for the chamber choice experiment. From left to right are the small, large, and medium chambers. (b) Configuration of chambers around natural burrows for the chamber choice experiment (see text for explanation).

a)

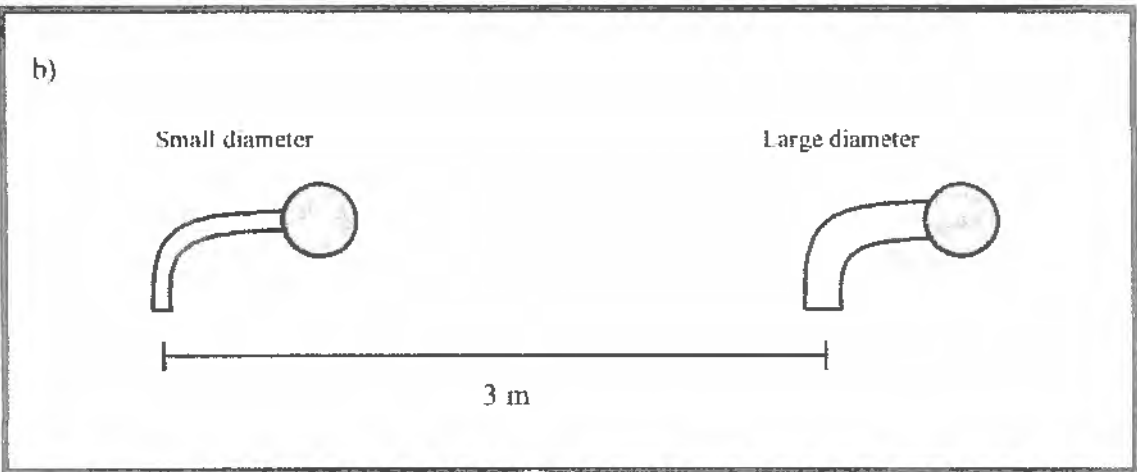


Figure 4. (a) Tunnel and chamber materials for the tunnel diameter choice experiment. From left to right is the large tunnel, 5 gal. chamber, and small tunnel. (b) Configuration of chambers for the tunnel diameter choice experiment (see text for explanation).



Figure 5. Burrowing owl eggs in medium (left) and large (right) chambers of artificial burrows.



Figure 6. Young burrowing owls produced in artificial burrows in the Snake River Birds of Prey National Conservation Area, Idaho. Owls were banded with colored leg bands for future identification.



Figure 7 Banding adult (left) and young (right) burrowing owls with numbered colored leg bands (white and yellow).



Figure 8. Adult burrowing owl using wooden perch placed near nest in artificial burrow. Each year in the Snake River Birds of Prey National Conservation Area, many pairs of burrowing owls use artificial burrows for nesting, and artificial burrows continue to be an important tool in habitat management activities for burrowing owls.

Table 1. Pattern of artificial nest burrow (re-) use in the Kuna Butte study area (1997 - 2000).
X = artificial burrow used for nesting; O = artificial burrow not used for nesting, confirmed; - = burrow likely not used, confirmation lacking; NM = burrow not monitored for use during study; D = burrow destroyed; NE = artificial burrow cluster did not exist.

Nest Name	Cluster Size ^a	1997	1998	1999	2000
Sewage Pond #1	3	X	D	D	D
Sewage Pond #2	3	X	D	D	D
Kuna Butte #1b	3	X	O	-	X
Andy #1 (Kuna Butte #3)	2	X	X	X	X
Kuna Butte #5	3	O	O	O	O
Andy #2 (Kuna Butte #6)	2	NE	X	X	O
Kuna Butte #7	3	O	O	O	O
Kuna Butte Gravel #1	2	X	O	O	O
Kuna Butte Gravel #2	2	O	O	O	O
Junkyard #1	2	NE	O	O	O
Effluent Field North #1	3	X	X	D	D
Effluent Field North #2	2	X	X	D	D
Effluent Field North #3	3	NE	X	D	D
Effluent Field South #1	3	X	X	D	D
Effluent Field South #2	2	X	X	D	D
Effluent Field South #3	2	NE	X	D	D
Effluent Field North 2A	2	NE	NE	X	O
Effluent Field North 3A	2	NE	NE	X	O
Effluent Field South 1A	2	NE	NE	X	X
Effluent Field South 2A	2	NE	NE	-	O
Effluent Field South 3A	2	NE	NE	-	O
Honeybee #1	2	NE	O	O	O
Honeybee #2	2	NE	O	O	O
Kuna Cave #2	3	O	O	O	O
Kuna Cave #3	3	O	O	O	O
Kuna Cave Satellite #1	2	X	X	X	X
Kuna Cave Satellite #2	2	O	O	O	O
Kuna Cave Ag #1	2	NE	O	O	X
Kuna Cave Ag #2	2	NE	X	O	O
Kuna Butte Ag #1	2	X	X	X	O
Kuna Butte Ag #2	2	NE	X	X	O
Kuna Butte Ag #3	2	NE	O	O	O
Swan Falls Ag #1	2	NE	X	-	-
Swan Falls Ag #2	2	NE	X	X	X

Table 1. Continued.

Nest Name	Cluster Size ^a	1997	1998	1999	2000
Swan Falls #3	3	O	O	-	-
Swan Falls #4	3	X	X	-	-
Swan Falls Satellite #5	2	O	X	X	X
Swan Falls #6	3	NE	X	-	-
Swan Falls #7	3	NE	X	-	-
John Hayes #1	3	O	X	NM	-
John Hayes #2	3	O	X	X	O
John Hayes #3	3	O	O	NM	O
B. Stewart #1	3	X	X	NM	X
B. Stewart #2	3	X	X	NM	O
B. Stewart #3	3	NE	X	NM	X
Poen #1	3	NE	O	NM	-
Prison #1	3	O	D	D	D
Prison #2	2	X	D	D	D
Prison #3	2	O	D	D	D

^aclusters of three placed around natural burrows used for nesting in previous year; clusters of two placed in nearby suitable habitat.

Table 2. Pattern of artificial nest burrow (re-) use in the Grand View study area (1997 - 2000). X = artificial burrow used for nesting; O = artificial burrow not used for nesting, confirmed; - = burrow likely not used, confirmation lacking; NM = burrow not monitored for use during study; D = burrow destroyed; NE = artificial burrow cluster did not exist.

Nest Name	Cluster Size ^a	1997	1998	1999	2000
Trailer #1	3	X	X	X	X
Trailer #2	3	X	X	X	X
Trailer #4	3	X	X	X	X
Trailer #5	3	NE	X	X	X
Well #1	3	O	X	X	X
Well #2	3	X	O	X	X
Well #3	2	X	X	X	X
Baja #1	3	X	X	X	X
Baja #2	2	X	X	X	X
Baja #3	2	X	X	X	X
Baja #4	2	O	X	X	X
Baja #5	3	NE	O	O	O
Baja #6	2	NE	X	X	X
Baja #7	2	NE	O	X	X
Substation East #1	3	X	X	O	X
Substation East #2	3	NE	O	X	X
Trailer View #1	3	X	X	X	X
Trailer View #2	2	O	O	X	O
Trailer View #3	2	O	O	O	X
Trailer View #4	3	X	O	O	X
Grand View #2	3	O	X	O	X
Grand View #3	3	O	O	X	X
Grand View #19	3	X	X	X	O
Highway #1	2	NE	X	X	X
Highway #2	2	NE	O	X	O
Substation South #1	3	X	O	X	X
Substation South #2	3	X	X	X	X
Substation South #4	3	O	X	X	X
Substation South #5	3	X	X	O	O
Substation South #6	3	X	X	X	O
Substation South #7	3	O	X	X	X
Substation Southeast 1	2	O	X	X	X
Baja Pole #19	2	X	X	X	X
Powerline #1	2	O	X	X	X
Powerline #2	2	X	X	X	X
Powerline #3	2	X	X	O	X

Table 2. Continued.

Nest Name	Cluster Size ^a	1997	1998	1999	2000
Powerline #4	2	O	X	X	X
Powerline #5	2	X	X	X	X
97-1	3	NE	O	X	O
Coyote Den #1	2	NE	X	X	O
Dirtmound #1	3	NE	O	O	O
Dirtmound #2	2	NE	X	X	X
Dirtmound #3	2	NE	O	X	O
Dirtmound #4	2	NE	X	O	O
Dirtmound #5	2	NE	O	O	X
398-1	3	NE	X	X	X
398-2	3	NE	X	O	X
398-3	3	NE	O	O	O
Backyard #1	2	O	X	X	X
Backyard #2	3	NE	O	X	X
Backyard #3	2	NE	X	O	X
Backyard #4	2	NE	O	O	O
Backyard #5	2	NE	X	O	O
Backyard #6	2	NE	X	O	O
Backyard #7	2	NE	O	X	X

^aclusters of three placed around natural burrows used for nesting in previous year; clusters of two placed in nearby suitable habitat.

Table 3. Number of eggs and number of banding-age young (14 – 28 d) at clusters of two and three during 1999 and 2000 in the Kuna Butte study area (1999 - 2000). Clusters not used by burrowing owls in both 1999 and 2000 have been omitted. A dash (-) indicates no nest in a particular year.

Nest Name	Cluster Size ^a	1999		2000	
		Eggs	Young	Eggs	Young
Kuna Butte #1b	3	-	-	≥ 1	1
Andy #1 (Kuna Butte #3)	2	≥ 8	8	7	5
Andy #2 (Kuna Butte #6)	2	≥ 9	0	-	-
Effluent Field North 2A	2	10 ^b	6	-	-
Effluent Field North 3A	2	≥ 11	4	-	-
Effluent Field South 1A	2	9	6	8	4
Kuna Cave Satellite #1	2	≥ 11	8	9	1
Kuna Cave Ag #1	2	-	-	8	7
Kuna Butte Ag #1	2	≥ 7 ^c	3	-	-
Kuna Butte Ag #2	2	11 ^b	10	-	-
Swan Falls Ag #2	2	≥ 9	9	10	6
Swan Falls Satellite #5	2	≥ 8	0	11	0
John Hayes #2	3	? ^d	? ^d	-	-
B. Stewart #1	3	NM	NM	≥ 1	1
B. Stewart #3	3	NM	NM	≥ 3	3

^aclusters of three placed around natural burrows used for nesting in previous year; clusters of two placed in nearby suitable habitat.

^bincludes one egg collected for egg physiology study in collaboration with Dr. Del Kilgore, University of Montana.

^cthree eggs collected from seemingly abandoned nest where rocks piled over entrance. Pair continued to lay and incubate in adjacent chamber.

^dnesting confirmed by landowner, unknown number of eggs or banding age young.

Table 4. Number of eggs and number of banding-age young (14 – 28 d) at clusters of two and three during 1999 and 2000 in the Grand View study area (1999 - 2000). Clusters not used by burrowing owls in both 1999 and 2000 have been omitted. A dash (-) indicates no nest in a particular year .

Nest Name	Cluster Size ^a	1999		2000	
		Eggs	Young	Eggs	Young
Trailer #1	3	10 ^b	9	9	3
Trailer #2	3	11	5	10	6
Trailer #4	3	≥ 7	2	6	6
Trailer #5	3	≥ 9	6	9	0
Well #1	3	9 ^b	6	9	0
Well #2	3	11 ^b	10	9	0
Well #3	2	≥ 10 ^b	9	9	3
Baja #1	3	≥ 10	10	9	3
Baja #2	2	9 ^b	7	10	0
Baja #3	2	11 ^b	5	9	2
Baja #4	2	11 ^b	7	9	0
Baja #6	2	10	4	10	0
Baja #7	2	11 ^b	8	9	6
Substation East #1	3	-	-	8	0
Substation East #2	3	≥ 8	6	7	2
Trailer View #1	3	10	9	10	2
Trailer View #2	2	≥ 9	9	-	-
Trailer View #3	2	-	-	5	0
Trailer View #4	3	-	-	7	6
Grand View #2	3	-	-	9	2
Grand View #3	3	10	6	8	0
Grand View #19	3	≥ 3	3	-	-
Highway #1	2	≥ 8	8	8	2
Highway #2	2	8	6	-	-
Substation South #1	3	≥ 10	8	7	3
Substation South #2	3	11 ^b	6	5	3
Substation South #4	3	9 ^b	6	10	0
Substation South #6	3	9 ^b	0	-	-
Substation South #7	3	5	0	9	0
Substation Southeast 1	2	8	8	8	3
Baja Pole #19	2	≥ 9	8	10	0
Powerline #1	2	9 ^b	6	9	0
Powerline #2	2	9	0	9	0
Powerline #3	2	-	-	9	2

Table 4. Continued.

Nest Name	Cluster Size ^a	1999		2000	
		Eggs	Young	Eggs	Young
Powerline #4	2	8	8	8	0
Powerline #5	2	≥ 9	2	9	0
97-1	3	≥ 11	1	-	-
Coyote Den #1	2	9	1	-	-
Dirtmound #2	2	7 ^b	3	8	1
Dirtmound #3	2	8 ^b	6	-	-
Dirtmound #5	2	-	-	9	2
398-1	3	10 ^b	9	11	0
398-2	3	-	-	8	0
Backyard #1	2	9	5	6	3
Backyard #2	3	9	6	8	5
Backyard #3	2	-	-	9	1
Backyard #7	2	10	9	8	0

^aclusters of three placed around natural burrows used for nesting in previous year; clusters of two placed in nearby suitable habitat.

^bincludes one egg collected for egg physiology study in collaboration with Dr. Del Kilgore, University of Montana.

APPENDIX A
1999 Banding Data

Band numbers, date of marking or recapture, age, sex, color-marking on left and right legs, and location for burrowing owls banded near Kuna, Ada County and near Grand View, Elmore County, Idaho during 1999.

NOTE:

Age:

AHY = after hatching year, adult bird

L = local (a young bird incapable of sustained flight, nestling)

Sex:

M = male

F = female (sexed based on behavior and presence of brood patch)

U = unknown

Color/Aluminum band:

AL = aluminum

R = red

B = blue

G = green

Y = yellow

W = white

P = pink

Note: Birds banded as 804-10001 thru 804-10232 received two (one yellow, one white) rather than three color bands. Each color band also contained numerals corresponding to the last three digits of the aluminum band.

Band Number	Date	Age	Sex	Left		Right		Area
				Top	Bottom	Top	Bottom	
1204-59458*	17-Apr	AHY	F	P	B	AL	Y	Grand View
1204-43415	17-Apr	AHY	F	P	AL	W	B	Grand View
1204-43416	17-Apr	AHY	F	P	AL	W	W	Grand View
1204-43417	09-May	AHY	F	P	AL	W	P	Kuna
1204-43418	09-May	AHY	F	P	AL	P	R	Kuna
1204-43419	09-May	AHY	F	AL	R	R	B	Kuna
614-52147*	13-May	AHY	F	G	AL	G	Y	Grand View
1204-57105*	13-May	AHY	F	AL	Y	R	P	Grand View
1204-43420	13-May	AHY	F	AL	G	R	G	Grand View
1204-43421	13-May	AHY	F	AL	R	G	R	Grand View
1204-59456*	14-May	AHY	F	AL	Y	W	P	Grand View
1204-43422	14-May	AHY	F	AL	R	G	G	Grand View
1204-43423	14-May	AHY	F	AL	R	G	B	Grand View

1204-43424	14-May	AHY	F	AL	R	G	W	Grand View
1204-43425	14-May	L	U	AL	R	Y	P	Grand View
1204-43426	14-May	L	U	AL	R	W	B	Grand View
1204-43427	14-May	L	U	AL	R	W	Y	Grand View
1204-43428	14-May	L	U	AL	R	W	W	Grand View
1204-43429	14-May	L	U	AL	R	W	P	Grand View
1204-43430	14-May	L	U	AL	R	R	B	Grand View
1204-43431	14-May	L	U	AL	R	P	G	Grand View
1204-43432	16-May	AHY	F	AL	B	R	Y	Grand View
1204-43433	16-May	L	U	AL	B	R	W	Grand View
1204-43434	16-May	L	U	G	AL	Y	W	Grand View
1204-43435	16-May	L	U	G	AL	Y	P	Grand View
1204-43436	16-May	L	U	G	AL	W	R	Grand View
1204-43437	16-May	L	U	G	AL	W	G	Grand View
1204-43438	16-May	L	U	G	AL	W	W	Grand View
1204-43439	16-May	L	U	G	AL	P	R	Grand View
1204-43440	16-May	L	U	Y	AL	B	Y	Grand View
1204-43441	16-May	L	U	Y	AL	B	W	Grand View
1204-59442*	16-May	AHY	F	G	G	AL	Y	Grand View
614-52222*	16-May	AHY	F	R	Y	AL	R	Grand View
1204-43800*	16-May	AHY	F	Y	B	P	AL	Grand View
1204-59440*	16-May	AHY	F	G	B	AL	Y	Grand View
1204-43442	17-May	AHY	F	Y	AL	Y	Y	Grand View
1204-43443	17-May	AHY	F	Y	AL	Y	P	Grand View
1204-43444	17-May	L	U	Y	AL	W	R	Grand View
1204-43445	17-May	L	U	Y	AL	W	G	Grand View
1204-43446	17-May	L	U	Y	AL	P	R	Grand View
1204-43447	17-May	L	U	Y	AL	P	G	Grand View
1204-43448	17-May	L	U	W	AL	R	R	Grand View
1204-43449	19-May	AHY	F	W	AL	B	Y	Grand View
1204-43450	17-May	L	U	W	AL	B	W	Grand View
1204-43452	17-May	AHY	F	W	AL	B	W	Grand View
1204-43453	19-May	AHY	F	W	AL	B	P	Grand View
1204-43454	19-May	L	U	W	AL	R	R	Grand View
1204-43455	19-May	L	U	W	AL	G	B	Grand View
1204-43456	19-May	L	U	W	AL	G	G	Grand View
1204-43457	19-May	AHY	F	AL	P	G	Y	Grand View
614-89693*	20-May	AHY	F	G	AL	R	W	Grand View
1204-43458	20-May	AHY	F	G	W	AL	P	Grand View
1204-59478*	21-May	AHY	F	AL	W	G	Y	Grand View
1204-43459	21-May	L	U	AL	R	R	R	Grand View
1204-43460	21-May	L	U	R	B	AL	R	Grand View

1204-43461	21-May	L	U	R	W	AL	R	Grand View
1204-43462	21-May	L	U	G	B	AL	R	Grand View
1204-43463	21-May	L	U	G	G	AL	R	Grand View
1204-43464	21-May	L	U	G	Y	AL	R	Grand View
1204-43465	21-May	L	U	Y	B	AL	R	Grand View
1204-43466	21-May	L	U	Y	Y	AL	R	Grand View
1204-43467	21-May	L	U	AL	R	W	R	Grand View
1204-43468	21-May	L	U	AL	R	W	Y	Grand View
1204-43469	21-May	L	U	AL	R	P	R	Grand View
1204-43470	21-May	L	U	P	B	AL	R	Grand View
1204-43471	21-May	L	U	B	G	AL	B	Grand View
1204-43472	21-May	L	U	B	Y	AL	B	Grand View
1204-43473	21-May	L	U	B	P	AL	B	Grand View
1204-43474	21-May	L	U	G	B	AL	B	Grand View
1204-43475	21-May	L	U	G	G	AL	B	Grand View
1204-43476	21-May	L	U	G	Y	AL	B	Grand View
614-52279*	24-May	AHY	F	W	R	AL	B	Kuna
1204-43477	24-May	L	U	Y	B	AL	B	Kuna
1204-43478	24-May	L	U	Y	G	AL	B	Kuna
1204-43479	24-May	L	U	W	P	AL	B	Kuna
1204-43480	24-May	L	U	P	G	AL	B	Kuna
1204-43481	24-May	L	U	P	B	AL	B	Kuna
1204-43482	24-May	L	U	B	R	AL	G	Kuna
1204-43483	24-May	L	U	B	Y	AL	G	Kuna
1204-43484	24-May	L	U	G	R	AL	G	Kuna
1204-43485	26-May	L	U	G	B	AL	G	Kuna
1204-43486	26-May	L	U	P	P	AL	G	Kuna
1204-43487	26-May	L	U	Y	Y	AL	P	Kuna
804-10001	26-May	L	U	Y	AL		W	Kuna
804-10002	26-May	L	U	Y	AL		W	Kuna
804-10003	26-May	L	U	Y	AL		W	Kuna
804-10004	26-May	L	U	Y	AL		W	Kuna
804-10005	26-May	L	U	Y	AL		W	Kuna
804-10006	26-May	L	U	Y	AL		W	Grand View
804-10007	26-May	L	U	Y	AL		W	Grand View
804-10008	26-May	L	U	Y	AL		W	Grand View
804-10008	26-May	L	U	Y	AL		W	Grand View
804-10010	26-May	L	U	Y	AL		W	Grand View
804-10011	26-May	L	U	Y	AL		W	Grand View
804-10012	26-May	L	U	Y	AL		W	Grand View
804-10013	26-May	L	U	Y	AL		W	Grand View
804-10014	26-May	L	U	Y	AL		W	Grand View

804-10015	26-May	L	U	Y	AL	W	Grand View
804-10016	26-May	L	U	Y	AL	W	Grand View
804-10017	26-May	L	U	Y	AL	W	Grand View
804-10018	26-May	L	U	Y	AL	W	Grand View
804-10019	26-May	L	U	Y	AL	W	Grand View
804-10020	26-May	L	U	Y	AL	W	Grand View
804-10021	27-May	AHY	F	Y	AL	W	Grand View
804-10022	27-May	L	U	Y	AL	W	Grand View
804-10023	27-May	L	U	Y	AL	W	Grand View
804-10024	27-May	L	U	Y	AL	W	Grand View
804-10025	27-May	L	U	Y	AL	W	Grand View
804-10026	27-May	L	U	Y	AL	W	Grand View
804-10027	27-May	L	U	Y	AL	W	Grand View
804-10028	27-May	L	U	Y	AL	W	Grand View
804-10029	27-May	L	U	Y	AL	W	Grand View
804-10030	27-May	L	U	Y	AL	W	Grand View
804-10031	27-May	L	U	Y	AL	W	Grand View
804-10032	27-May	L	U	Y	AL	W	Grand View
804-10033	27-May	L	U	Y	AL	W	Grand View
804-10034	27-May	L	U	Y	AL	W	Grand View
804-10035	27-May	L	U	Y	AL	W	Grand View
804-10036	27-May	L	U	Y	AL	W	Grand View
804-10037	27-May	L	U	Y	AL	W	Grand View
804-10038	01-Jun	L	U	Y	AL	W	Grand View
804-10039	01-Jun	L	U	Y	AL	W	Grand View
804-10040	01-Jun	L	U	Y	AL	W	Grand View
804-10041	01-Jun	L	U	Y	AL	W	Grand View
804-10042	01-Jun	L	U	Y	AL	W	Grand View
804-10043	01-Jun	L	U	Y	AL	W	Grand View
804-10044	01-Jun	AHY	M	Y	AL	W	Grand View
804-10045	01-Jun	L	U	Y	AL	W	Grand View
804-10046	01-Jun	L	U	Y	AL	W	Grand View
804-10047	01-Jun	L	U	Y	AL	W	Grand View
804-10048	01-Jun	L	U	Y	AL	W	Grand View
804-10049	01-Jun	L	U	Y	AL	W	Grand View
804-10050	01-Jun	L	U	Y	AL	W	Grand View
804-10051	01-Jun	L	U	Y	AL	W	Grand View
804-10052	01-Jun	L	U	Y	AL	W	Grand View
804-10053	01-Jun	L	U	Y	AL	W	Grand View
804-10054	01-Jun	L	U	Y	AL	W	Grand View
804-10055	01-Jun	L	U	Y	AL	W	Grand View
804-10056	01-Jun	L	U	Y	AL	W	Grand View

804-10057	01-Jun	L	U	Y	AL	W	Grand View
804-10058	01-Jun	L	U	Y	AL	W	Grand View
804-10059	01-Jun	L	U	Y	AL	W	Grand View
804-10060	01-Jun	L	U	Y	AL	W	Grand View
804-10061	01-Jun	L	U	Y	AL	W	Grand View
804-10062	01-Jun	L	U	Y	AL	W	Grand View
804-10063	01-Jun	L	U	Y	AL	W	Grand View
804-10064	01-Jun	L	U	Y	AL	W	Grand View
804-10065	01-Jun	L	U	Y	AL	W	Grand View
804-10066	01-Jun	L	U	Y	AL	W	Grand View
804-10067	01-Jun	L	U	Y	AL	W	Grand View
804-10068	01-Jun	L	U	Y	AL	W	Grand View
804-10069	01-Jun	L	U	Y	AL	W	Grand View
804-10070	03-Jun	L	U	Y	AL	W	Grand View
804-10071	03-Jun	L	U	Y	AL	W	Grand View
804-10072	03-Jun	L	U	Y	AL	W	Grand View
804-10073	03-Jun	L	U	Y	AL	W	Grand View
804-10074	03-Jun	L	U	Y	AL	W	Grand View
804-10075	03-Jun	L	U	Y	AL	W	Grand View
804-10076	03-Jun	L	U	Y	AL	W	Grand View
804-10077	03-Jun	L	U	Y	AL	W	Grand View
804-10078	03-Jun	L	U	Y	AL	W	Grand View
804-10079	03-Jun	L	U	Y	AL	W	Grand View
804-10080	03-Jun	L	U	Y	AL	W	Grand View
804-10081	03-Jun	L	U	Y	AL	W	Grand View
804-10082	03-Jun	L	U	Y	AL	W	Grand View
804-10083	03-Jun	L	U	Y	AL	W	Grand View
804-10084	03-Jun	L	U	Y	AL	W	Grand View
804-10085	03-Jun	L	U	Y	AL	W	Grand View
804-10086	03-Jun	L	U	Y	AL	W	Grand View
804-10087	03-Jun	L	U	Y	AL	W	Grand View
804-10088	03-Jun	L	U	Y	AL	W	Grand View
804-10089	03-Jun	L	U	Y	AL	W	Grand View
804-10090	03-Jun	L	U	Y	AL	W	Grand View
804-10091	03-Jun	L	U	Y	AL	W	Grand View
804-10092	03-Jun	L	U	Y	AL	W	Grand View
804-10093	03-Jun	L	U	Y	AL	W	Grand View
804-10094	03-Jun	L	U	Y	AL	W	Grand View
804-10095	03-Jun	L	U	Y	AL	W	Grand View
804-10096	03-Jun	L	U	Y	AL	W	Grand View
804-10097	03-Jun	L	U	Y	AL	W	Grand View
804-10098	03-Jun	L	U	Y	AL	W	Grand View

804-10099	03-Jun	L	U	Y	AL	W	Grand View
804-10101	03-Jun	L	U	Y	AL	W	Grand View
804-10102	03-Jun	L	U	Y	AL	W	Grand View
804-10103	03-Jun	L	U	Y	AL	W	Grand View
804-10104	03-Jun	L	U	Y	AL	W	Grand View
804-10105	03-Jun	L	U	Y	AL	W	Grand View
804-10106	03-Jun	L	U	Y	AL	W	Grand View
804-10107	03-Jun	L	U	Y	AL	W	Grand View
804-10108	03-Jun	L	U	Y	AL	W	Grand View
804-10109	03-Jun	L	U	Y	AL	W	Grand View
804-10110	10-Jun	L	U	Y	AL	W	Grand View
804-10111	10-Jun	L	U	Y	AL	W	Grand View
804-10112	10-Jun	L	U	Y	AL	W	Grand View
804-10113	10-Jun	L	U	Y	AL	W	Grand View
804-10114	10-Jun	L	U	Y	AL	W	Grand View
804-10115	10-Jun	L	U	Y	AL	W	Grand View
804-10116	10-Jun	L	U	Y	AL	W	Grand View
804-10117	10-Jun	L	U	Y	AL	W	Grand View
804-10118	10-Jun	L	U	Y	AL	W	Grand View
804-10119	10-Jun	L	U	Y	AL	W	Grand View
804-10120	10-Jun	L	U	Y	AL	W	Grand View
804-10121	10-Jun	L	U	Y	AL	W	Grand View
804-10122	10-Jun	L	U	Y	AL	W	Grand View
804-10123	10-Jun	L	U	Y	AL	W	Grand View
804-10124	10-Jun	L	U	Y	AL	W	Grand View
804-10125	10-Jun	L	U	Y	AL	W	Grand View
804-10126	10-Jun	L	U	Y	AL	W	Grand View
804-10127	10-Jun	L	U	Y	AL	W	Grand View
804-10128	10-Jun	L	U	Y	AL	W	Grand View
804-10129	10-Jun	L	U	Y	AL	W	Grand View
804-10130	10-Jun	L	U	Y	AL	W	Grand View
804-10131	10-Jun	L	U	Y	AL	W	Grand View
804-10132	10-Jun	L	U	Y	AL	W	Grand View
804-10133	10-Jun	L	U	Y	AL	W	Grand View
804-10134	10-Jun	L	U	Y	AL	W	Grand View
804-10135	10-Jun	L	U	Y	AL	W	Grand View
804-10136	10-Jun	L	U	Y	AL	W	Grand View
804-10137	10-Jun	L	U	Y	AL	W	Grand View
804-10138	10-Jun	L	U	Y	AL	W	Grand View
804-10139	10-Jun	L	U	Y	AL	W	Grand View
804-10140	10-Jun	L	U	Y	AL	W	Grand View
804-10141	10-Jun	L	U	Y	AL	W	Grand View

804-10142	10-Jun	L	U	Y	AL	W	Grand View
804-10143	10-Jun	L	U	Y	AL	W	Grand View
804-10144	10-Jun	L	U	Y	AL	W	Grand View
804-10145	10-Jun	L	U	Y	AL	W	Grand View
804-10146	10-Jun	L	U	Y	AL	W	Grand View
804-10147	10-Jun	L	U	Y	AL	W	Grand View
804-10148	11-Jun	L	U	Y	AL	W	Grand View
804-10149	11-Jun	L	U	Y	AL	W	Grand View
804-10150	11-Jun	L	U	Y	AL	W	Grand View
804-10151	11-Jun	L	U	Y	AL	W	Grand View
804-10152	11-Jun	L	U	Y	AL	W	Grand View
804-10153	11-Jun	L	U	Y	AL	W	Grand View
804-10154	11-Jun	L	U	Y	AL	W	Grand View
804-10155	11-Jun	L	U	Y	AL	W	Grand View
804-10156	11-Jun	L	U	Y	AL	W	Grand View
804-10157	11-Jun	L	U	Y	AL	W	Grand View
804-10158	11-Jun	L	U	Y	AL	W	Grand View
804-10159	11-Jun	L	U	Y	AL	W	Grand View
804-10160	11-Jun	L	U	Y	AL	W	Grand View
804-10161	11-Jun	L	U	Y	AL	W	Grand View
804-10162	11-Jun	L	U	Y	AL	W	Grand View
804-10163	11-Jun	L	U	Y	AL	W	Grand View
804-10164	11-Jun	L	U	Y	AL	W	Grand View
804-10165	11-Jun	L	U	Y	AL	W	Grand View
804-10166	11-Jun	L	U	Y	AL	W	Grand View
804-10167	11-Jun	L	U	Y	AL	W	Grand View
804-10168	11-Jun	L	U	Y	AL	W	Grand View
804-10169	11-Jun	L	U	Y	AL	W	Grand View
804-10170	11-Jun	L	U	Y	AL	W	Grand View
804-10171	12-Jun	L	U	Y	AL	W	Kuna
804-10172	12-Jun	L	U	Y	AL	W	Kuna
804-10173	12-Jun	L	U	Y	AL	W	Kuna
804-10174	12-Jun	L	U	Y	AL	W	Kuna
804-10175	12-Jun	L	U	Y	AL	W	Kuna
804-10176	12-Jun	L	U	Y	AL	W	Kuna
804-10177	12-Jun	L	U	Y	AL	W	Kuna
804-10178	12-Jun	L	U	Y	AL	W	Kuna
804-10179	12-Jun	L	U	Y	AL	W	Kuna
804-10180	12-Jun	L	U	Y	AL	W	Kuna
804-10181	12-Jun	L	U	Y	AL	W	Kuna
804-10182	12-Jun	L	U	Y	AL	W	Kuna
804-10183	12-Jun	L	U	Y	AL	W	Kuna

804-10184	12-Jun	L	U	Y	AL		W	Kuna
804-10185	12-Jun	L	U	Y	AL		W	Kuna
804-10186	12-Jun	L	U	Y	AL		W	Kuna
804-10187	12-Jun	L	U	Y	AL		W	Kuna
804-10188	12-Jun	L	U	Y	AL		W	Kuna
804-10189	14-Jun	AHY	U	Y	AL		W	Kuna
804-10190	14-Jun	L	U	Y	AL		W	Kuna
804-10191	14-Jun	L	U	Y	AL		W	Kuna
804-10192	14-Jun	L	U	Y	AL		W	Kuna
804-10193	14-Jun	L	U	Y	AL		W	Kuna
804-10194	14-Jun	L	U	Y	AL		W	Kuna
804-10195	14-Jun	L	U	Y	AL		W	Kuna
804-10196	14-Jun	L	U	Y	AL		W	Kuna
804-10197	14-Jun	L	U	Y	AL		W	Kuna
804-10198	14-Jun	L	U	Y	AL		W	Kuna
804-10199	14-Jun	L	U	Y	AL		W	Kuna
804-10200	14-Jun	L	U	Y	AL		W	Kuna
804-10201	14-Jun	L	U	Y	AL		W	Kuna
804-10202	14-Jun	L	U	Y	AL		W	Kuna
804-10203	14-Jun	L	U	Y	AL		W	Kuna
804-10204	14-Jun	L	U	Y	AL		W	Kuna
804-10205	14-Jun	L	U	Y	AL		W	Kuna
804-10206	14-Jun	L	U	Y	AL		W	Kuna
1204-43418*	14-Jun	AHY	F	R	AL	P	R	Kuna
804-10207	15-Jun	L	U	Y	AL		W	Grand View
804-10208	15-Jun	L	U	Y	AL		W	Grand View
804-10209	15-Jun	L	U	Y	AL		W	Grand View
804-10210	15-Jun	L	U	Y	AL		W	Grand View
804-10211	15-Jun	L	U	Y	AL		W	Grand View
804-10212	15-Jun	L	U	Y	AL		W	Grand View
804-10213	15-Jun	L	U	Y	AL		W	Grand View
804-10214	16-Jun	L	U	Y	AL		W	Grand View
804-10215	16-Jun	L	U	Y	AL		W	Grand View
804-10216	16-Jun	L	U	Y	AL		W	Grand View
804-10217	16-Jun	L	U	Y	AL		W	Grand View
804-10218	16-Jun	L	U	Y	AL		W	Grand View
804-10219	16-Jun	L	U	Y	AL		W	Grand View
804-10220	16-Jun	L	U	Y	AL		W	Grand View
1204-59479*	16-Jun	AHY	F	G	W	AL	W	Grand View
804-10221	16-Jun	L	U	Y	AL		W	Grand View
804-10222	16-Jun	L	U	Y	AL		W	Grand View
804-10223	16-Jun	L	U	Y	AL		W	Grand View

804-10224	16-Jun	L	U	Y	AL		W	Grand View
804-10225	16-Jun	L	U	Y	AL		W	Grand View
1204-59478*	17-Jun	AHY	F	G	Y	AL	W	Grand View
804-10226	18-Jun	L	U	Y	AL		W	Grand View
804-10227	02-Jul	L	U	Y	AL		W	Grand View
804-10228	02-Jul	L	U	Y	AL		W	Grand View
804-10229	02-Jul	L	U	Y	AL		W	Grand View
804-10230	19-Jul	L	U	Y	AL		W	Kuna
804-10231	19-Jul	L	U	Y	AL		W	Kuna
804-10232	19-Jul	L	U	Y	AL		W	Kuna

*Indicates recapture of previously banded burrowing owl.

APPENDIX B
2000 Banding Data

Band numbers, date of marking or recapture, age, sex, color-marking on left and right legs, and location for burrowing owls banded near Kuna, Ada County and near Grand View, Elmore County, Idaho during 1999.

NOTE:

Age:

AHY = after hatching year, adult bird

L = local (a young bird incapable of sustained flight, nestling)

Sex:

M = male

F = female (sexed based on behavior and presence of brood patch)

U = unknown

Color/Aluminum band:

AL = aluminum

R = red

B = blue

G = green

Y = yellow

W = white

P = pink

Note: Most birds banded in 2000 received two (one yellow, one white) rather than three color bands. Each color band also contained numerals corresponding to the last three digits of the aluminum band.

Band Number	Date	Age	Sex	Left		Right		Area
				Top	Bottom	Top	Bottom	
804-10233	21-Apr	AHY	F	Y	AL		W	Grand View
1204-43440*	21-Apr	AHY	F	Y	AL	B	Y	Grand View
804-10234	21-Apr	AHY	F	Y	AL		W	Grand View
804-10235	21-Apr	AHY	M	Y	AL		W	Grand View
804-10236	27-Apr	AHY	F	Y	AL		W	Kuna
804-10237	27-Apr	AHY	F	W		Y	AL	Kuna
804-10238	27-Apr	AHY	F	W		Y	AL	Kuna
804-10239	02-May	AHY	F	W		Y	AL	Kuna
804-10240	04-May	AHY	F	W		Y	AL	Grand View
804-10241	04-May	AHY	F	W		Y	AL	Grand View
804-10242	04-May	AHY	F	W		Y	AL	Grand View
1204-43429*	04-May	AHY	F	AL	R	W	P	Grand View
804-10014*	04-May	AHY	F	Y	AL		W	Grand View

804-10243	05-May	AHY	F	W		Y	AL	Grand View
804-10244	05-May	AHY	F	W		Y	AL	Grand View
804-10245	05-May	AHY	F	W		Y	AL	Grand View
1204-59445*	05-May	AHY	F	Y	R	AL	Y	Grand View
804-10246	05-May	AHY	F	W		Y	AL	Grand View
1204-43442*	05-May	AHY	F	AL	Y	Y	Y	Grand View
1204-59478*	05-May	AHY	F	G	Y	AL	W	Grand View
804-10247	05-May	AHY	F	W		Y	AL	Grand View
804-10248	05-May	AHY	F	W		Y	AL	Grand View
804-10249	09-May	AHY	F	W		Y	AL	Grand View
804-10250	09-May	AHY	F	W		Y	AL	Grand View
804-10251	09-May	AHY	F	W		Y	AL	Grand View
804-10252	09-May	AHY	F	W		Y	AL	Grand View
804-10253	10-May	AHY	F	W		Y	AL	Grand View
804-10254	16-May	AHY	F	W		Y	AL	Grand View
1204-45958*	16-May	AHY	F	P	B	AL	Y	Grand View
614-52292*	16-May	AHY	F	B	R	AL	G	Grand View
614-89693*	16-May	AHY	F	AL		R	W	Grand View
804-10139*	16-May	AHY	F	Y	AL		W	Grand View
1204-43423*	12-May	AHY	F	AL	R	G	B	Grand View
804-10255	12-May	AHY	F	W		Y	AL	Grand View
1204-59441*	12-May	AHY	F	G	G	AL	Y	Grand View
804-10256	12-May	AHY	F	W		Y	AL	Grand View
1204-57105*	12-May	AHY	F	AL	Y	R	P	Grand View
804-10140*	13-May	AHY	F	Y	AL		W	Grand View
804-10257	13-May	AHY	F	W		Y	AL	Grand View
804-10258	13-May	AHY	F	W		Y	AL	Grand View
804-10259	13-May	AHY	F	W		Y	AL	Grand View
804-10260	15-May	AHY	F	W		Y	AL	Grand View
804-10261	15-May	AHY	F	W		Y	AL	Grand View
804-10262	18-May	AHY	F	W		Y	AL	Kuna
804-10263	19-May	AHY	F	W		Y	AL	Kuna
804-10264	25-May	AHY	F	W		Y	AL	Grand View
804-10265	25-May	AHY	M	W		Y	AL	Grand View
804-10266	31-May	AHY	M	W		Y	AL	Grand View
804-10267	31-May	L	U	W		Y	AL	Grand View
804-10268	31-May	L	U	W		Y	AL	Grand View
804-10269	31-May	L	U	W		Y	AL	Grand View
804-10270	31-May	L	U	W		Y	AL	Grand View
804-10271	31-May	L	U	W		Y	AL	Grand View
804-10272	31-May	L	U	W		Y	AL	Grand View
804-10273	01-Jun	L	U	W		Y	AL	Grand View

804-10274	01-Jun	L	U	W	Y	AL	Grand View
804-10275	01-Jun	L	U	W	Y	AL	Grand View
804-10276	01-Jun	L	U	W	Y	AL	Grand View
804-10277	01-Jun	L	U	W	Y	AL	Grand View
804-10278	01-Jun	L	U	W	Y	AL	Grand View
804-10279	02-Jun	L	U	W	Y	AL	Grand View
804-10280	02-Jun	L	U	W	Y	AL	Grand View
804-10281	02-Jun	L	U	W	Y	AL	Grand View
804-10282	02-Jun	L	U	W	Y	AL	Grand View
804-10283	02-Jun	L	U	W	Y	AL	Grand View
804-10284	02-Jun	L	U	W	Y	AL	Grand View
804-10035*	04-Jun	AHY	M	Y	AL	W	Grand View
804-10285	05-Jun	L	U	W	Y	AL	Grand View
804-10286	05-Jun	L	U	W	Y	AL	Grand View
804-10287	05-Jun	L	U	W	Y	AL	Grand View
804-10288	05-Jun	L	U	W	Y	AL	Grand View
804-10289	05-Jun	L	U	W	Y	AL	Grand View
804-10290	05-Jun	L	U	W	Y	AL	Grand View
804-10291	05-Jun	L	U	W	Y	AL	Grand View
804-10292	05-Jun	L	U	W	Y	AL	Grand View
804-10293	05-Jun	AHY	M	W	Y	AL	Grand View
804-10294	06-Jun	L	U	W	Y	AL	Kuna
804-10295	06-Jun	L	U	W	Y	AL	Kuna
804-10296	06-Jun	L	U	W	Y	AL	Kuna
804-10297	06-Jun	L	U	W	Y	AL	Kuna
804-10298	06-Jun	L	U	W	Y	AL	Kuna
804-10299	06-Jun	L	U	W	Y	AL	Kuna
804-10300	09-Jun	L	U	W	Y	AL	Grand View
804-10301	09-Jun	L	U	W	Y	AL	Grand View
804-10302	09-Jun	L	U	W	Y	AL	Grand View
804-10303	09-Jun	L	U	W	Y	AL	Grand View
804-10304	09-Jun	L	U	W	Y	AL	Grand View
804-10305	09-Jun	L	U	W	Y	AL	Grand View
804-10306	09-Jun	L	U	W	Y	AL	Grand View
804-10307	13-Jun	L	U	W	Y	AL	Grand View
804-10308	13-Jun	L	U	W	Y	AL	Grand View
804-10309	13-Jun	L	U	W	Y	AL	Grand View
804-10310	13-Jun	L	U	W	Y	AL	Grand View
804-10311	13-Jun	L	U	W	Y	AL	Grand View
804-10312	13-Jun	L	U	W	Y	AL	Grand View
804-10313	13-Jun	L	U	W	Y	AL	Grand View
804-10314	14-Jun	L	U	W	Y	AL	Grand View

804-10315	14-Jun	L	U	W		Y	AL	Grand View
804-10316	14-Jun	L	U	W		Y	AL	Grand View
804-10317	14-Jun	L	U	W		Y	AL	Grand View
804-10318	14-Jun	L	U	W		Y	AL	Grand View
1204-59410*	14-Jun	AHY	M	Y	B	AL	G	Grand View
804-10319	15-Jun	L	U	W		Y	AL	Grand View
804-10320	15-Jun	L	U	W		Y	AL	Grand View
804-10321	15-Jun	L	U	W		Y	AL	Grand View
804-10322	15-Jun	L	U	W		Y	AL	Grand View
804-10323	16-Jun	L	U	W		Y	AL	Kuna
804-10324	16-Jun	L	U	W		Y	AL	Kuna
804-10325	16-Jun	L	U	W		Y	AL	Kuna
804-10326	16-Jun	L	U	P	P	Y	AL	Kuna
804-10327	16-Jun	L	U	R	R	Y	AL	Kuna
804-10328	16-Jun	L	U	W	W	Y	AL	Kuna
804-10329	16-Jun	L	U	B	B	Y	AL	Kuna
804-10330	16-Jun	L	U	G	G	Y	AL	Kuna
804-10331	16-Jun	L	U	R	G	Y	AL	Kuna
804-10332	16-Jun	L	U	R	B	Y	AL	Kuna
804-10333	16-Jun	L	U	R	W	Y	AL	Kuna
804-10334	16-Jun	L	U	R	Y	Y	AL	Kuna
804-10335	16-Jun	L	U	R	P	Y	AL	Kuna
804-10336	16-Jun	L	U	W	B	Y	AL	Kuna
804-10337	16-Jun	L	U	W	R	Y	AL	Kuna
804-10338	16-Jun	L	U	W	P	Y	AL	Kuna
804-10339	20-Jun	L	U	G	P	Y	AL	Kuna
804-10340	22-Jun	L	U	G	W	Y	AL	Grand View
804-10341	22-Jun	L	U	G	B	Y	AL	Grand View
804-10342	23-Jun	L	U	Y	Y	Y	AL	Kuna
804-10343	23-Jun	L	U	Y	R	Y	AL	Kuna
804-10344	23-Jun	L	U	Y	P	Y	AL	Kuna
804-10345	23-Jun	L	U	Y	B	Y	AL	Kuna
804-10346	23-Jun	L	U	Y	W	Y	AL	Kuna
804-10347	27-Jun	L	U	W		Y	AL	Grand View
804-10348	27-Jun	L	U	W		Y	AL	Grand View
804-10349	27-Jun	L	U	W		Y	AL	Grand View
804-10350	27-Jun	L	U	W		Y	AL	Grand View
804-10351	27-Jun	L	U	W		Y	AL	Grand View
804-10352	27-Jun	L	U	W		Y	AL	Grand View
804-10353	27-Jun	L	U	W		Y	AL	Grand View
804-10354	27-Jun	L	U	W		Y	AL	Grand View
804-10355	27-Jun	L	U	W		Y	AL	Grand View

804-10356	27-Jun	L	U	W	Y	AL	Grand View
804-10357	27-Jun	L	U	W	Y	AL	Grand View
804-10358	27-Jun	L	U	W	Y	AL	Grand View
804-10359	27-Jun	L	U	W	Y	AL	Grand View
804-10360	27-Jun	L	U	W	Y	AL	Grand View
804-10361	27-Jun	L	U	W	Y	AL	Grand View

*Indicates recapture of previously banded burrowing owl.

U.S. Department of the Interior
Bureau of Land Management
Idaho State Office
1387 S. Vinnell Way
Boise ID 83709

BLM/ID/PT-03/015+1150