

**A COMPARATIVE SURVEY OF THE
GRAND RIVER NATIONAL GRASSLAND
FOR BURROWING OWLS IN 2001 AND 2005**

prepared by

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4 January 2006

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ABSTRACT: Black-tailed prairie dog dogs (*Cynomys ludovicianus*) colonies on the Grand River National Grassland in northwestern South Dakota were surveyed for burrowing owls (*Athene cunicularia*) in 2001 and 2005. In 2001, 29 prairie dog colonies were visited and owls were observed at 16 colonies (55%). There was a total of 165 burrowing owls observed with an average of 10.3 owls per occupied colony. Density of owls at occupied colonies in 2001 was 0.10 owls per acre. At these 16 occupied colonies, 35 pairs of owls were identified, and 101 young were counted with an average of 2.9 juvenile owls per family. The average size of colonies used by burrowing owls (103 acres) was greater than those not used by owls (14 acres). In 2005, 38 prairie dog colonies were visited and owls were found at 17 colonies (45%). There was a total of 127 burrowing owls observed with an average of 7.5 owls per occupied colony. Density of owls at occupied colonies in 2005 was 0.07 owls per acre. Thirty-one owl families were observed in 2005, with an average of 2.2 juveniles per family. The average size of colonies used by burrowing owls (110 acres) was greater than those not used by owls (21 acres). From 2001 to 2005, it appeared that burrowing owl numbers on the Grand River National Grassland declined slightly despite a 26% increase in prairie dog acreage and at least 10 additional new colonies. During both survey years, burrowing owls primarily used prairie dog colonies larger than 20 acres in size.

INTRODUCTION

The Great Plains prior to settlement contained a great diversity of plant and wildlife species distributed across an area that spanned most of the mid-North American continent. However, much of the Great Plains has been converted to agricultural cropland and pastureland, and many of the native plant and wildlife species have been impacted through this process. Tracts of Federal lands throughout the western Great Plains have preserved some of the prairie grassland diversity. The Grand River National Grassland (GRNG) in northwestern South Dakota protects about 164,000 acres of grasslands. Although much of this area was formerly cultivated, the GRNG consists of 8 large blocks of grass dominated landscape. These grasslands provide habitat for several sensitive grassland dependent bird and mammal species. Colonies of black-tailed prairie dogs (*Cynomys ludovicianus*) occur on 4 of these grassland blocks and they in turn provide important habitat to several prairie dog associated species. These associated species on the GRNG include the burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), golden eagle, (*Aquila chrysaetos*), badger (*Taxidea taxus*), and prairie rattlesnake (*Crotalus viridis*). Prairie dogs alter the prairie environment by creating areas of high burrow density. Prairie dog burrows are unique in that no other rodent species on the Great Plains constructs deep burrows in the 4-6" diameter size class. Prairie dogs also change grassland plant species composition (increased forb abundance) and

structure (decreased vegetation height). Prairie dog colonies also represent areas of high prey density. These prairie dog induced changes to the grassland habitats are generally critical to 1 or more life history aspects of associated species. On the Great Plains, the burrowing owl is closely associated with the black-tailed prairie dog (Butts and Lewis 1982). Burrowing owls are attracted to prairie dog colonies because of the availability of burrows for nesting and escape cover. The low growing vegetation in prairie dog colonies is also attractive to burrowing owls, and provides suitable hunting habitat.

Long-term changes in black-tailed prairie dog numbers and distribution on the Great Plains have also influenced burrowing owl numbers and distribution. Black-tailed prairie dog distribution and abundance was greatly reduced during the 20th century through agricultural conversion of grasslands, poisoning campaigns, and the introduction of sylvatic plague (Koford 1958). The burrowing owl on the Great Plains has probably declined proportionately in relation to the decline in black-tailed prairie dogs. Considering the range-wide decline in prairie dogs and burrowing owls, the prairie dog colonies on the GRNG represent critical habitat for burrowing owls.

In August 2001, South Dakota Game, Fish and Parks funded a survey to gather baseline information on burrowing owl numbers and distribution on the GRNG (Knowles 2001). This was the first attempt to document the occurrence, distribution and numbers of burrowing owls on the GRNG. During this survey, all known prairie dog colonies on the GRNG were surveyed for burrowing owls, and owls were observed at 16 of the 29 prairie dog colonies (55%) examined. At these 16 occupied colonies, 35 pairs of owls were identified, and 101 young were counted with an average of 2.9 juvenile owls per family. The average size of colonies used by burrowing owls (101 acres) was greater than those not used by owls (14 acres). In 2005, this survey was repeated to assess burrowing population trend and further evaluated their use of prairie dog colonies. This report summarizes the results of both the 2001 and 2005 burrowing surveys.

STUDY AREA AND METHODS

The GRNG was located in Perkins and Corson Counties in northwestern South Dakota. Although the study area consisted of the entire GRNG, the primary burrowing owl survey effort was restricted to prairie dog colonies found on 4 grassland blocks in the southern and eastern portions of the Grassland. The GRNG was characterized by rolling grassland prairie phasing into gently broken topography close to the North and South Grand Rivers, and the Grand River. Elevation within the study area ranged from 2,200 to 2,900 feet. Upland areas were dominated by grasses with western wheatgrass (*Agropyron smithii*), little bluestem (*Andropogon scoparius*), blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*) being common native species. However, much of the upland area was planted to crested wheatgrass (*Agropyron cristatum*) during the 1930s, and within these areas, crested wheatgrass was often the dominant species. About 75 miles of hardwood draws occurred in several portions of the study area. The hardwood draws were dominated by green ash (*Fraxinus pennsylvanica*). Mature stands of plains cottonwood (*Populus deltoides*) also occurred on a few bottomland sites along the South Grand and Grand Rivers, but most bottomland areas were

grass and shrub dominated.

In 2001, there were 29 known black-tailed prairie dog colonies on or adjacent to the GRNG. These colonies totaled about 1,834 acres, and the average colony size was about 63 acres. In 2001, the Forest Service provided an acreage estimate for most of the prairie dog colonies on lands they administered. These acreages were determined from a 1999-2000 mapping effort. This mapping effort consisted of driving the perimeter of the prairie dog colony while recording coordinates with a GPS unit. These data had been differentially corrected, converted to shape files and then imported into a GIS program. There was no mapping information for 5 colonies located entirely or primarily on public lands. In August 2001, I estimated acreages for these 5 colonies by recording UTM coordinates along the perimeter of the colonies with a GPS unit (Garmin 12XL), plotting these coordinates on graph paper, counting the squares encompassed by the resulting polygon, and then multiplying the number of squares by the area represented a square.

One surveyed colony (#28) in 2001 and 2005 was located entirely on private land. (Maps showing colony numbers and locations are presented in Appendix A.) This colony was included in the survey because it could be easily viewed from the county road. In 2001, portions of 2 other surveyed colonies (#9, 29) were primarily located on private and Standing Rock Reservation land, and Colony #3 was located entirely on Bureau of Reclamation land. Other wildlife survey work in this area since the 2001 survey found at least 7 other small prairie dog colonies located on private land adjacent to the GRNG. In addition, 3 colonies (#17, 18, 19) went to private landownership as a result of a land exchange, but 2 of these colonies (#18, 19) in 2005 could be adequately viewed from adjacent public land to determine presence or absence of burrowing owls. The third colony (#17) was not visible from public land and was not surveyed in 2005. Acreages of these colonies were visually estimated. Prairie dog colonies located on Federal land within the GRNG were mapped again in 2002 (Knowles 2003a, Table 1) and 2005 (Forest Service files) following the same procedures employed in the 1999-2000 mapping effort. Results of these mapping efforts found 26 colonies and 1,786 acres on Forest Service land in 2002, and 34 colonies and 2,071 acres on Forest Service land in 2005. This represented about a 16.5% increase in prairie dog acreage on Forest Service land from 2002 to 2005, or about a 5.5% annual increase through the period.

GRNG personal estimated prairie dog acreage on the Grassland (method unknown) in 5 years from 1985 through 1993. These data are plotted in Figure 1 along with the 2 recent complete surveys, and they show that prairie dog acreage on the GRNG has fluctuated from about 1,400 acres to about 3,000 acres through this time period. Prairie dog acreage fluctuations during this period were probably due to prairie dog control efforts. Management practices during this period consisted of periodic prairie dog poisoning during the 1980s and early 1990s. However, there has been no organized effort to poison prairie dogs on the GRNG since the mid-1990s. Recreational shooting of prairie dogs on the GRNG was a popular summer activity that had the potential to locally impact prairie dog numbers. Since 2001, prairie dog shooting on the GRNG was permitted from mid-June through winter. Prior to this, there were no seasonal restrictions on prairie dog shooting.

Table 1. Summary of prairie dog colonies found on Forest Service administered land on the Grand River National Grassland in May 2002.

	Number of Colonies	Total Acres	Average Size (acres)
Total	26	1,786	68.6
Valley Bottom	10	354	35.4
Badland Basin	2	313	156.5
Rolling Prairie	13	1,132	87.1
Ridge Top	1	4	4.0
Water Source	13	1,416	108.9
Homestead	7	423	60.4
Burrowing Owl	15	1,267	84.5
Ferruginous Hawk	3	471	157.0
Upland Sandpiper	16	1,563	97.7

The 2 burrowing owl surveys were conducted from 3-11 August 2001, and 5-13 August 2005. The surveys during each survey period consisted of visiting each prairie dog colony on or adjacent to the GRNG during morning (sunrise to 10 AM) and evening (5 PM to sunset) periods. The burrowing owl survey followed methods described by Atkinson (2001). Burrowing owl family groups in each colony were identified and recorded, and each family group was carefully counted to determine the number of young and adults present. Approximately one hour or more was spent observing an owl family with binoculars and a spotting scope to obtain an accurate count of a family group. Even with this level of effort, the counts should be considered a minimum since individual owls were constantly entering and exiting burrows during the survey period. An effort was made to make the data collection between the 2 survey periods as similar as possible in order for the survey results to be comparable. However, a 20-acre colony used by owls in 2001 was dropped from the survey in 2005 because the Forest Service transferred the land to private ownership, and 10 new prairie dog colonies were found and added to the survey in 2005. The 2 larger colonies in this group (estimated at 20 and 40 acres) were primarily on private land and appeared to have encroached on Federal land. These 2 colonies were probably present in 2001, but were not surveyed because they were only on private land. Weather conditions during both survey years were similar with day time high temperatures ranging from 90-102°F.

RESULTS AND DISCUSSION

In 2001, 29 prairie dog colonies were examined for burrowing owls and in 2005, 38 colonies were surveyed for owls. In 2001, an estimated 1,834 acres of active prairie dog colonies was surveyed, and in 2005, an estimated 2,311 acres of active prairie dog colonies was surveyed. This represented about a 26% increase in prairie dog acreage from 2001 to 2005, or about a 6% annual growth rate

in prairie dog occupied acreage. The average colony size in 2001 was 64 acres, and in 2005 the average colony size was 61 acres. The decline in average colony size was due to at least 10 new small colonies developing on Forest Service and adjacent lands from 2001 to 2005. One large colony (#7) in the Little Egypt area appeared to have decreased in size from 2001 to 2005, but most other colonies were either stable or increased in size between these 2 surveys (Table 2). In 2001, the majority (76%) of prairie dog colonies were less than 50 acres, but 81% of the prairie dog acreage was accounted for by colonies over fifty acres, and the 3 largest prairie dog colonies accounted for 61% of the prairie dog acreage. A similar situation existed in 2005.

The total number of colonies used by owls in 2005 was similar to the number of colonies used by owls in 2001. In 2001, burrowing owls were found on 16 of 29 (55%) colonies examined, and in 2005 burrowing owls were found at 17 of 38 (45%) colonies examined. The decline in percentage of colonies used by owls from 2001 to 2005 was due to the addition of 10 new small colonies to the survey. In 2005, 8 of the 10 new prairie dog colonies surveyed were less than 20 acres and burrowing owls were found at only 1 of these colonies. The average size of prairie dog colonies used by burrowing owls in 2001 was 101 acres, and the average size of colonies used by burrowing owls in 2005 was 110 acres. The average size of colonies not used by burrowing owls in 2001 was 14 acres, and the average size of colonies not used by burrowing owls in 2005 was 21 acres. During the 2 survey years, burrowing owls were observed in a total of 21 different prairie dog colonies. Twelve colonies were used during both survey years. The average size of colonies used by burrowing owls in both years was 147 acres in 2005, and the average size of colonies used by owls during only 1 survey year was 30 acres. Prairie dog colonies less than 10 acres received little use by burrowing owls during both survey years. In 2001, only 1 of 8 colonies less than 10 acres was occupied by burrowing owls, and in 2005 only 2 of 12 colonies less than 10 acres were use by owls. During both 2001 and 2005, the percentage of prairie dog colonies occupied by burrowing owls increased as the size class of the colonies increased (Figure 2). Most of the colonies over 50 acres were used by burrowing owls. In 2001, only 1 in 7 colonies over 50 acres in size were not used by burrowing owls, and in 2005, only 2 of 11 colonies greater than 50 acres were not used by burrowing owls. It appears prairie dog colonies need to be at least 20 acres or larger to obtain consistent burrowing owl use and to have opportunity for multiple burrowing owl families on a colony. Overall, on the GRNG, burrowing owls would be benefitted by more and larger prairie dog colonies.

During 2001, there was considerable survey effort for other wildlife species found off of prairie dog colonies, and only 1 burrowing owl was found off of a prairie dog colony. This bird was at a badger excavated burrow on the northern portion of the GRNG. This was an area with no known prairie dogs colonies in close proximity . This site was re-visited again in August 2001, and an owl was again found here, but there was no indication that this was a pair of owls with a family. This was the only burrowing owl observed off of a prairie dog colony during 2001 and 2005. This site was not visited in 2005 because of time constraints with the 10 new colonies.

During June 2001, 20 prairie dog colonies were surveyed for mountain plovers (*Charadrius montanus*) and burrowing owls were observed at 12 of these colonies (60%). During the August

2001 survey, burrowing owls were subsequently observed at 3 of these colonies where owls were not observed in June 2001. While mapping prairie dog colonies in May 2002, burrowing owls were observed in 15 of 26 (58%) colonies. During early June 2001, a burrowing owl was observed in colony #21, but 2 visits to this colony during August 2001 failed to reveal any owls. Apparently this owl family was lost between early June and early August. No owls were found in this colony in 2005. In 2001, this was the only colony where owls were observed in June, but not in August. Colony #21 was also the only large colony where owls were not found in August 2001 and 2005. There was easy vehicle access to this colony off of a paved road, and prairie dog shooting may have accounted for loss of owls in 2001 and no owls in 2005.

During the 2001 survey, a total of 165 burrowing owls was observed with an average of 10.3 owls per occupied colony, and a density of 0.10 owls per acre for those colonies used by owls (Figure 3, Table 2). During this survey, 35 burrowing owl families were identified with an average of 2.9 young per family. This would be a minimum estimate since it is possible that not all juveniles owls were counted. No young were observed with 1 pair of adults. Excluding this observation, brood sizes ranged from 1 to 6, but most (82%) owl families contained 2 to 4 young. The total number of owls observed in prairie dog colonies was strongly correlated with the number of owl families observed suggesting that most owl pairs successfully raised young in 2001. In 2005, there was a total of 127 burrowing owls observed with an average of 7.5 owls per occupied colony (Figure 3, Table 2). Density of owls per occupied colony in 2005 was 0.07 owls per acre. There was a total of 31 owl families observed in 2005, with an average of 2.2 juveniles per family. No young were observed with 1 pair of adults in 2005. The trend from 2001 to 2005 appeared to be fewer owl families, and smaller broods despite a greater number of prairie dog colonies (10 additional colonies) and increased overall prairie dog acreage (24% increase). It was apparent that from 2001 to 2005, burrowing owl reproduction and survival was not sufficiently high to take advantage of the increased availability of prairie dog colony habitat. This would suggest that factors other than habitat might be influencing burrowing owl numbers on the GRNG. Other factors that might influence burrowing owl reproduction and survival include prey availability, predation, and prairie dog shooting.

In Montana, Atkinson (2001) conducted a two year study of burrowing owls on prairie dog colonies. In 1999, he and his 28 person survey team visited 209 colonies totaling 10,079 acres, and in 2000 they visited 193 colonies totaling 9,602 acres. Prairie dog colony occupancy rate by burrowing owls was 38% and 42% in 1999 and 2000, respectively (Atkinson 2001). The average number of burrowing owls observed per colony during the two survey years was 2.35 and 3.83, respectively. In 2000, the average number of young observed per family in Montana was 2.48. Atkinson (2000) reported that the average prairie dog colony used by owls was 70.3 acres compared to an average colony size of 36.0 acres where owls were not found. This is further evidence that prairie dog colony size is important to burrowing owl occupancy. Burrowing owl density on occupied prairie dog colonies in Montana was 0.05 owls per acre. Burrowing owl density, percent occupancy rate, and number of young per family were higher on the GRNG than in Montana except in 2005 when the average brood size was slightly less on the GRNG. However, the Montana data represented a random sample of prairie dog colonies throughout the state, and some prairie dog colony complexes in Montana appear to be better burrowing owl habitat than others. Systematic surveys of specific

prairie dog complexes in Montana have shown considerable variation in burrowing owl occurrence between areas and between years (Knowles 1998). For example, surveys of over 150 prairie dog colonies in Phillips and Blaine Counties in north-central Montana in 1983 and 1998 found 51% and 60% of the colonies occupied by burrowing owls while similar surveys in Custer County in southeastern Montana in 1977, 1979, and 1996 (44-128 colonies surveyed) found occupancy rates of 14%, 27%, and 5% of the colonies occupied (Knowles 1998). On the Little Missouri National Grassland, a survey of 128 prairie dog colonies in the late 1990s found a burrowing owl occupancy rate of 34%, and the average number of owls observed per occupied colony was 10.3 (Gary Foley, USDA Forest Service biologist, pers. commun.).

Although it is not possible to determine long-term population trend with only 2 years of data, it is apparent that burrowing owl numbers did not increase despite a 24% increase in prairie dog acreage on the GRNG, and a 36% increase in the number of colonies. At a minimum, it appeared that the number of owl families and that average brood size decreased from 2001 to 2005. Consequently burrowing owl density on occupied colonies in 2005 declined about 30% from 2001. The cause of this change is not known. The biggest change in burrowing owl numbers was noted in Colony #8, the largest colony on the GRNG. In 2001, 7 families and 34 owls were counted in this colony and in 2005 only 2 families and 4 owls were counted. This colony was surveyed on 2 different days in 2005 to confirm the decline in burrowing owls.

Incidental take of burrowing owls (and in some cases willful take of owls and other wildlife species) by recreational prairie dog shooters has the potential to influence burrowing owl numbers in prairie dog colonies. Although I have no data to support the contention that recreational shooting influences burrowing owl numbers, there appears to be a pattern in my burrowing owl observations that support this contention. Colony #8 (largest on the GRNG) had easy vehicle access and was popular with prairie dog shooters. While conducting other wildlife survey work in June in 2002, 6 groups of shooters were observed at colony #8 on a mid-June weekend, and approximately 60 shots were fired within a 0.5 hour period from 1120 to 1150. This level shooting intensity actually began shortly after sunrise and continued into the evening. Probably well over a 1,000 rounds of ammunition were fired at colony #8 in a single day. During the 2005 burrowing owl survey, 137 shell casings (mainly 0.223 caliber of which 65 were recently fired) were found scattered on a hill, and on another hill 29 freshly fired 0.223 caliber shell casings were found neatly arranged in 2 groups; 11 inserted in the dirt with the primer end down, and 18 inserted in the dirt with the primer end up. In this area, lots of prairie dog remains were found on and near prairie dog mounds. Many prairie dog burrows were plugged and these plugged burrows had flies clustered at the burrow entrances. Other examples of prairie dog shooting was observed at colony #1, where the burrowing owl survey effort was interrupted in both 2001 and 2005 by prairie dog shooters. In 2001, shooters arrived at the colony and began firing while I was walking through the colony. In 2005, the survey was interrupted twice by shooters. In 1 case, the shooters were polite enough to talk to me prior to shooting while the other case was a similar situation as 2001. Dead burrowing owls along with other associated wildlife species (badgers, coyotes (*Canis latrans*), ferruginous hawks, white-tailed jackrabbits (*Lepus townsendi*)) have been found in prairie dog colonies during mapping efforts. For example, dead burrowing owls were found in 3 of 23 prairie dog colonies mapped in northwestern South Dakota (Knowles 2005).

Prairie dog mapping efforts generally examine only the outer perimeter of colonies and are not representative of the actual number of wildlife species shot incidental to prairie dogs. In addition, despite the short vegetation that is characteristic of prairie dog colonies, small dead animals are not easily seen from more than a few yards away especially when mapping prairie dog colonies on an ATV.

One shooter at Colony #8 was interviewed in 2002. When asked if he shot burrowing owls, his reply was that he tried not to shoot owls, but at long distances it was difficult to distinguish between owls and prairie dogs. There may also be a small percentage of shooters that purposely shoot owls. It would only take 1 such individual to significantly impact owl numbers on a prairie dog colony. Adult owls shot during June or early July would result in nest failure. The pattern that I have observed on the GRNG that suggests the possible impact of recreational shooting on burrowing owls was seen in comparison of burrowing owl numbers at colonies which had only poor vehicle trails or no trails leading to the colony (Colonies #9, 23, 29), and colonies with easy vehicle access such as Colonies #1, 7, 8, 21, and 22. Colonies with poor vehicle access tended to have high prairie dog densities with many intact prairie dog family groups sitting on mounds (adult female with her litter of juvenile prairie dogs) when examined for burrowing owls. This group of colonies had similar or increased owl numbers in 2005 as compared to 2001 (see Table 2). Colonies # 1, 7, 8, and 22 were depicted with a prairie dog icon on the GRNG visitor map. Colony #7 also had a sign at a critical intersection of roads pointing the way to the colony. These colonies with easy vehicle access (examples of shooting in Colonies #1 and 8 given above) either had low owl numbers in both years or declining owl numbers from 2001 to 2005. Probably all prairie dog colonies on the GRNG received some level of recreational shooting during a given year, but the colonies with easy access and those featured on the GRNG visitor map received greater shooting intensity than those with poor access. Based on these observations, recreational prairie dog shooting may account for some loss of owls.

A variety of other wildlife species was observed in the prairie dog colonies during the visits to prairie dog colonies in both 2001, 2002, and 2005. Other species observed on prairie dog colonies included horned larks (*Alauda arvensis*), chestnut-collared longspurs (*Calcarius ornatus*), killdeer (*Charadrius vociferus*), and upland sandpipers (*Bartramia longicauda*). The former 3 species were probably nesting on prairie dog colonies as well as raising young on colonies, while the latter species used colonies for courtship and brood rearing habitat. Golden eagles and ferruginous hawks were observed in or flying over several colonies, and were known to have nests in close proximity to colonies. For example, 3 active ferruginous hawk nests were found around colony #7 in 2005, and an active golden nests was located close to colony 8. Badgers were observed on several occasions in prairie dog colonies, and sign of badger excavated burrows was common in most colonies. Knowles and Knowles (2005) examined 7 GRNG prairie dog colonies in October 2004 and found prairie rattlesnakes at 4 colonies with concentrations of snakes preparing for hibernation at 3 colonies. During the August 2005 survey, a large male rattlesnake was observed traveling through colony #16 (this colony was not part of the October 2004 survey), and an adult (female?) rattlesnake was found in a series of badger burrows near the top of an east facing ridge in colony #8. Such sites close to hibernaculum are reported as birthing areas for rattlesnakes.

Table 2. Summary of burrowing owls observed during the August 2001 and 2005 surveys of Grand River National Grassland prairie dog colonies. Burrowing owl survey results are reported as Number of owl families (F)/ Total number of owls observed (T)/Number of adults owls observed (A)/Number of juveniles owls observed (J). (NM = not mapped, * = total area based on a visual estimate, NS = not surveyed).

Colony No.	Colony Size (acres)		Burrowing Owls Observed	
	2001	2005	2001 F/T/A/J	2002 F/T/A/J
1	328	369	1/6/2/4	1/5/3/2
2	12	41	0/0/0/0	0/0/0/0
3	18	20*	0/0/0/0	0/0/0/0
4	8	10	1/5/2/3	2/9/4/5
5	14	46	2/10/4/6	3/11/6/5
6	22	55	2/11/4/7	3/15/6/9
7	270	166	2/11/4/7	1/2/2/0
8	524	513	7/34/14/20	2/4/3/1
9	20*	80*	2/9/3/6	3/13/3/9
10	31	27	0/0/0/0	2/4/3/1
11	2	11	0/0/0/0	0/0/0/0
12	5	26	0/0/0/0	0/0/0/0
13	10	51	0/0/0/0	1/6/2/4
14	20	53	1/4/1/3	0/0/0/0
15	31	35	1/4/2/2	0/0/0/0
16	1	10	0/0/0/0	0/0/0/0
17	20	NM	1/3/0/3	NS Private
18	2	5*	0/0/0/0	0/0/0/0
19	2	5*	0/0/0/0	0/0/0/0
20	17	46	0/0/0/0	0/0/0/0
21	72	113	0/0/0/0	0/0/0/0
22	101	133	3/18/5/13	1/5/2/3
23	84	164	6/27/12/15	3/23/6/17
24	129	123	3/9/6/3	2/4/3/1
25	2	1	0/0/0/0	1/3/1/2
26	35	48	1/4/1/3	1/3/2/1
27	4	5	0/0/0/0	0/0/0/0
28	10*	20*	1/6/2/4	0/0/0/0
29	40*	60*	1/4/2/2	4/15/8/7

Table 2 continued:

Colony No.	Colony Size (acres)		<u>Burrowing Owls Observed</u>	
	2001	2005	2001 F/T/A/J	2002 F/T/A/J
30	NM	20*	NS	1/5/3/2
31	NM	1	NS	0/0/0/0
32	NM	1	NS	0/0/0/0
33	NM	2	NS	1/2/1/1
34	NM	3	NS	0/0/0/0
35	NM	1	NS	0/0/0/0
36	NM	1	NS	0/0/0/0
37	NM	2	NS	0/0/0/0
38	NM	4	NS	0/0/0/0
39	NM	40*	NS	0/0/0/0
Total			35/165/64/101	31/127/57/69

Table 3. List of prairie dog colonies found on and adjacent to the Grand River National Grassland showing land ownership (FS = Forest Service, PRVT = Private, BR = Bureau of Reclamation, RES = Reservation), acreage (2001/2002/2005), and location. (*Colony partially or totally located on private land; total acreage is an estimate)

Colony No.	Land Ownership	Acreage	Colony Location	
			Deg. N Latitude	Deg. W Longitude
1	FS	328/323/369	45.69093	102.22195
2	FS	12/18/41	45.71135	102.20990
3	BR	18/ /20*	45.75425	102.18830
4	FS	8/9/10	45.80000	102.11380
5	FS	14/18/46	45.80861	102.06730
6	FS	22/20/55	45.80210	102.06386
7	FS	270/270/166	45.71978	102.09891
8	FS	524/461/513	45.60955	101.99365
9	FS/RES	20/40/80*	45.61756	101.91145
10	FS	31/30/27	45.58610	102.40576
11	FS	2/ 2/11	45.58483	102.42755
12	FS	5/14/26	45.61516	102.42395
13	FS	10/20/51	45.58421	102.41333

Table 3 continued:

Colony No.	Land Ownership	Acreage	Colony Location	
			Deg. N Latitude	Deg. W Longitude
14	FS/PRVT	20/44/53	45.57673	102.41325
15	FS	31/34/35	45.58641	102.46701
16	FS	1/ 4/10	45.58590	102.53680
17	PRVT	20*/	45.61175	102.57346
18	PRVT	2*/	45.60317	102.56916
19	PRVT	2*/	45.60215	102.57640
20	FS	17/14/46	45.60183	102.56358
21	FS	72/72/113	45.62418	102.49021
22	FS	101/111/133	45.64130	102.54027
23	FS	84/96/164	45.65731	102.48910
24	FS	129/115/123	45.54103	101.93213
25	FS/PRVT	2 / 7/1	45.54515	101.98445
26	FS	35/34/48	45.62026	102.35103
27	FS/PRVT	4 /0/5	45.64698	102.47831
28	PRVT	10 / /20*	45.76131	102.39251
29	FS/PRVT	40 /50/60*	45.72811	102.03655
30	FS/PRVT	/20*	45.65825	102.17636
31	FS	/1	45.61884	102.35430
32	FS	/1	45.58335	102.40982
33	FS	/2	45.79634	102.08773
34	FS	/3	45.71657	102.24927
35	FS	/1	45.71505	102.23518
36	FS	/1	45.69631	102.18678
37	FS	/2	45.66088	102.18678
38	FS	/4	45.62513	102.42986
39	FS/PRVT	/40*	45.62142	102.42793

The 2001 and 2005 comparative burrowing owl survey show that burrowing owls selected for larger prairie dog colonies, and that owl use of the larger prairie dog colonies was more consistent than owl use of smaller colonies. These data also show that habitat provided by prairie dog colonies was very important to burrowing owls. If the grassland habitat surrounding prairie dog colonies were equally important to burrowing owls for hunting, and burrowing owls only needed prairie dog colonies for a nest burrow, then burrowing owl occupancy rate of smaller colonies would be similar to that observed for larger colonies. This was not the case and it was apparent that burrowing owls required large areas of high burrow densities and short vegetation.

The prairie dog colonies on the GRNG provide a block of important habitat for burrowing owls in northwestern South Dakota. This prairie dog complex extends onto the Standing Rock Reservation in North and South Dakota, and the total complex size may include over 750 colonies with over 40,000 acres of active prairie dog colonies (Knowles 2003b). The total burrowing owl population in this complex may exceed 1,000 adult birds and this is certainly a significant burrowing owl population on the northern Great Plains. The prairie dog colonies on the GRNG represent a good area to monitor this burrowing owl population within this large prairie dog complex because the Federal landownership eliminates access problems associated with private land and Reservation prairie dog colonies. The GRNG also has prairie dog acreage figures starting in 1985, and there are now 2 complete burrowing owl surveys. Further monitoring of burrowing owls on the GRNG would help establish a population trend for this burrowing owl population and help to identify factors that influence burrowing owl numbers.

ACKNOWLEDGMENTS

I would like to thank Doug Backlund, South Dakota Game, Fish, and Parks, for proposing this study in 2001, and for obtaining funding for this study in 2005. In 2005, this survey was funded by through a South Dakota Wildlife Diversity Grant. I would also like to thank Grand River National Grassland personnel for their assistance during both survey years.

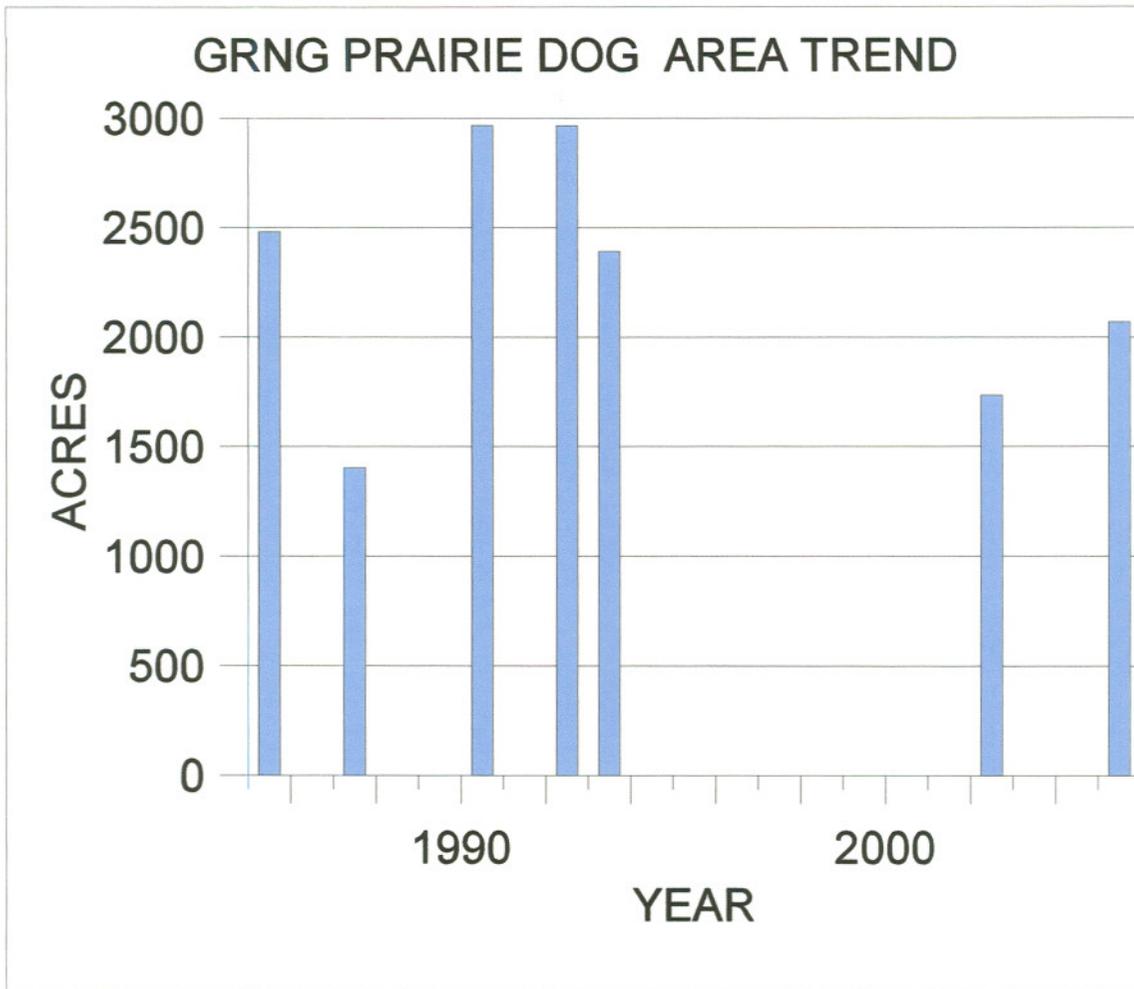


Figure 1. Grand River National Grassland prairie dog area trend from 1985 to 2005.

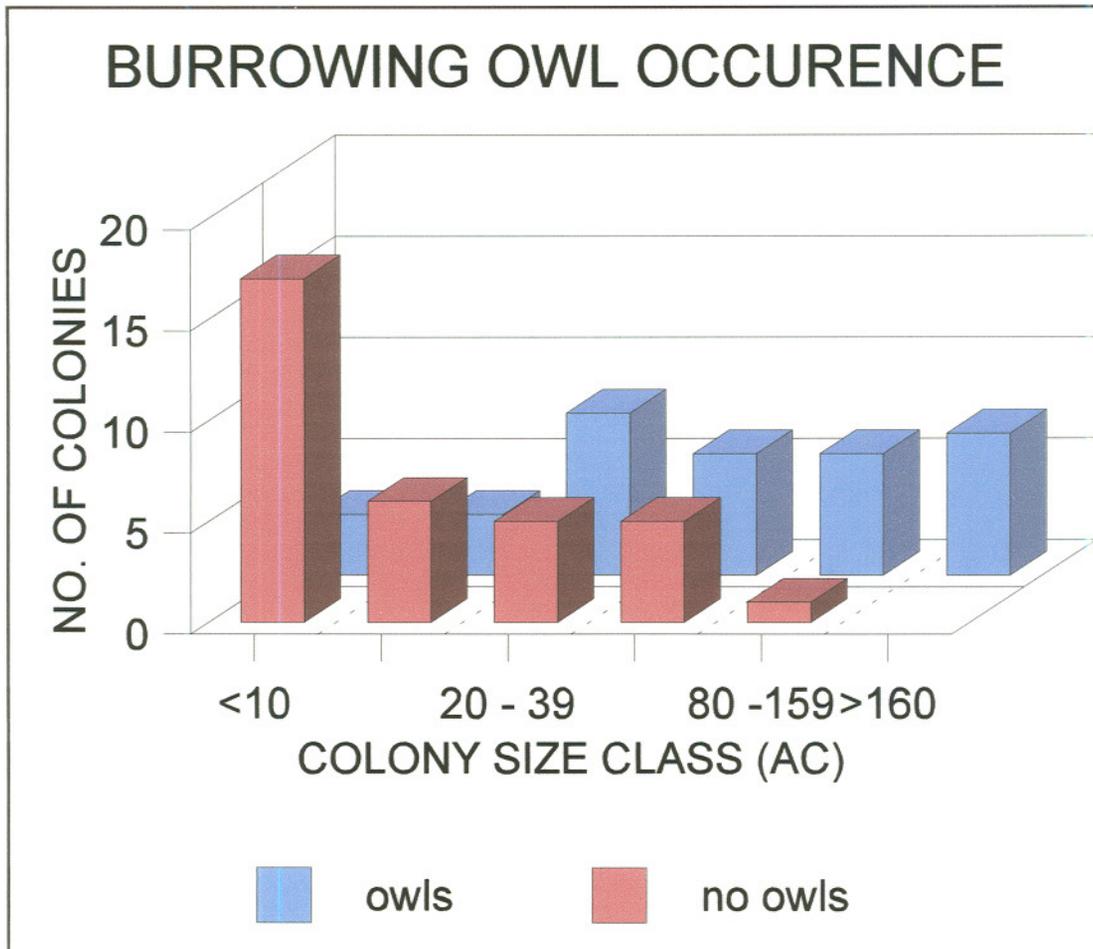


Figure 2. Distribution of prairie dog colony size classes for colonies with and without burrowing owls on the GRNG in 2001 and 2005.

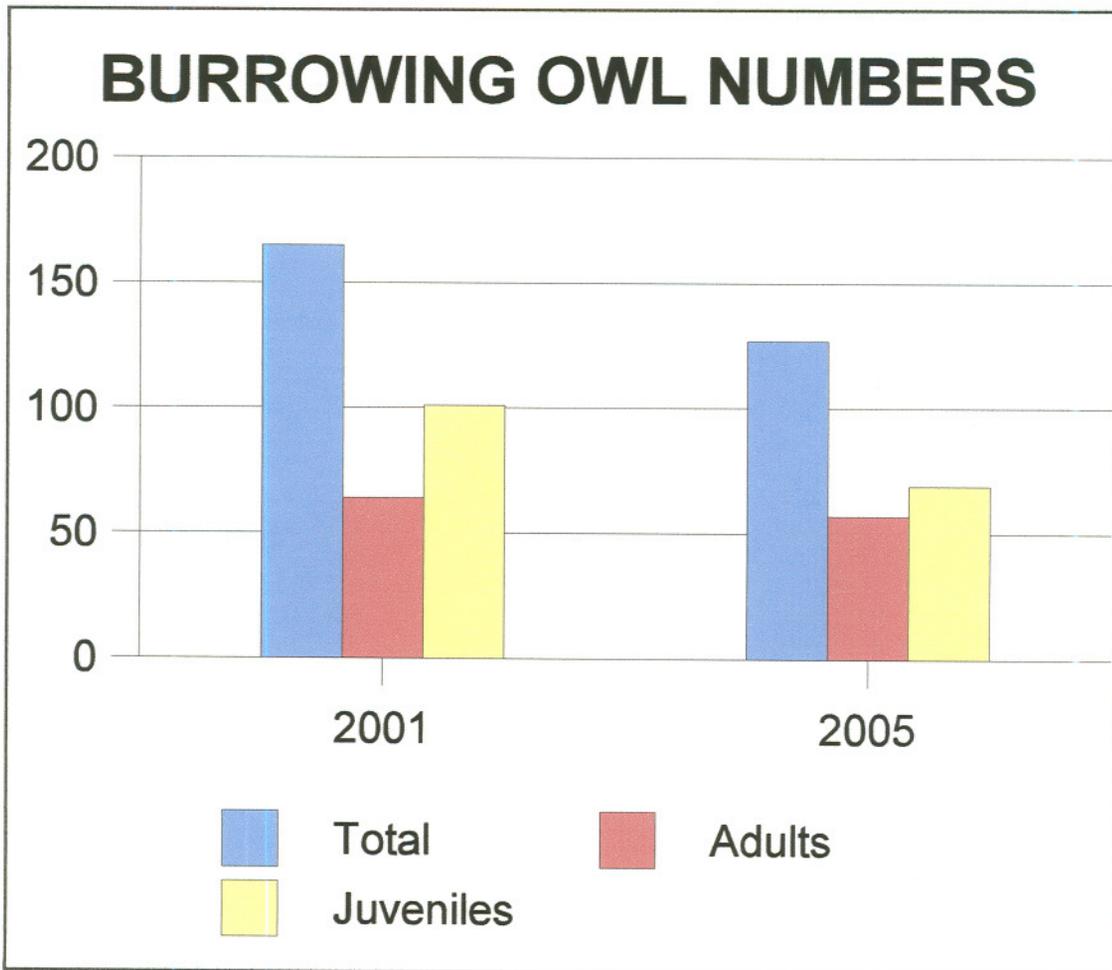


Figure 3. Total number of burrowing owls observed in 2001 and 2005, and number of owls classified as adults and juveniles

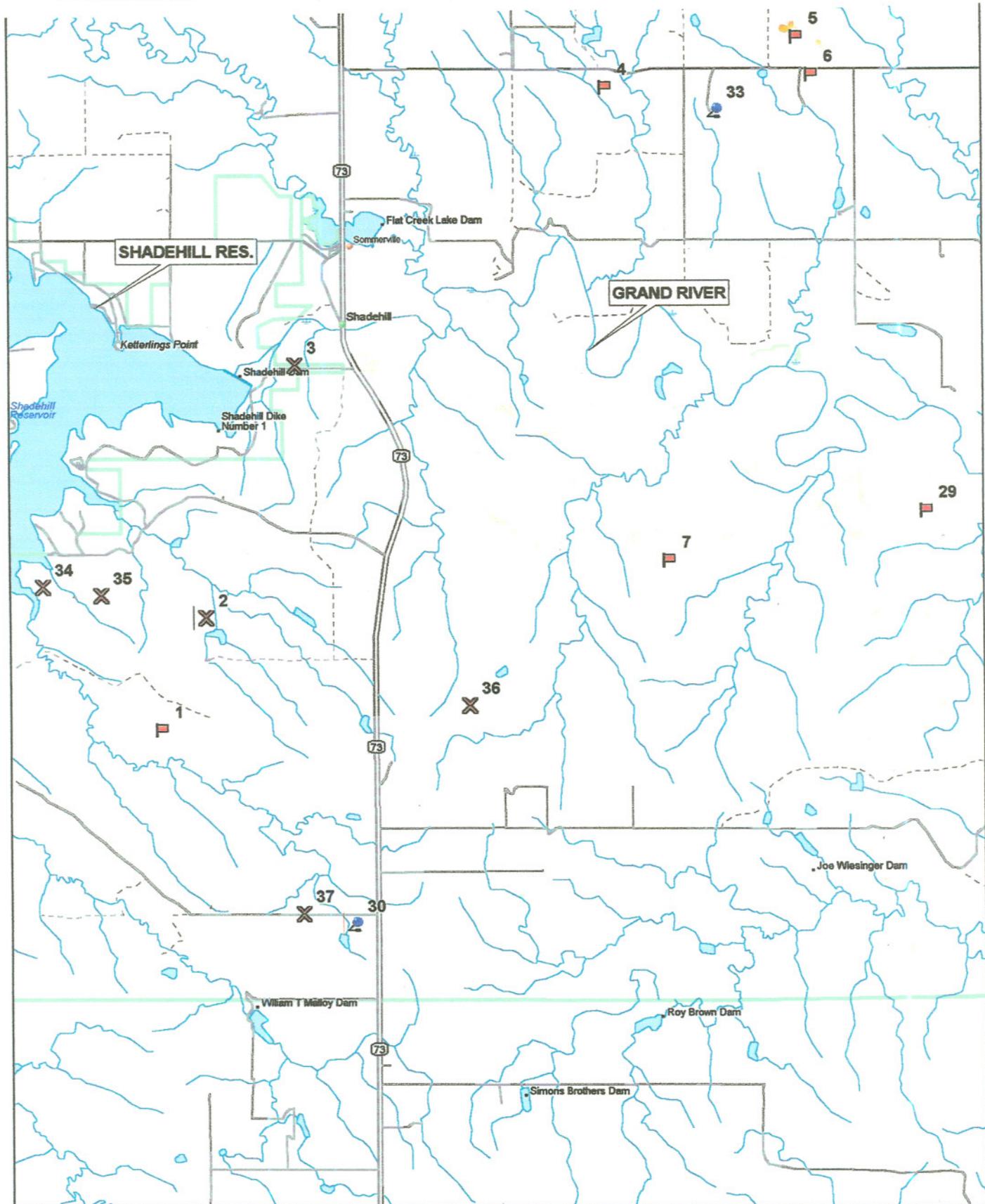
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APPENDIX A

**MAPS SHOWING THE LOCATION AND COLONY NUMBER
OF PRAIRIE DOG COLONIES SURVEYED DURING
2001 AND 2005**

Figure A-1. Map of the northeastern portion of the study area showing the location of prairie dog colonies where burrowing owl were observed during both survey years (red flags), one survey year (blue pin), or not observed (red X). Numbers correspond to colony numbers shown in Tables 2 and 3.



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 Zoom Level: 11-0 Datum: NAD27

Scale 1 : 100,000

1" = 1.58 mi



Figure A-2. Map of the southwestern portion of the study area showing the location of prairie dog colonies where burrowing owl were observed during both survey years (red flags), one survey year (blue pin), or not observed (red X). Numbers correspond to colony numbers shown in Tables 2 and 3.

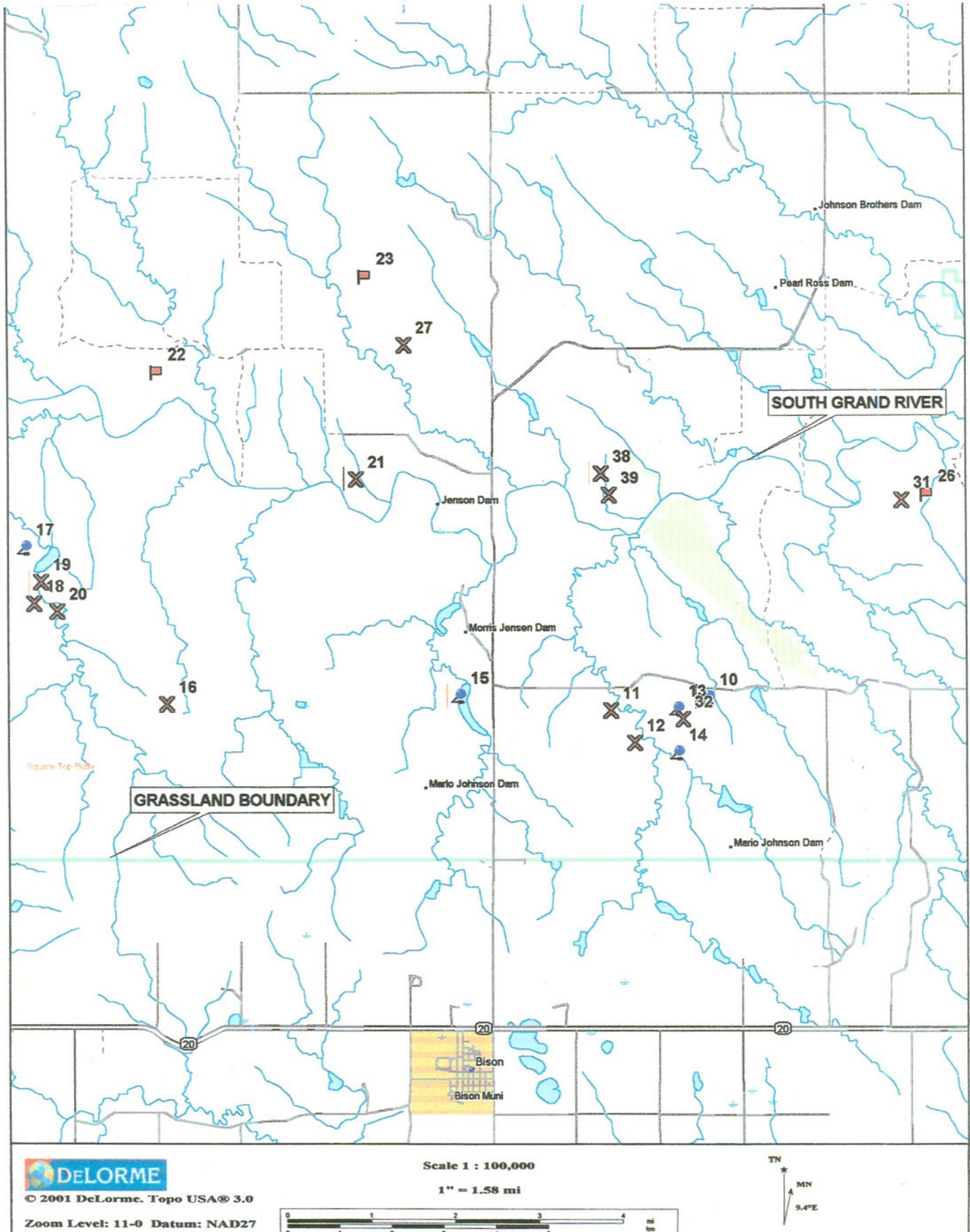


Figure A-3. Map of the southeastern portion of the study area showing the location of prairie dog colonies where burrowing owl were observed during both survey years (red flags), one survey year (blue pin), or not observed (red X). Numbers correspond to colony numbers shown in Tables 2 and 3.

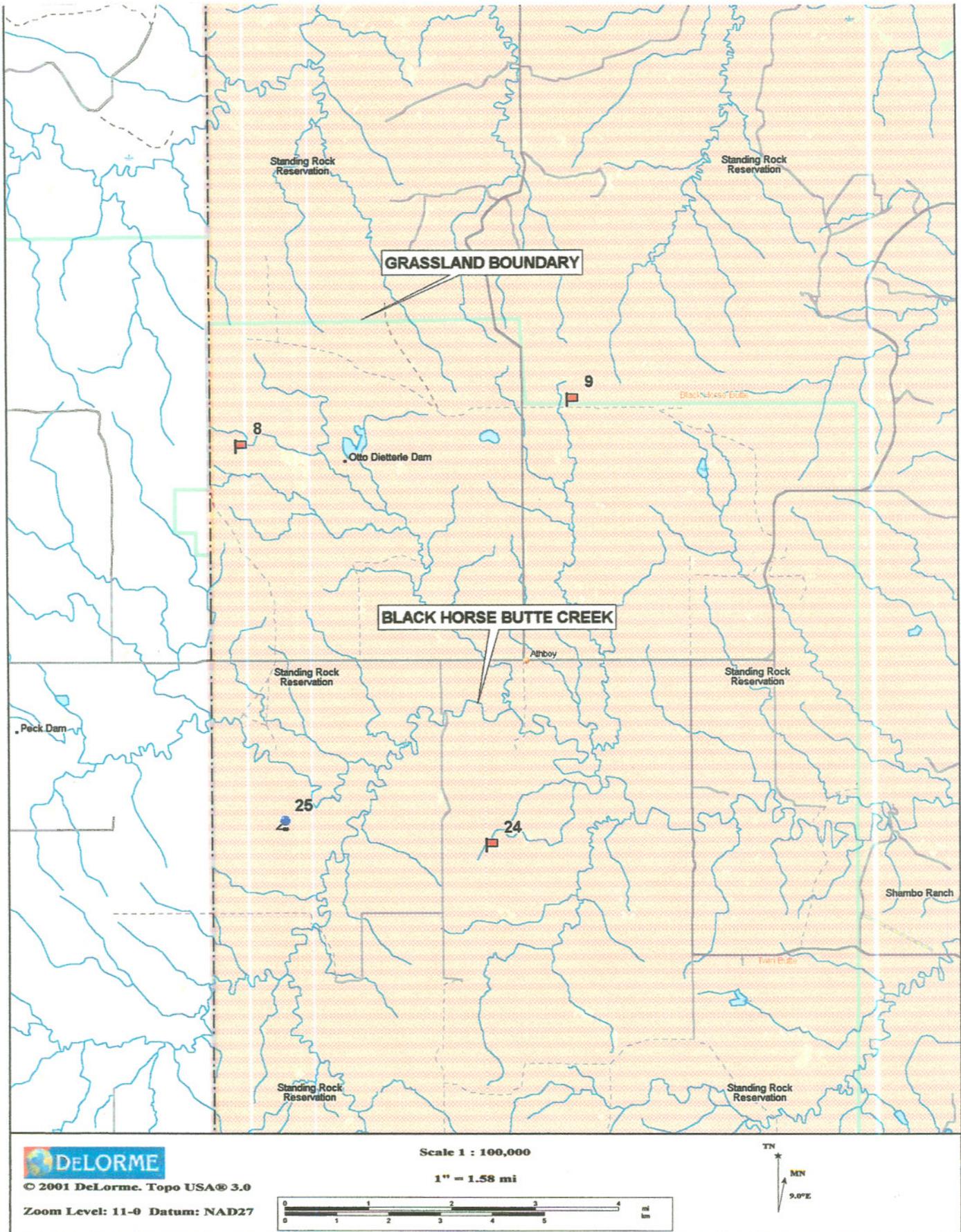
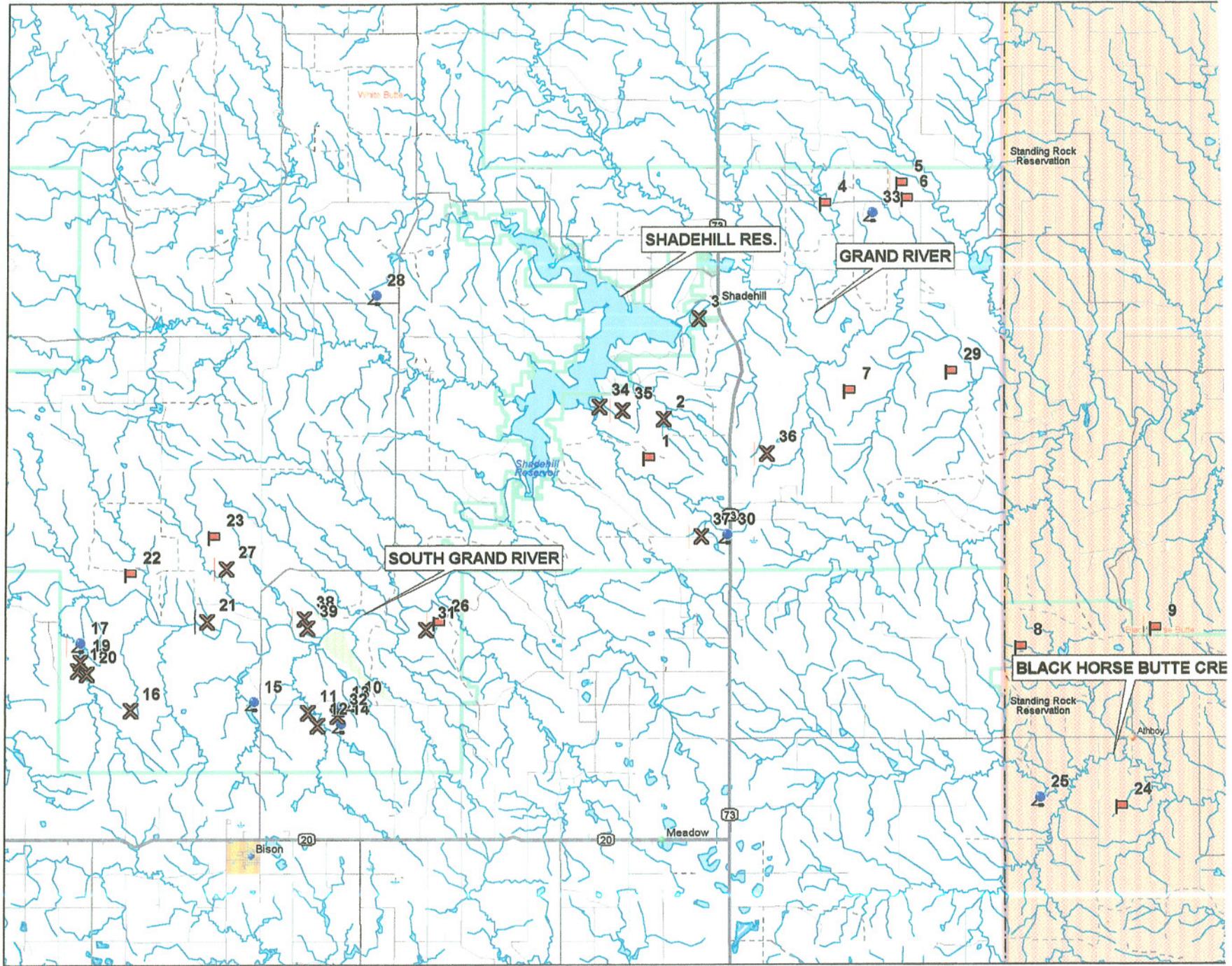


Figure A-4. Map of the entire study area showing the distribution of prairie dog colonies.



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Scale: 1 : 250,000 Zoom Level: 9-6 Datum: NAD27 Map Rotation: 0° Magnetic Declination: 9.2°E