Burrowing Owl Use of Cimarron, Comanche, and Rita Blanca National Grasslands

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Introduction

The Burrowing Owl (*Speotyto cunicularia*) is a small owl that is closely associated with prairie dogs (*Cynomys spp.*). The owls frequently live in abandoned prairie-dog burrows, and hunt on or near prairie dog towns for insects and small mammals. Burrowing Owls will also use the abandoned burrows of other mammals, such as ground squirrels (*Spermophilus spp.*) and badgers (*Taxidea taxus*) (Haug et al. 1993). Burrowing Owls occur throughout the western United States and Mexico. Northern populations are migratory, while more southerly populations are year-round residents (Haug et al. 1993). Central populations may contain a mix of both resident and migratory individuals (Butts 1976). Burrowing Owl is a U.S.D.A. Forest Service Region 2 Sensitive Species (Ryke et al. 1994) in need of monitoring and management.

Cimarron, Comanche, and Rita Blanca National Grasslands, located in the central to southern Great Plains, all contain populations of Burrowing Owls. We conducted surveys from May 1999 to April 2000 to determine population levels, time of occupancy, and time of nesting. The U.S.D.A. Forest Service conducted the surveys during the first half of the 12-month period with the Colorado Bird Observatory taking responsibility for the second half.

Study Sites

Cimarron National Grassland in southwest Kansas contains approximately 108,000 acres of shortgrass, midgrass, and sand sagebrush (*Artemisia filifolia*) prairie habitat. Precipitation is approximately 17 inches annually. We surveyed ten black-tailed prairie dog (*Cynomys ludovicianus*) towns, ranging in size from seven to 172 acres.

The Carrizo unit of Comanche National Grassland in southeast Colorado contains approximately 265,800 acres. Habitat includes shortgrass, midgrass, and sand sagebrush prairie. Annual precipitation is approximately 14-17 inches. We surveyed 12 black-tailed prairie dog towns, ranging in size from two to 120 acres.

Rita Blanca National Grassland in the western Oklahoma panhandle and northern Texas panhandle contains approximately 94,000 acres. Shortgrass and midgrass prairie habitats are present. Precipitation is approximately 17-18 inches annually. We surveyed nine black-tailed prairie dog towns, ranging in size from two to 157 acres.
Shortgrass prairie habitat is dominated by buffalo grass (*Buchloe dactyloides*) and blue grama

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(*Bouteloua gracilis*). Other species include red three-awn (*Aristida longiseta*) and broom snakeweed (*Gutierrezia sarothrae*). Soils are typically compact loams and clays.

Midgrass prairie habitat contains a variety of both short and tall grass species, including sand dropseed (*Sporobolus cryptandrus*), sand lovegrass (*Eragrostis trichodes*), sideoats grama (*Bouteloua curtipendula*), blue grama, western wheatgrass (*Pascopyrum smithii*), and bluestems (*Andropogon spp.*). Woody vegetation includes soapweed (*Yucca glauca*) and cholla cactus (*Opuntia imbricata*). Soils vary from sandy to clayey.

Sand sagebrush prairie is dominated by sand sagebrush and also contains a variety of primarily tall grasses. Common species include sand dropseed, sand lovegrass, and bluestems. Common forbs include ragweed (*Ambrosia spp.*) and sunflower (*Helianthus spp.*). Soils are sandy. While prairie dog towns were not typically located in sand sagebrush, several towns were located in pockets of midgrass or shortgrass surrounded by sand sagebrush habitat.

Methods

We set 31 prairie dog towns as the maximum number of towns which we could survey monthly, based on available resources. The number of prairie dog towns that we surveyed on each Grassland was proportional to each grassland's contribution to the total number of prairie dog towns on the three grasslands. Within each grassland, we classified all prairie dog towns by size-class, using 30-acre increments. The number of towns surveyed in each size-class was based on the proportion of towns on that grassland in each size class. We then randomly chose specific towns from within each size class (Table 1).

We surveyed each town once each month, conducting observations during morning (0700-1100) and evening (1600-2000) time periods when owls were most active. We did not conduct surveys if wind speeds exceeded 20 mph, since strong winds cause burrowing owls to seek shelter in burrows (pers. obs.).

At each prairie dog town surveyed, we established fixed viewing locations with one viewing location per 50 acres of dog town. We established additional locations when topography made it impossible to see an entire 50 acres. We conducted three 3-minute counts within a 30-minute time period (at 0 minutes, 15 minutes, and 27 minutes) at each viewing location. We attempted to minimize over- or under-counting owls at towns with more than one viewing location by noting movements between viewing locations.

Results

Monthly counts of owls per town ranged from 0 to 71 owls, with each town having owls present during at least one of the months surveyed. We calculated mean maximum density of owls/acre for each town size-class for each grassland (Table 2). These calculations, utilizing the maximum count for each town, indicate higher owl densities on towns in the 0-30 and 31-60 acre size classes than on the larger prairie dog towns. There is a positive linear correlation (R^2=0.1795, slope=0.1282)

between number of owls and dog town acreage (Fig. 2).

From an August peak total of 445 owls on all three grasslands, numbers gradually declined to November at which time we found only two (Fig. 1; raw data in Appendix A). The monthly rates of departure from the towns were 25.6% (August to September), 34.2% (September to October), and 39.8% (October to November). Numbers remained stable at a very low level until March. Owls arrived steadily during March (115 owls) and April (104 owls).

Discussion

Smaller prairie dog towns (0-60 acres) support more burrowing owls per acre than do larger towns (61-180 acres). This may be due to a higher edge/area ratio at smaller towns. Edges may be favored by owls due to increased prairie dog activity (Hughes 1993) and burrow availability (Butts 1973; Desmond et al. 1995). There may also be increased prey availability along edges or in neighboring habitat due to increased vegetative structure and diversity (pers. obs.). While smaller towns had higher owl densities, larger towns contained many of the largest owl populations. For towns larger than 60 acres, there was little change in owl density with increasing town acreage, although comparisons are limited by the scarcity of larger towns. Of the five towns with maximum counts of $\geq$30 owls, four had acreages exceeding 100 acres. It is not known how population size may affect factors such as reproductive success, predation rates, and genetic exchange. These and other questions should be answered before determining that smaller prairie dog towns are "better" habitat for Burrowing Owls than larger towns.

Burrowing Owls begin nesting in early May and continue through July. We determined this nesting period by the observation of young of the year at burrow entrances from mid-June through mid-August and subtracting an incubation period of 28-30 days (Zarn 1974, Henny and Blus 1981, Olenick 1990) and a two-week period between hatching and appearance above ground (Haug et al. 1993). The increasing trend in numbers through the summer (June-August) is undoubtedly due to the appearance of young above ground.

Owls departed through the fall (September-November) with wintering numbers stabilized by November. The population on the three grasslands is virtually completely migratory as we only found three individuals during the winter, two on Rita Blanca and one on Cimarron. Previous work in the area of the Rita Blanca also found very low numbers of wintering Burrowing Owls (Butts 1976). Owls began arriving in March and overall numbers of adults peaked in April with a slight decline in May (Fig. 1). This suggests that these towns were utilized by through-migrant owls in spring, although we cannot discount the possibility that initiation of nesting caused the observed decline. Additionally, as the April and May counts were in different years, differing numbers of local breeders could also cause this difference.

Summary

Burrowing Owls were observed on all prairie dog towns surveyed on Cimarron, Comanche, and Rita Blanca National Grasslands between May 1999 and April 2000. Owl densities per acre were greater on towns from 0-60 acres in size than they were on larger towns, however, there is a direct relationship between town size and total number of owls. Nesting occurs from May through July. These three grasslands do not provide wintering habitat for Burrowing Owls; virtually all breeding owls leave.

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Table 1. Number of prairie dog towns surveyed for Burrowing Owls by size class and location.

	0-30 ac	31-60 ac	61-90 ac	91-120 ac	121-150 ac	151-180 ac	Totals
Cimarron	5	1	1	1	1	1	10
Comanche	7	2	1	2	0	0	12
Rita Blanca	5	3	0	0	0	1	9
Totals	17	6	2	3	1	2	31

Table 2. Mean maximum Burrowing Owl densities (owls/acre) by prairie dog town size-class and location. NA = Not available, due to absence of a town in the given size-class.

	0-30 ac	31-60 ac	61-90 ac	91-120 ac	121-150 ac	151-180 ac
Cimarron	0.71 (SE=0.43)	1.73	0.10	0.13	0.22	0.05
Comanche	1.55 (SE=1.46)	0.52 (SE=0.22)	0.19	0.36 (SE=0.07)	NA	NA
Rita Blanca	1.33 (SE=1.12)	0.27 (SE=0.05)	NA	NA	NA	0.29
Combined	1.24 (SE=1.14)	0.60 (SE=0.58)	0.15 (SE=0.07)	0.29 (SE=0.15)	0.22	0.17 (SE=0.17)

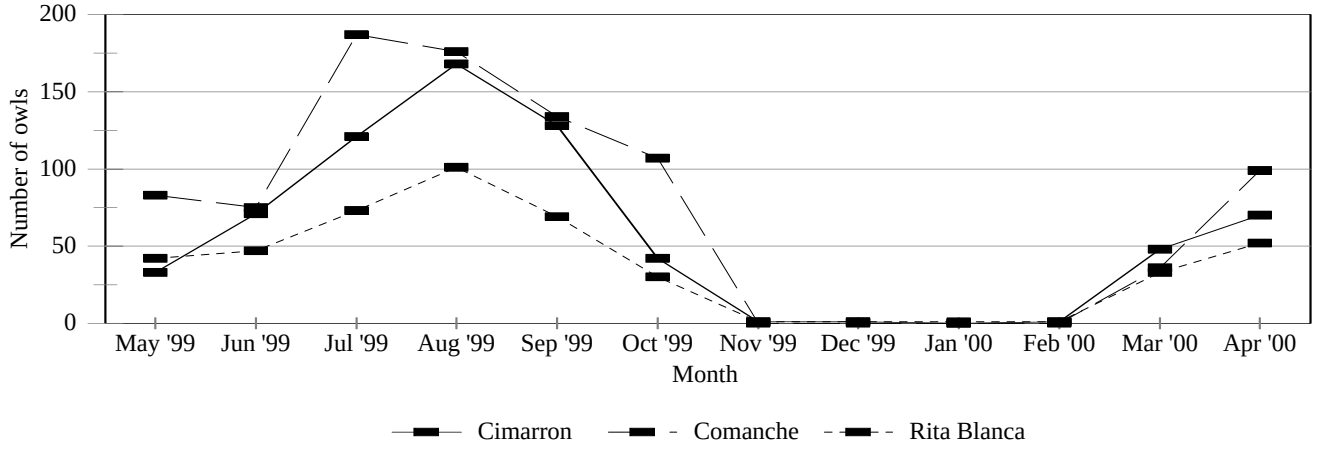

Figure 1. Monthly counts of Burrowing Owls on three National Grasslands, May 1999-April 2000.

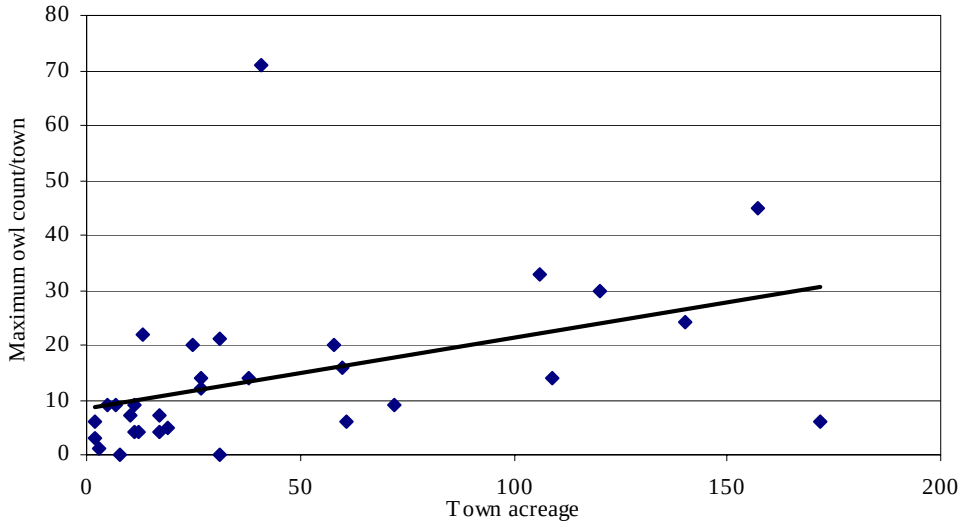

Figure 2. Regression analysis of maximum owl counts vs. dog town acreage on three National Grasslands, May 1999-April 2000 (R^2=0.1795, slope=0.1282).