

OCCURRENCE OF BURROWING OWLS IN BLACK-TAILED PRAIRIE DOG COLONIES ON GREAT PLAINS NATIONAL GRASSLANDS

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ABSTRACT.—The United States Department of Agriculture (USDA) Forest Service classifies the Burrowing Owl (*Athene cucularia*) as a sensitive species on Great Plains National Grasslands, although no grassland-wide assessment had been conducted prior to the survey described here. During spring and summer 1998, most black-tailed prairie dog (*Cynomys ludovicianus*) colonies on National Grasslands were examined for the presence of Burrowing Owls. Of 582 colonies examined for Burrowing Owls, 444 (76%) showed signs of black-tailed prairie dog activity. Remaining colonies examined ($N = 138$) were inactive due to sylvatic plague (*Yersinia pestis*), shooting, or poisoning. We observed Burrowing Owls at 322 (55%) of the 582 colonies; owls were detected on 307 (69%) of 444 active colonies and 15 (11%) of 138 inactive colonies. Among National Grassland units, the percentage of colonies occupied by owls ranged from 16–93%. Burrowing Owl occupancy of active black-tailed prairie dog colonies was higher in the southern Great Plains (93%) than in the northern Great Plains (59%). National Grasslands occur primarily in the western Great Plains from North Dakota to Texas and encompass approximately 1.5 million ha of short- and mixed-grass prairie, most of which is potential habitat for black-tailed prairie dogs. Of this potential habitat, prairie dog colonies currently occupy 17 075 ha. Thus, there is substantial

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National Grassland area for prairie dog colonies to increase and provide additional nesting opportunities for Burrowing Owls.

KEY WORDS: *Burrowing Owl*; *Athene cunicularia*; *black-tailed prairie dog*; *Cynomys ludovicianus*; *breeding distribution*; *survey*; *National Grasslands*; *Great Plains*.

Ocurrencia de los Búhos Cavadores en colonias de perros de la pradera en los Pastizales Nacionales de las Grandes Llanuras

RESUMEN.—El Servicio de Bosques del Departamento de Agricultura de los Estados Unidos (USDA) clasificó al Búho Cavador (*Athene cunicularia*) como una especie sensitiva en los Pastizales Nacionales de las Grandes Llanuras, aunque una extensa evaluación en zonas sin pastizales ha sido conducida antes del estudio descrito aquí. Durante la primavera y verano de 1998, la mayoría de colonias de perros de la pradera de cola negra (*Cynomys ludovicianus*) en los Pastizales Nacionales fueron examinada buscando Búhos Cavadores. De 582 colonias examinadas, 444 (76%) mostraron señales de actividad de los perros de la pradera. Las colonias examinadas restantes ($N = 138$) estaban inactivas debido a la plaga de (*Yersinia pestis*), caza, o envenenamiento. Observamos Búhos Cavadores en 322 (55%) de las 582 colonias: los búhos fueron detectados en 307 (69%) de las 444 colonias activas y 15 (11%) de las 138 colonias inactivas. Entre las unidades de los Pastizales Nacionales, el porcentaje de colonias ocupadas por los búhos estuvo en el rango de 16–93%. La ocupación del Búho Cavador de colonias activas de perros de la pradera de cola negra fue mas alta en las Grandes Llanuras del sur (93%) que en las Grandes Llanuras norteñas (59%). Los Pastizales Nacionales ocurren ante todo en las Grandes Llanuras occidentales desde Dakota del Norte a Texas y comprenden aproximadamente 1.5 millones de ha de praderas de hierbas cortas y mixtas, la mayoría de las cuales son hábitats potenciales para los perros de la pradera de cola negra. De estos hábitats potenciales, las colonias de perros de la pradera actualmente ocupan 17 075 ha. De tal manera, que allí hay un área substancial de Pastizales Nacionales para colonias de perros de la pradera que pueden incrementar y proveer de oportunidades adicionales de anidación para los Búhos Cavadores.

[Traducción de Victor Vanegas y César Márquez]

The Great Plains constitutes at least one-third of the breeding range of the Burrowing Owl (*Athene cunicularia*) in North America (Haug et al. 1993, Sheffield 1997). Within this region, burrows of black-tailed prairie dogs (*Cynomys ludovicianus*) provide nest sites for Burrowing Owls (Butts and Lewis 1982, Desmond 1991). Historically, the main source of nest burrows in the Great Plains must also have been the estimated 40–100 million ha of black-tailed prairie dog colonies (hereafter, 'colonies') that occurred in short- and mid-grass prairies (Anderson et al. 1986, Mulhern and Knowles 1996).

Indeed, enormous colonies were not uncommon. Merriam (1902) stated that one colony in Texas covered approximately 65 000 km². However, such large colonies no longer exist. Conversion of grassland to cropland, intensive poisoning programs (Fagerstone and Ramey 1996), and sylvatic plague (*Yersinia pestis*; Cully 1993) have decimated the black-tailed prairie dog. Colony fragmentation is significant (Flath and Clark 1986); most remaining colonies are ≤ 40 ha in size and are isolated

from other colonies (USDA Forest Service unpubl. data). The black-tailed prairie dog, a keystone species (Kotliar et al. 1999, Kotliar 2000), is now a candidate for listing as a threatened species under the Endangered Species Act (ESA, United States Fish and Wildlife Service 2000).

Given the decline of the Burrowing Owl in Canada (Wellicome and Haug 1995, James and Espie 1997, Wellicome 1997), the Nebraska panhandle (Desmond et al. 2000), North Dakota (Murphy et al. 2001), and elsewhere in the Great Plains (James and Espie 1997), we decided to assess the occurrence of Burrowing Owls on Great Plains National Grasslands. The USDA Forest Service administers approximately 1.5 million ha of National Grasslands from North Dakota to Texas, and the Forest Service has classified the Burrowing Owl as a sensitive species. Accordingly, the species warrants monitoring and management to prevent it from decreasing toward threatened or endangered status under the ESA. Here, we quantify the presence and distribution of Burrowing Owls in most of these colonies. Although Burrowing Owls nest in

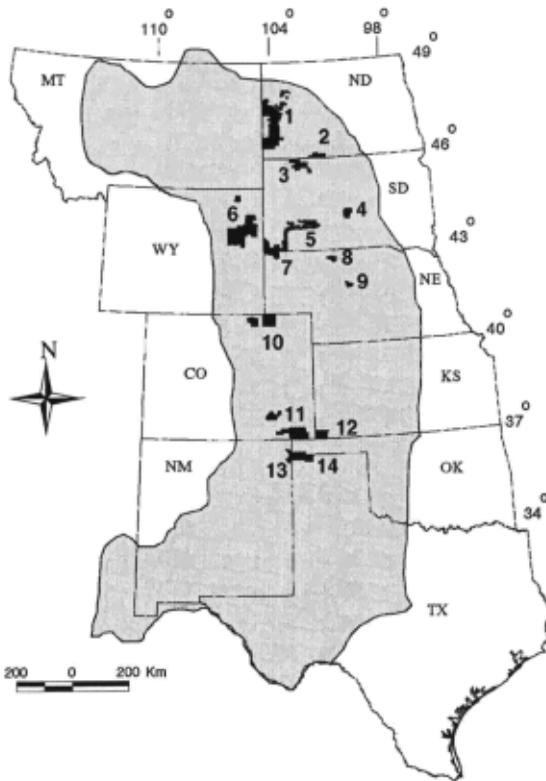


Figure 1. Location of Great Plains National Grasslands and Forests: 1 = Little Missouri, North Dakota; 2 = Cedar River, North Dakota; 3 = Grand River, South Dakota; 4 = Fort Pierre, South Dakota; 5 = Buffalo Gap, South Dakota; 6 = Thunder Basin, Wyoming; 7 = Oglala, Nebraska; 8 = McKelvie National Forest, Nebraska; 9 = Nebraska National Forest, Nebraska; 10 = Pawnee, Colorado; 11 = Comanche, Kansas; 12 = Cimarron, Colorado; 13 = Kiowa, New Mexico; 14 = Rita Blanca, Oklahoma and Texas. The stippled area is the range of the black-tailed prairie dog.

badger (*Taxidea taxus*) and other mammalian burrows, the principal burrow habitat on National Grasslands is provided by black-tailed prairie dogs.

STUDY AREA AND METHODS

We located and mapped all colonies on National Grasslands (Fig. 1). National Grasslands that were surveyed are located in the Great Plains-Palouse Dry Steppe Province (Bailey 1995) and include short- and mixed-grass prairie with some valley and badlands topography. Most National Grasslands contain extensive areas of restored grasslands, which were in cropland through the 1930s.

Locations of most colonies on northern Great Plains National Grasslands were documented before this project began. During 1997–98, we calculated the area of all colonies largely through the use of differentially corrected

positional data acquired from the Global Positioning System (GPS) receivers. Aerial photography was used to map the colonies on most of the Buffalo Gap National Grassland (Schenbeck and Myhre 1986). In the southern Great Plains, we conducted an aerial survey to locate colonies on the Comanche, Kiowa, and Rita Blanca National Grasslands during 8–11 June 1998, and later used GPS receivers to map these colonies.

We defined active colonies as those showing black-tailed prairie dog activity throughout the entire burrow system or in part of the burrow system. An inactive colony showed no black-tailed prairie dog activity but retained an intact burrow system and, thus, the potential for Burrowing Owl nesting.

We assessed occurrence of Burrowing Owls on active and inactive black-tailed prairie dog colonies at all National Grassland units containing colonies (Table 1), except Oglala and two National Forest units in Nebraska that are largely grassland with 28 ha of colonies. We determined the presence of owls within each colony through visual observation (binoculars and spotting scopes) from vantage points and by walking or driving through colonies. We spent 20–60 min in each colony between 0600–2000 H. To determine nest occupancy, we looked at burrow mounds for excrement, prey remains, food pellets, eggshell fragments, and feathers (California Burrowing Owl Consortium 1997).

RESULTS

There are 17 075 ha of black-tailed prairie dog colonies on National Grasslands, representing 1.09% of the total National Grassland land base (1 556 048 ha). The percentage of the land-base occupied by black-tailed prairie dog colonies (active + inactive) within National Grasslands ranged from 0% on Cedar River to 3.26% on Thunder Basin (Table 1). Four-hundred forty-four (76%) of 582 colonies examined were active with black-tailed prairie dogs. Comanche and Buffalo Gap had the largest number of the remaining 138 inactive colonies. These colonies were inactive due to sylvatic plague and poisoning. We observed Burrowing Owls at 322 (55%) of the 582 colonies: 307 (69%) of the 444 active colonies had owls and 15 (11%) of the 138 inactive colonies had owls (Fig. 2).

On northern Great Plains National Grasslands (Pawnee, Thunder Basin, Buffalo Gap, Fort Pierre, Grand River, and Little Missouri), 330 (87%) of the 378 colonies examined were active and 48 (13%) were inactive. Burrowing Owls occurred on 196 (59%) of the active colonies and 12 (24%) of the inactive colonies. Most of the inactive colonies were those recently poisoned on the Fall River ranger district of the Buffalo Gap. One colony on Fort Pierre appeared to be inactive because of intensive shooting, and colonies on Pawnee may

Table 1. Black-tailed prairie dog colonies and Burrowing Owl surveys on Great Plains National Grasslands.

NATIONAL GRASSLAND	SIZE (ha)	HABITAT OCCUPIED BY PRAIRIE DOGS		% COLONIES SURVEYED ^a	SURVEY DATE
		ha	% TOTAL		
Little Missouri	462 705	1050	0.23	64	14–30 Aug.
Cedar River	2 723	0	0.00	—	—
Grand River	62 717	643	1.03	100	13–16 July
Fort Pierre	46 941	291	0.61	100	2–24 June, 6–10 July
Buffalo Gap	241 666	5370	2.22	82	June–July
Thunder Basin	226 688	7381	3.26	68	15 June–15 July
Oglala	38 234	300	0.78	0	—
Nebraska ^b	36 488	28	0.07	0	—
McKelvie ^b	46 966	0	0.00	—	—
Pawnee	78 127	296	0.38	100	7 July–11 Aug.
Comanche	176 181	556	0.31	100	15–26 June
Cimarron	43 776	521	1.19	100	29 June–5 July
Kiowa	55 205	248	0.45	100	29 June–1 July
Rita Blanca	37 631	391	1.04	100	29 June–1 July

^a Colonies surveyed by observing from nearby vantage points (all units) and also by driving (Thunder Basin) or walking (nine other units) through colonies.

^b Units of the Nebraska National Forest (largely grassland).

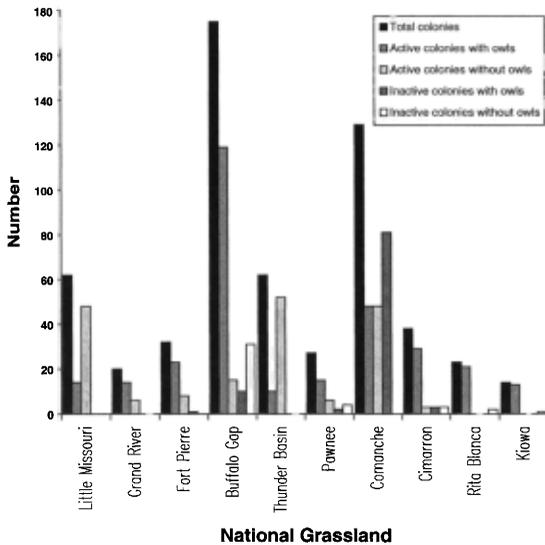


Figure 2. The number and activity status of black-tailed prairie dog colonies observed with and without breeding Burrowing Owls during 1998 at black-tailed prairie dog colonies on Great Plains National Grasslands.

have been inactive because of sylvatic plague. The percentage of colonies occupied by Burrowing Owls ranged from 16% on Thunder Basin to 75% on Grand River.

On southern Great Plains National Grasslands (Cimarron, Comanche, Kiowa, Pawnee, and Rita Blanca), 114 (56%) of the 204 colonies examined were active and 90 (44%) were inactive. Colonies destroyed by sylvatic plague on Comanche accounted for 90% of the inactive colonies. Burrowing Owls were detected on 111 (97%) of the active colonies and three (3%) of the inactive colonies. The percentage of colonies occupied by Burrowing Owls ranged from 37% on the Comanche to 93% on the Kiowa.

DISCUSSION

Burrowing Owls appear to prefer active black-tailed prairie dog colonies (Butts 1973). Burrowing Owls on National Grasslands were more commonly present in active colonies than in inactive colonies (Fig. 2), and tend to be more common in active colonies than in areas containing badger burrows (Desmond 1991, Desmond and Savidge 1996). Colonies destroyed by poisoning or plague harbor a declining number of breeding pairs of owls in successive years. In the absence of black-tailed prairie dog activity, burrows fill in and become unusable

to the owls. Furthermore, predation rates on the owls are higher at abandoned black-tailed prairie dog colonies than at active colonies (Desmond et al 2000).

There is no apparent explanation for the low percentage of black-tailed prairie dog colonies containing Burrowing Owls on Thunder Basin (16%; Fig. 2). M. Desmond (unpubl. data) surveyed Thunder Basin black-tailed prairie dog colonies in 1995 and saw no Burrowing Owls. Late survey dates (August) may explain the low percentage (22%) of colonies observed with Burrowing Owls at the Little Missouri.

Our data indicate that Great Plains National Grasslands provide a limited number of black-tailed prairie dog colonies, and thus, limited breeding habitat for Burrowing Owls (Table 1). Modeling of habitat potential (based upon soils, slope, and vegetation) on northern Great Plains National Grasslands indicates that habitat potentially-suitable for prairie dogs comprises >70% of each grassland; however, only 1.9% of this potential habitat is currently occupied by black-tailed prairie dog colonies (USDA Forest Service unpubl. data). Modeling of southern Great Plains National Grasslands likely will indicate that most of those grasslands are also potential habitat for prairie dogs.

Availability of burrows is extremely important for the long-term viability of the Burrowing Owl population (Zarn 1974, Desmond et al. 1995, Desmond and Savidge 1996). National Grasslands and other federal lands represent 1% of the U.S. Great Plains. National Grasslands typically are fragmented, making reestablishment of extensive colonies (e.g., Merriam 1902) difficult without land exchange and consolidation. The Burrowing Owl is a sensitive species for which population viability is a concern, as evidenced by declines in population size and availability of habitat, and the consequent reduction in the species' distribution.

The United States Fish and Wildlife Service (2000) determined that the black-tailed prairie dog warrants listing as a threatened species under the ESA. This should induce land management agencies to maximize their efforts to protect and restore black-tailed prairie dog colonies. National Grasslands are part of the U.S. National Forest System and are administered in compliance with the ESA, National Forest Management Act, National Environmental Policy Act, and other acts. In the past, colonies have been poisoned on National

Grasslands to the same extent as those on private land (Roemer and Forrest 1996). Poisoning has ended on National Grasslands, and management plans for northern Great Plains National Grasslands recommend increasing black-tailed prairie dog colonies (USDA Forest Service 2001). National Grasslands could serve as core reserves for black-tailed prairie dogs and associated declining species, including the Burrowing Owl (Wuerthner 1997).

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