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## DISTRIBUTION OF BURROWING OWLS IN EAST-CENTRAL SOUTH DAKOTA

Western burrowing owl (*Athene cunicularia hypugaea*) populations have declined across much of western North America, particularly at the northern and eastern edges of the species' breeding range (Martell et al. 2001, Murphy et al. 2001, Shyry et al. 2001, Skeel et al. 2001, Klute et al. 2003). In South Dakota, the burrowing owl is a summer resident that historically was relatively common throughout the state, but its range has decreased in recent decades, especially in the eastern half of the state (Whitney et al. 1978, South Dakota Ornithologists' Union [SDOU] 1991, Peterson 1995). Tallman et al. (2002) described the species as uncommon to locally common in western South Dakota, uncommon in the north-central part of the state, and casual (i.e., not within the species' normal range, but with 3–10 records in the past 10 years) elsewhere in the eastern half. The burrowing owl is a Species of Greatest Conservation Need (South Dakota Department of Game, Fish and Parks [SDGFP] 2006) and a Level I Priority Species in South Dakota (Bakker 2005).

Burrowing owls in South Dakota are strongly associated with colonies of semifossorial mammals, particularly black-tailed prairie dogs (*Cynomys ludovicianus*; hereafter prairie dogs) in the west and Richardson's ground squirrels (*Spermophilus richardsonii*; hereafter ground squirrels) in the east (Whitney et al. 1978, SDOU 1991, Peterson 1995, Tallman et al. 2002). Both of these species are commonly regarded as agricultural pests, and colonies are sometimes poisoned by farmers and ranchers (Matschke et al. 1982, Hoogland 2006). Localized extirpations of colonial burrowing mammals are frequently followed by declines in burrowing owl populations (Desmond et al. 2000, Holroyd et al. 2001, Klute et al. 2003, Poulin et al. 2011). Most prairie dog colonies in South Dakota are found in counties west of the Missouri River or bordering the river on the east (Kempema et al. 2009). Thiele (2012) documented widespread occurrence of burrowing owls nesting in prairie dog colonies in western counties; however, a small number of prairie dog and ground squirrel colonies do exist in eastern South Dakota. Burrowing owls also are known to utilize burrows created by other mammals, such as marmots (*Marmota* spp.), American badgers (*Taxidea taxus*), coyotes (*Canis latrans*), and foxes (*Vulpes* spp.), when otherwise suitable habitat (e.g., level to gently sloping grassland with few trees) is present (Johnsgard 2002, Dechant et al. 2003, Poulin et al. 2011).

The United States Geological Survey (USGS) Northern Prairie Wildlife Research Center (NPWRC) conducted long-term (2003–2012) research in east-central South Dakota that evaluated the impact of wind-energy facilities on grassland birds. The wind-energy facilities were BP Wind Energy's Titan facility (BP; Hand County, 44° 28.608'N, 99° 10.051'W), NextEra Energy's South Dakota Wind Energy Center (SDWEC; Hyde County, 44° 21.533'N, 99° 27.593'W), and Acciona's Tatanka facility (Tatanka; McPherson County, South

Dakota, and Dickey County, North Dakota, 45° 56.355'N, 99° 0.660'W). All three wind-energy facilities are located within the Missouri Coteau ecoregion (Bryce et al. 1998). The landscape surrounding the wind-energy facilities typifies the ecoregion description of Bluemle (1991) of morainely rolling plains interspersed with wetlands, mixed-grass prairie pastures, planted grasslands, hayfields, and cropland.

Although it was apparent that too few burrowing owls would be detected to determine whether wind-energy facilities were impacting the species, we knew that sighting information would help verify breeding status and current distribution in east-central South Dakota. Therefore, we recorded locations of burrowing owls found during formal grouse and grassland bird surveys using Global Positioning System (GPS) units, and recorded notes on number of adults and young, burrow type, and surrounding land use. We mapped perimeters of prairie dog colonies in which burrowing owls were located using GPS units. We conducted roadside lek-locating surveys for greater prairie-chickens (*Tympanuchus cupido*) and sharp-tailed grouse (*T. phasianellus*) in April and May from roads around and within wind-energy facilities following the methodology of the North Dakota Game and Fish Department (NDGF 1963). We conducted grouse surveys at SDWEC during 2005–2010 and 2012 across an annual survey region that comprised 57 km<sup>2</sup>. Similarly, we conducted grouse surveys at BP during 2008–2010 and 2012 across an annual survey region that comprised 88 km<sup>2</sup>. We conducted grouse surveys at Tatanka during 2007–2010 and 2012 across an annual survey region that covered 44 km<sup>2</sup> in South Dakota and 100 km<sup>2</sup> in North Dakota.

We conducted total-area avian surveys (Stewart and Kantrud 1972) at SDWEC during 2003–2006, 2008, 2010, and 2012; eight survey plots that ranged in size from 41 to 148 ha were surveyed. We conducted avian surveys at BP during 2008–2010; 3–4 plots ranging from 37 to 112 ha were surveyed. At Tatanka, we conducted avian surveys in one 29-ha plot in South Dakota during 2002–2003, 2010, and 2012. In North Dakota, we conducted avian surveys in 13 plots ranging from 6 to 108 ha during 2002–2010 and 2012. We established avian survey plots in grazed mixed-grass prairie within and adjacent to wind-energy facilities using grids of fiberglass posts arranged in parallel lines spaced approximately 200 m apart. We marked lines in 50-m intervals using wire flags or fiberglass posts. We recorded grid-point coordinates using GPS units. Observers recorded all birds seen and heard within 50 m of transects established within the grids. We marked observations on datasheets composed of U.S. Department of Agriculture National Agriculture Imagery Program images overlaid by grid and turbine locations. We conducted avian surveys 2–4 times annually from late May to early July, from 0.5 hr after sunrise to 1100 hrs, on days of good visibility and good aural detectability (e.g., days with little or no precipitation and with wind velocities not exceeding 40 kph). We did not conduct surveys during a steady drizzle, prolonged rain, or fog.

Table 1. Burrowing owl locations and observations in Beadle, Brown, Hand, and Hyde counties, South Dakota, 2003–2012.

County	Location	Legal description	Years	Observation	Burrow type	Surrounding land use
Brown	1	128 N – 65 W – 6 – NE	2008	one pair	badger	roadside adjacent to native pasture
Beadle	2	111 N – 64 W – 3 – NE	2010	one adult	badger	railroad grade in native right-of-way
Hand	3	112 N – 70 W – 34 – SW	2008	one pair	badger	roadside adjacent to native pasture
	4	112 N – 70 W – 5 – SE	2012	one adult, five chicks	badger	stock pond in native pasture
Hyde	5	114 N – 71 W – 2 – SW	2012	one pair	badger	native pasture
	6	114 N – 71 W – 15 – SE	2012	one pair	badger	native pasture
	7	114 N – 71 W – 22 – NE	2012	one pair, one to two chicks	badger	native pasture
	8	114 N – 72 W – 36 – NW	2012	one pair	badger	native pasture
	9	111 N – 72 W – 17 – NW	2012	one pair, six chicks	prairie dog	32 ha prairie dog colony in native pasture (Cowan Waterfowl Production Area)
	10	111 N – 72 W – 25 – SW	2003-04, 2006	one pair each yr, three chicks seen 2006	prairie dog	21 ha prairie dog colony in native pasture
	11	111 N – 72 W – 34 – SE	2012	one adult, one chick	prairie dog	65 ha prairie dog colony in native pasture
	12	110 N – 72 W – 3 – NW	2007	one pair	unknown	native pasture
	13	110 N – 72 W – 12 – NE	2008	one pair	unknown	native pasture
	14	110 N – 72 W – 9 – NW	2003-04, 2006, 2008, 2012	one pair each yr, one to two chicks seen in 2003, 2006, and 2012	prairie dog	61 ha prairie dog colony in native pasture
	15	110 N – 72 W – 9 – NE	2003-04, 2006, 2008, 2012	one to two adults each yr except for two pairs and four chicks in 2012	prairie dog	61 ha prairie dog colony in native pasture
	16	110 N – 72 W – 10 – NW	2006, 2012	one adult in 2006, one pair and three chicks in 2012	prairie dog	1 ha prairie dog colony in native pasture
	17	110 N – 72 W – 13 – NW	2007	one adult	badger	native pasture
	18	110 N – 72 W – 14 – SW	2010	one adult	unknown	bird seen near edge of stock pond in native pasture
	19	110 N – 71 W – 15 – SW	2007	one adult	unknown	mown hayfield

In 2012, we sought out historical and current burrowing owl locations in east-central South Dakota from B. Jamison, Biologist, U.S. Fish and Wildlife Service Huron Wetland Management Office and from C. Mehls, Coordinator, SDGFP Natural Heritage Database. We queried T. Runia and S. Kempema, SDGFP biologists who were doing biological research in Hand and Hyde counties. We consulted Peterson (1995) for records from the first South Dakota Breeding Bird Atlas (SDBBA1), conducted from 1988 to 1993, and we contacted N. Drilling of the Rocky Mountain Bird Observatory (RMBO) for records from the second Breeding Bird Atlas (SDBBA2), conducted from 2008 to 2012. We searched for records in the SDOU database (SDOU 2012), as well as in the Breeding Bird Survey (BBS) database (Sauer et al. 2011).

B. Jamison provided one location (Location 9; Table 1), which J. Thiele (JPT) visited during summer 2012 to determine current status. The Natural Heritage Database held no records for burrowing owls in our area of interest. T. Runia provided five locations (Locations 2, 5–8) discovered in 2012. Locations 1, 3–4, and 19 were discovered by NPWRC personnel while driving to study areas. In 2012, JPT revisited locations found in previous years, except for Location 19, which was not revisited due to time constraints. All other observations were located within the area covered by NPWRC grouse or avian surveys. Due to time constraints, we were not able to determine the precise locations and current status of those observations within the SDBBA, SDOU, and BBS databases, but rather we used those data to gauge how common burrowing owls were, and whether breeding had been established, within east-central South Dakota counties.

Based on both the wind-energy study and the queries to other organizations, burrowing owls were recorded at 19 locations in east-central South Dakota (Table 1) and at one location in Dickey Co., North Dakota (46° 10.21'N, 98° 43.85'W; one pair in a prairie dog colony in a pasture in 2008 and one adult in 2009). One observation each occurred in Beadle and Brown counties. Two observations occurred in Hand County and fifteen observations occurred in Hyde County. All burrowing owl locations occurred in grazed mixed-grass pastures or roadside and railroad rights-of-way adjacent to native pastures except Location 19, which occurred in a mown hayfield. All sites known to be occupied by burrowing owls in multiple years were in active prairie dog colonies; other burrows used by owls were created by badgers or of unknown origin. Breeding was confirmed at one location (Location 4) in Hand County and at seven locations (Locations 7, 9–11 and 14–16) in Hyde County. Of the grouse and avian surveys conducted at wind-energy facilities, only surveys at SDWEC yielded burrowing owls. Locations 10–11 and 14–16 occurred 322 to 805 m from the nearest wind turbine. Burrowing owls at these locations were observed in multiple years (with the exception of Location 11, which was discovered the last year of the study), and the burrowing owls occupied prairie dog colonies that were in existence prior to

turbine construction in 2003. Locations 12–13 and 17–18 occurred within the area surveyed for grouse or on avian plots without wind turbines (reference sites). Burrowing owls at these locations were not within prairie dog colonies and were each observed in just one year, suggesting that the solitary burrows of other mammal species do not provide stable conditions that favor long-term occupation.

To our knowledge, observations of a brood of burrowing owl chicks at Location 4 in 2012 represent the only confirmed breeding record in Hand County. Burrowing owls were recorded as possible or probable breeders in three atlas blocks in Hand County during the SDBBA1 and in three locations during SDBBA2. South Dakota Ornithologists' Union reported observations of burrowing owls during the breeding seasons of 1988, 1990, 2006, 2010, and 2011, but no owls were confirmed as breeding individuals or pairs. Hand County contained a single BBS route, but approximately half of this route lay in Buffalo County to the south. This survey route has been completed 16 times since 1967. Burrowing owls were recorded sporadically on this route in the 1960s and 1970s, though the records did not indicate which county. In 1976, 15 burrowing owls were recorded. After 1976, the route was only surveyed in 2000 and from 2006 to 2010; no burrowing owls were recorded.

We confirmed breeding by burrowing owls at seven locations in Hyde County in 2003, 2006, and 2012. Burrowing owls have not been documented as a breeding species in Hyde County since Harris et al. (1977) reported several nesting pairs in Hyde County. However, landowners in our Hyde County study area have observed burrowing owls on their property since at least the 1950s, although no formal records have been maintained (J. M. Runestad and J. T. Runestad, personal communication). The SDGFP Natural Heritage Database had no breeding records for Hyde County, but a Hyde County landowner did report a group of burrowing owls in a pasture in 1994; it was never confirmed as a family group (C. Mehls, SDGFP Natural Heritage Database, personal communication). No observations of burrowing owls occurred in Hyde County during SDBBA1. The burrowing owl was recorded as a probable breeder in one Hyde County atlas block during SDBBA2, but breeding was not confirmed. SDOU reported sightings of burrowing owls in Hyde County during the breeding seasons of 1988, 1998, 2004, 2005, and 2012, but no reports were made of breeding. Hyde County does not contain a BBS route.

Breeding was not confirmed in Brown County, although the presence of a pair of adult owls at a burrow on separate days in May 2008 indicated that breeding was probably attempted. Neither this location nor the one in Dickey County, North Dakota (26 km to the northeast), had burrowing owls after 2009; there were no other observations of owls made during the 10 years of the wind study at Tatanka or its environs. The burrowing owl was recorded as a possible breeder in one block in Brown County during SDBBA1 and SD-

BBA2. Burrowing owls have been reported infrequently in Brown County in recent years by SDOU, with observations in 1989, 1994, 2002, and 2010; however, no breeding was reported. Brown County contains one BBS route, which has been surveyed 15 times since 1969. Burrowing owls were reported in the late 1970s and early 1980s, but the most recent burrowing owl record for this route was of a single bird in 1984. No burrowing owls were recorded in subsequent years (1987, 2003, 2004, 2008, and 2009) that the route was surveyed.

The single burrowing owl observation in Beadle County did not necessarily indicate a breeding attempt. Burrowing owl records for this county are particularly scarce; no burrowing owls were reported in the county during SDBBA1 or SDBBA2. SDOU reported a single burrowing owl in Beadle County in May 2009. The BBS route in Beadle County has been surveyed 20 times since 1967, with one burrowing owl recorded in 1967, 1968, and 1978. Since then, none were recorded in 1989, 1999–2002, or 2005–2009.

Our observations of burrowing owls provide additional evidence that the breeding range of burrowing owls still does extend into eastern South Dakota, and burrowing owls will utilize available burrows in areas with suitable habitat. Ensuring the existence of prairie dog colonies and grazed mixed-grass prairie in east-central South Dakota are likely the key factors in the continued presence of burrowing owls in this region of the state. Despite limited availability of prairie dog colonies in our study areas, burrowing owls were present in most colonies across multiple years, suggesting that prairie dog colonies represent the best available nesting locations for burrowing owls in the area. The presence of prairie dogs is advantageous to burrowing owls because prairie dogs continually create new burrows and repair old burrows, providing many structurally sound burrows for owls to use. Wildlife managers seeking to document other breeding locations for burrowing owls in the region should begin by locating active prairie dog colonies.

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