

Shed fur from a reestablished bison herd incorporated into nests of two semifossorial rodents in central Nebraska

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ABSTRACT.—Although dried plants are the material most often reported in burrows and nests of semifossorial rodents, the use of shed mammal fur for nest material has remained largely speculative. Herein we report 2 accounts documenting 2 small mammal species, thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*) and western deermouse (*Peromyscus sonoriensis*), utilizing bison (*Bison bison*) fur in burrow and nest construction within a pasture grazed by a reintroduced bison herd in central Nebraska. Use of such materials from a formerly widespread species throughout the Great Plains may improve reproductive fitness for these grassland rodent species. Our observations lend support to the idea that bison reintroductions restore ecological interactions that were likely once common in North American grasslands.

RESUMEN.—A pesar de que los materiales vegetales secos son los que se reportan más comúnmente en las madrigueras y nidos de roedores semifossoriales, el uso de pelo desprendido de otros mamíferos sigue siendo objeto de especulación. En este trabajo, presentamos dos registros de dos especies de pequeños mamíferos, la ardilla de tierra de trece franjas (*Ictidomys tridecemlineatus*) y el ratón ciervo occidental (*Peromyscus sonoriensis*), utilizando pelo de bison (*Bison bison*) para la construcción de sus madrigueras y nidos dentro de un pastizal pastoreado por un rebaño de bisontes reintroducido en central Nebraska. El uso de materiales provenientes de una especie que anteriormente se distribuía ampliamente en las Grandes Llanuras, podría mejorar la aptitud reproductiva de estos roedores de pastizal. Nuestras observaciones respaldan la idea de que la reintroducción de bisontes restablece interacciones ecológicas que probablemente fueron comunes en los pastizales de America del Norte.

Historically, the American bison (*Bison bison*; herein “bison”) played a keystone role in the Great Plains, influencing vegetation dynamics, soil structure, and wildlife communities (Knapp 1999). The near extirpation of tens of millions of bison during the late 19th century (Shaw 1995) almost certainly restricted numerous direct and indirect ecological relationships (Zhao et al. 2016). Due to the removal of this ecologically important and dominant grassland species, documented interactions between bison and other grassland fauna remain relatively scarce (Jung et al. 2010). However, understanding how other taxa, like rodents, utilize bison-derived resources is essential for evaluating the ecological outcomes of bison reintroduction programs (Sanderson et al. 2008).

Most studies examining the effects of bison reintroduction on rodents and other small mammals have focused on habitat modification through grazing (Burke et al. 2020). For example, black-tailed prairie dogs (*Cynomys ludovicianus*) benefit

from bison grazing, which maintains short vegetation and improves predator detection near colonies (Hoogland 1981). Conversely, bison may benefit from prairie dog grazing, which maintains vegetation in a short, palatable, and nutritionally favorable state (Coppock et al. 1983). Similarly, deer mice (*Peromyscus maniculatus*) have been found at higher densities in bison-grazed grasslands compared to cattle-grazed or ungrazed sites (Matlack et al. 2001). Recent work documenting the mammal community of the Crane Trust (Ostrom et al. 2025) highlights the ecological importance of this site for both prairie-associated and generalist small mammals. An updated annotated checklist identified 52 mammal species on Crane Trust properties, including 19 rodent species, and documented notable shifts in relative abundance over the past 4 decades. Several prairie-associated small mammals, including deer mice and ground squirrels, were categorized as using prairie habitats that have experienced

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broader regional declines, emphasizing the importance of grassland for maintaining small mammal diversity in the Central Platte River valley. The mechanisms by which bison reintroduction influences rodent diversity, abundance, reproduction, and survival may not be solely explained by influence on vegetative structure and habitat availability (Burke et al. 2020). Non-trophic interactions between bison and small mammals, such as the use of shed fur in nest construction, remain poorly documented (Soper 1941, Jung et al. 2010).

In 2015, a conservation herd of 42 bison was reintroduced to the Crane Trust in south central Hall County, Nebraska, USA. The herd, currently managed from 115 to 125 individuals, grazes year-round across approximately 1200 acres of remnant and restored lowland tallgrass prairie, wet meadow, and sand-ridge prairie (Wiese 2022). The bison range consisted of 4 rotational pastures, with grazing intensity adjusted seasonally with an adaptive grazing program to meet habitat objectives such as promoting structural habitat heterogeneity and supporting native species biodiversity. Dominant grasses on the site include switchgrass (*Panicum virgatum*), Indiangrass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and smooth brome (*Bromus inermis*). Common forbs include Maximilian sunflower (*Helianthus maximiliani*), Canada goldenrod (*Solidago canadensis*), giant goldenrod (*S. gigantea*), white heath aster (*Symphyotrichum ericoides*), and black medick (*Medicago lupulina*) (Caven and Wiese 2022).

The reintroduction of bison has already influenced plant community composition and structure. For instance, bison wallows at the Crane Trust provide microsites for uncommon plants such as cutleaf evening primrose (*Oenothera laciniata*), green carpetweed (*Mollugo verticillata*), and purple sandgrass (*Triplasis purpurea*) (Caven et al. 2019, Caven and Wiese 2022). Herein we described rarely documented behaviors of rodents utilizing shed bison fur for nest or burrow construction, further demonstrating ecological linkages reestablished through bison reintroduction.

Both observations occurred within the “North Meadow” pasture (180 acres) during late spring 2025. This pasture was grazed by approximately 105 adult bison and 40 calves from 1 March to 1 June 2025. Evidence of recent bison grazing at both locations included abundant feces, hoof disturbance, and scattered clumps of shed bison fur.

On 6 June 2025, a thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*; herein “ground squirrel”) was observed collecting bison fur for nesting material at 40.78849, −98.46625 near Hall County, Nebraska, USA. The observation was made by M. Urbanski from about 17:40 to 18:50 CDT from a short distance using a Canon EOS R3 with a RF100-500 mm F4.5-7.1 L IS USM (Canon Inc., Tokyo, Japan). The ground squirrel occupied an area of short vegetation (5–10 cm in height) showing clear signs of recent grazing. It was first observed manipulating a clump of bison fur, grasping it with its mouth and forepaws and tearing off strands through coordinated pulling (Fig. 1A). The ground squirrel carried the fur into the burrow entrance, which was located directly beneath the shed bison fur (Fig. 1C). It was unclear whether the shed bison fur was moved to the burrow entrance by the ground squirrel or if it was opportunistically shed there. The ground squirrel transported at least 2 mouthfuls of bison fur and 1 mouthful of senesced grass stems into the burrow, alternating between collection bouts and vigilance behaviors (Figs. 1B–D).

On 9 July 2025, a western deermouse (*Peromyscus sonoriensis*; herein “deermouse”) nest lined with bison fur was discovered beneath a 60 × 120-cm plywood coverboard used for reptile surveys (40.4720, −98.2812). The observation, made by J.D. Wiese and W. Hamson at 11:05 CDT, was photographed using an iPhone 13 (Apple Inc., Cupertino, CA). The coverboard, in place for approximately 5–6 weeks, was located along a transition between grassland and restored cottonwood savanna. Vegetation height in the immediate area surrounding the coverboard ranged from 10 to 20 cm, though the area beneath the coverboard was mostly bare ground (Figs. 2A–B). The nest consisted mostly of fine, compacted bison fur and intermixed strands of thicker grass leaves forming a cup-shaped chamber approximately 8–10 cm in diameter. The nest contained 4 young deer mice estimated to be about 1 week old (Figs. 2C–E). Upon disturbance, the adult deermouse circled the nest several times before pulling an additional tuft of bison fur over the young and retreating to nearby cover (Fig. 2E). The coverboard was replaced, and the nest was left undisturbed.

Our 2 independent observations suggested that, when available, bison fur is incorporated into rodent nesting behaviors in grazed prairie systems. Bison shed throughout the spring and



Fig. 1. Thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*) collecting strands of shed bison (*Bison bison*) fur (A) and dried grass materials for nesting materials (B) at the entrance of its burrow directly below the larger clump of shed bison fur (C) and displaying vigilant behavior (D) on 6 June 2025.

early summer through grooming, rubbing, and wallowing (Mooring and Samuel 1998), creating a readily available source of fur for cohabiting semifossorial rodents. The observed deermouse's cuplike nest structure and brood size were typical for the species (Scheffer 1924) and observed within the species' known reproductive period (March–October) (Scheffer 1924). Similarly, the date in early June when we observed the thirteen-lined ground squirrel collecting bison fur aligns with its breeding and nesting period (Rongstad 1965, Wistrand 1974, Streubel 1975).

Compared to the common reports of plant materials used in fossorial small mammal nests, animal-derived nest materials such as shed fur are rarely documented. A lack of suitable materials in the environment may explain why few mammals have been reported using animal-

derived substances in nest construction (Deeming 2023). Nonetheless, incorporation of bison fur into nests, presumably for its insulative and protective properties, has been recorded in other taxa. For example, Coppedge (2009, 2010) reported bison fur use in the nests of 13 bird species in similar grassland systems, suggesting that the material provides both thermal benefits and camouflage against predators. These same explanations may apply to rodents. Flexible, insulative nesting materials improve microclimate stability in rodent nests (Gedeon et al. 2010), and fur-based insulation can conserve energy during reproduction and early development, as shown in rodents in Europe (Millesi et al. 1999, Redman et al. 1999). Jung et al. (2010) also documented red squirrels (*Tamiasciurus hudsonicus*) using bison fur as drey material.



Fig. 2. Prairie deer mouse (*Peromyscus sonoriensis*) found atop its nest beneath a coverboard (A). When the deer mouse moved from its nest (B), 4 juveniles were exposed within a cup-like nest (C) lined with fine, sun-faded bison (*Bison bison*) fur and thicker, lighter-colored leaves of grass (D) and covered with a nest cap consisting of shed bison fur mixed with grass leaves (E) on 9 July 2025.

Our observations fit within this broader context of bison fur use across taxa, providing direct evidence from 2 rodent species in central Nebraska.

These accounts provide rare evidence of semi-fossorial rodents directly utilizing bison-derived materials, extending known ecological interactions between bison and prairie fauna beyond trophic or vegetation-mediated pathways. This behavior highlights the potential for reintroduced bison to reestablish lost or weakened biotic linkages within Great Plains ecosystems not readily detected through small mammal community monitoring surveys. Future research comparing nest-material composition in grazed versus ungrazed systems could clarify how bison reintroduction influences small mammal nesting

ecology and contributes to the reestablishment of historical prairie linkages.

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