FINAL REPORT

State: South Dakota **Grant Number:** T-43-R-1

Study No: 2451

Project Title: Status of the Bear Lodge meadow jumping mouse (Zapus hudsonius campestris) in South Dakota.

Period Covered: June 1, 2010 through August 31, 2012

Objectives:

1. To determine the present distribution, abundance, and habitat affinity of Zapus hudsonius campestris) in the Black Hills of South Dakota during June and July of 2010 and 2011.
2. Compare the present distribution and abundance with historical records of this species.

The following manuscript was written for possible submission to the Proceedings of the South Dakota Academy of Science, and is being submitted as a final report for South Dakota Wildlife Action Plan Grant no. T-43-R-1, study no. 2451.

STATUS AND HABITAT ASSOCIATION OF THE BEAR LODGE MEADOW MOUSE IN THE BLACK HIILS OF SOUTH DAKOTA

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ABSTRACT

The Bear Lodge meadow jumping mouse (*Zapus hudsonius campestris*) is commonly reported from the Black Hills of South Dakota and the adjacent Bear Lodge mountains of Wyoming, however little information is available regarding their relative abundance and habitat associations. The purpose of this study was to determine the present distribution, abundance, and habitat affinity of *Z. hudsonius campestris* in the Black Hills of South Dakota and compare its current distribution to the historical record. Live trapping methods were used to estimate the number of individuals per 100 trap nights and

the relative abundance of this species. Capture rates ranged from 0 to 4.7 individuals per 100 trap nights, with a mean ± 1SD of 1.7 ± 1.6. The relative abundance of jumping mice ranged from 7 to 78% of the total number of small mammals. On 4 of the 16 streamside transects, jumping mice were the most numerous species, and were overall very common. Jumping mice were significantly correlated with percent litter cover (r = 0.673, d.f. = 14, P = 0.006), percent moss cover ((r = 0.58, d.f. = 14, P = 0.039) and negatively correlated with percent grass cover (r = -0.546, d.f. = 14, P = 0.035). Captures were located at elevations from 1279 to 1890 m, with no captures below 1235 m. Jumping mice were captured throughout the range of historical records, and were even collected in Meade county, despite a lack of reports of meadow jumping mice from that county in the past.

INTRODUCTION

The Bear Lodge meadow jumping mouse (*Zapus hudsonius campestris*) is endemic to the Black Hills of South Dakota, the adjacent Bear Lodge mountains of northeastern Wyoming, and northwestern South Dakota (Krutzsch 1954; Hall 1981). Turner (1974) summarized the work of some 46 people from 1947 to 1967, and reported 207 specimens of *Z. hudsonius campestris* from the Black Hills of South Dakota and the adjacent Bear Lodge Mountains, but reported no specimens from Meade and Fall River counties. No information was provided on population densities or relative abundance however. More recently, Duckwitz (2001) captured 7.2 meadow jumping mice per 1000 trap nights in Wind Cave National Park in Custer County during the summers of 1999 to 2000. Between 1977 and 1985, Easton and Wrenn (1988) reported capturing a total of 70 Z. hudsonius campestris in Spearfish Canyon, Lawrence County,

between 1977 and 1985, but again, no catch per unit effort or relative abundance was reported.

Beauvais (2000) and Hafner and Yensen (1998) characterized *Z. hudsonius campestris* as rare, but no systematic studies to determine the relative abundance and habitat affinities of this subspecies. Cryan (2004) described the information concerning Z hudsonius on the Northern Great Plains as "limited and biased, and there are no long-term data with which to evaluate population trends in the region." Therefore, the purpose of this study is to: 1) determine the present distribution, abundance, and habitat affinity of *Zapus hudsonius campestris* in the Black Hills of South Dakota, and 2) compare the present distribution and abundance with historical records of this species.

METHODS

To determine population sizes and distribution of the Bear Lodge meadow jumping mouse in the Black Hills, 16 study sites were sampled along small streams between June 2010 and July 2011, and another two control areas were sampled between June and July 2012 along dry ravines. Twenty-five Sherman Live Traps® were placed every 10-m along each side of the drainage. At the midpoint of these primary transects, two perpendicular transects with 25 traps spaced at 10-m intervals were established on opposite sides of each drainage to determine how far this species ranges from the water's edge. Occasionally, the perpendicular transects were established at opposite ends of the steamside transects because of steep terrain

which precluded the placement of traps. Thus, a total of 100 live traps at each study site were set for three trap nights, and GPS coordinates were recorded at each trap location.

Traps were baited with rolled oats, corn, and barley with molasses (as used by Meaney et al. (2003), and Frey and Malaney (2009) in studies of *Z. hudsonius preblei*), and supplied with cotton/polyester bedding material. Trainor et al. (2007) stated that this species is primarily nocturnal; therefore traps were checked between 08:00 hrs. and 10:00 hrs. each morning for three consecutive days. Small mammals were weighed and marked with either a passive integrated transponder (PIT) tag inserted between the scapulae or an ear tag. The relative age (adult, subadult, or juvenile) and sex were also recorded. Additional information recorded for males included whether the testes were abdominal or scrotal, and the relative size of the nipples was recorded for females. Voucher specimens were collected from incidental trap mortalities or animals captured during the last night of the trapping period and will be deposited in the Sternberg Museum, Fort Hays State University, Hays, Kansas. All methods followed the guidelines of the American Society of Mammalogists for the use of wild mammals in research (Gannon et al. 2007) and recommendations of the Dakota Wesleyan University's Institutional Animal Care and Use Committee.

To determine the habitat affinities of this subspecies, several habitat variables were measured along one streamside transect and one perpendicular transect at 20-m intervals at each study site. Abiotic measurements included the elevation of the study site, soil compaction and soil moisture. Soil compaction was measured with a Dicky-John Soil Compaction Tester (Dicky-John Corporation, 5200 Dickey-john Road, Auburn, Illinois, 62615, USA) at 10 cm and 20 cm below the ground surface. Soil moisture was measured at 10 cm depth with a model number

DSMM500 Digital Soil Moisture Meter (General Tools and Instruments, 80 White Street, New York, NY 10013-3567). Canopy cover (Leaf Area Index – LAI) was measured with a WinSCANOPY digital image analyzer (Regent Instruments, Inc., 21 Antares Drive, Nepean, Ontario K2E 7T8) at 1 meter above the ground surface. Percent cover of grasses, forbs, shrubs, rock, moss, litter, and fallen timber was estimated at ground level using the method of Daubenmire (1959).

RESULTS

A total of 88 *Z. hudsonius campestris* were captured on 14 of 16 trapping sites located in riparian zones in Lawrence, Meade, Pennington, and Custer Counties in the Black Hills of South Dakota (appendix A). No jumping mice were captured in the two control areas located at xeric sites. There was no significant difference in the number of jumping mice captured between the 2010 and 2011 trapping seasons ($t = -1.27$, d.f. = 14, $P = 0.224$). The number of jumping mice captured per 100 trap nights ranged from 0 to 4.7, with a mean ± 1SD of 1.7 ± 1.6 (Table 1). The relative abundance of jumping mice relative to other species of small mammals captured ranged from 0 to 78% with a mean % ± 1SD of 23 ± 22. Other species captured included the deer mouse (*Peromyscus maniculatus*), white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), long-tailed vole (*Microtus longicaudus*), prairie vole (*Microtus ochrogaster*), Southern red-backed vole (*Cleithrionomys gapperi*), least chipmunk (*Eutamias minimus*), red squirrel (*Tamias hudsonius*), northern flying squirrel (*Glaucomys sabrinus*)

masked shrew (*Sorex cinereus*), short-tailed weasel (*Mustela erminea*), and the least weasel (*Mustela nivalis*).

Jumping mice were nearly always captured near water, with 92% of the captures occurring along the streamside transects. This species was captured along the perpendicular transects extending away from the stream on only two of the study sites. Two individuals were captured at distances of 58 and 108 meters from Castle Creek in 2010 (see table 1 for locality). In addition, four individuals were captured on a steep slope covered with scattered shrubs at a mean distance of 130 m from City Creek in 2011 (see table 1 for locality). No jumping mice were captured on either of the two xeric control sites that were trapped in 2012.

Capture locations of jumping mice ranged in elevation from 1279 to 1890 m (table 1). No jumping mice were captured at the two lowest elevations at 1042 and 1235 m.

Habitat associations – Jumping mice were not restricted to any particular riparian association, but appeared to be limited by the need for a perennial water source. Riparian vegetation ranged from areas dominated by ponderosa pine (*Pinus ponderosa*), birch species (*Betula* sp.), and willow (*Salix* sp.) to Black Hills spruce (*Picea glauca*), willow (Salix sp.), and redosier dogwood (*Cornus sericea*).

Because the variances of the number of jumping mice captured in 2010 and 2011 were not significantly different ($F = 0.91$, d.f. = 7, $P = 0.907$), data were pooled from 2010 and 2011 for all correlation and multiple regression analyses. After eliminating one outlier from the data set, the total number of *Z. hudsonius campestris* captured on each area was positively correlated with percent moss cover ($r = 0.58$, d.f. = , $P = 0.039$) and percent cover of litter ($r = 0.673$, d.f. =

14, P = 0.006). Additionally, the number of jumping mice was negatively correlated with percent grass cover (r = -0.546, d.f. = 14, P = 0.035).

A comparison of the distribution of the Bear Lodge meadow jumping mice captured in this study to historical records revealed no major reduction in the range of this species in the Black Hills of South Dakota (Figure 1). There were a few marginal records within the last 25 years beyond the borders of this study (Duckwitz 2001, Easton and Wrenn 1988), but these were a result of the specific locations of their studies rather than a result of shrinkage in their distribution.

DISCUSSION

Although there are no comparable studies that have targeted the Bear Lodge meadow jumping mouse, the number of individuals captured per 100 trap nights was considerably higher than reported by Duckwitz (2001). Even more revealing is the relative abundance of this species across the study sites (Table 1). On average, the Bear Lodge meadow jumping mouse made up almost one-fourth of the small mammal community in the northern and central Black Hills. This species comprised about 50% of the small mammal community at several study sites, with a high of 78% in the City Creek drainage near Deadwood, SD. Thus, the fact that *Z. hudsonius campestris* is the dominant small mammal species in riparian zones of higher altitudes suggests that it is very common in the Black Hills of South Dakota, despite the many disturbances that this area has experienced.

Despite the capture of several jumping mice over 100 meters from water, this species is extremely dependent on free-flowing streams in the Black Hills. This also suggests that buffer zones are needed at least 200 meters along streams near logging operations. An active logging operation was being conducted near the North Boxelder Creek study site, but the areas along the stream where jumping mice frequent were undisturbed and higher than average numbers of jumping mice were captured on this site. Forest managers should still be concerned with protecting watersheds from run-off associated with logging operations to protect aquatic and riparian habitat for other species.

Grazing activity was also observed on the Elk Creek and South Fork Castle Creek study areas. Jumping mice were found on both of these areas, with Elk Creek having a below average capture rate and the South Fork Castle Creek an above average capture rate. The small number of grazing sites in this study precludes any conclusion regarding the effect of grazing on jumping mice however.

The Black Hills has a long history of small-stream flooding. Both of these disturbances have been occurring for millennia however. In 1972, over 38 cm of rain in a 6-hr period resulted in 238 deaths and $160 million in damage as a result of flooding of Rapid Creek near Rapid City, SD (Carter, et al. 2002). Driscoll, et al. (2012) concluded that other drainages, including Boxelder Creek, Elk Creek and Spring Creek have experienced paleoflooding at intensities exceeding the 1972 Rapid City flood. Clearcutting of dead timber as a result of mountain pine beetle (*Dendroctonus ponderosae*) infestations has increased in the Black Hills in recent years, potentially increasing runoff and the chance of flooding. Caution is warranted in salvaging

beetle-damaged timber, not only for the sake of wildlife, but also to prevent another tragedy such as the 1972 Rapid City flood.

The vegetation analysis conducted in this study suggests that the Bear Lodge meadow jumping mouse is associated with streams with banks covered with abundant moss, litter, and a mixture of grasses and forbs. Turner (1974) reported specimens from 1275 to 1975 m elevation between 1947 and 1967, which is comparable to the range of elevations in which jumping mice were found in this study. Thus, it appears that elevations below 1250 feet are insufficient to support jumping mouse populations. Due to their strong association with perennial streams, any factor that reduces stream flow to zero is likely to result in local extinction of Bear Lodge meadow mouse populations.

ACKNOWLEDGEMENTS

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Table 1. Locations, trapping dates, number of jumping mice captured per 100 trap nights, and relative abundance of Bear Lodge meadow jumping mice.

Study Site	*County*	*GPS Coordinates (WGS 84 map datum)*		*Trapping Dates*	*No. /100 Trap Nights*	*Relative Abun-dance (%)*	*Eleva-tion (m)*
Spring Cr.	Pennington	13T 0610247	UTM 4857568	30 June - 2 Ju10	2.7	21	1635
Tepee Gulch	Pennington	13T 0629694	UTM 4863824	28-30 July 2010	1	23	1305
Castle Creek	Pennington	13T 0605295	UTM 4880344	4-6 August 2010	0.67	12	1543
S. Fork Castle Cr.	Pennington	13T 0591223	UTM 4870367	12-14 July 2011	3.7	48	1890
Rhoads Fork Cr.	Pennington	13T 0591628	UTM 4887884	15-17 July 2011	3.3	37	1816
Elk Creek	Meade	13T 0615020	UTM 4905661	20-22 July 2010	0.67	18	1438
Marcotte GPA	Meade	13T 0615660	UTM 4916567	20-22 June 2012	0	0	1235
Higgins Gulch	Lawrence	13T 0583705	UTM 4924187	16-18 June 2010	4	26	1279
Hanna Creek	Lawrence	13T 0592048	UTM 4902302	23-25 June 2010	2.7	43	1726
City Creek	Lawrence	13T 0599453	UTM 4915598	22-24 June 2011	4.7	78	1550
N Fork Boxelder Cr.	Lawrence	13T 0604320	UTM 4897492	6-8 July 2011	2.3	50	1718
Hell Canyon	Custer	13T 0594277	UTM 4841133	28-30 June 2011	0.67	7	1578
French Cr.	Custer	13T 0604902	UTM 4847447	21-23 July 2011	0.67	12	1718
Willow Cr.	Custer	13T 0613719	UTM 4853409	26-28 July 2011	1.3	18	1747
FR336	Custer	13T 0617456	UTM 4833850	7-9 July 2010	0	0	1548
Harry Mills Road	Custer	13T 0602168	UTM 4842021	27-29 July 2012	0	0	1682
Whitney Preserve	Fall River	13T 0617117	UTM 4799533	14-16 July 2010	0	0	1042
Mean					1.7	23	
Standard Deviation					1.6	22	

Figure 1. Map of where the Bear Lodge meadow jumping mouse was present (red dots) and absent (black dots) in this study, along with historical localities (clear dots) where this species was captured previously. The two xeric control areas are not shown as these are not considered to be typical jumping mouse habitat.

Figure 2. Number of jumping mice captured per 100 trap nights at various study site elevations.

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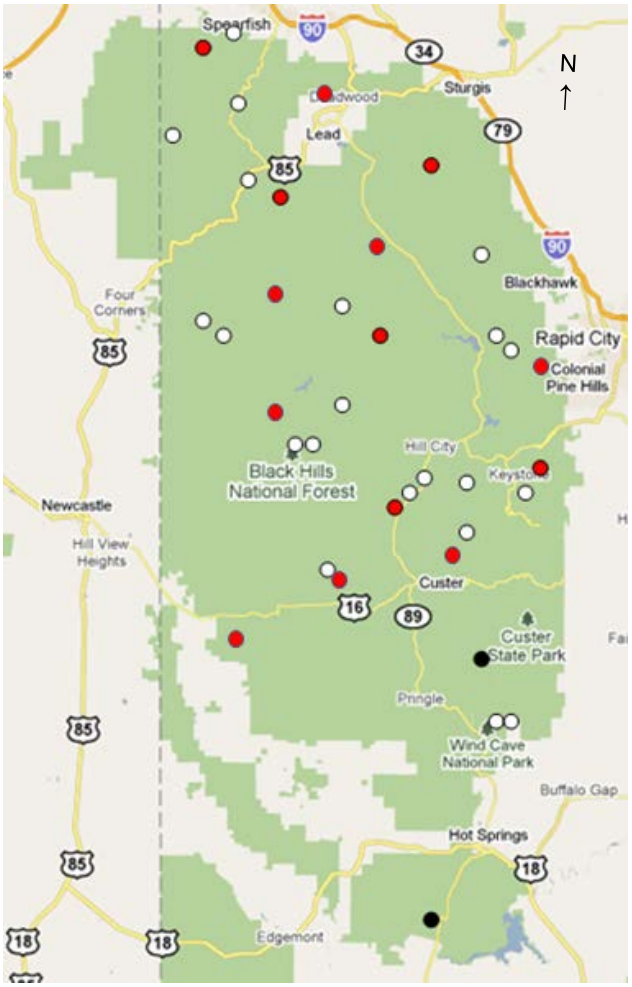
N
Spearfish
90
34
Sturgis
Deadwood
Lead
79
85
90
Blackhawk
Four Corners
Rapid City
Colonial Pine Hills
85
Hill City
Keystone
Black Hills National Forest
Newcastle
Hill View Heights
Custer
16
89
Custer State Park
Pringle
85
Wind Cave National Park
Buffalo Gap
Hot Springs
85
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18
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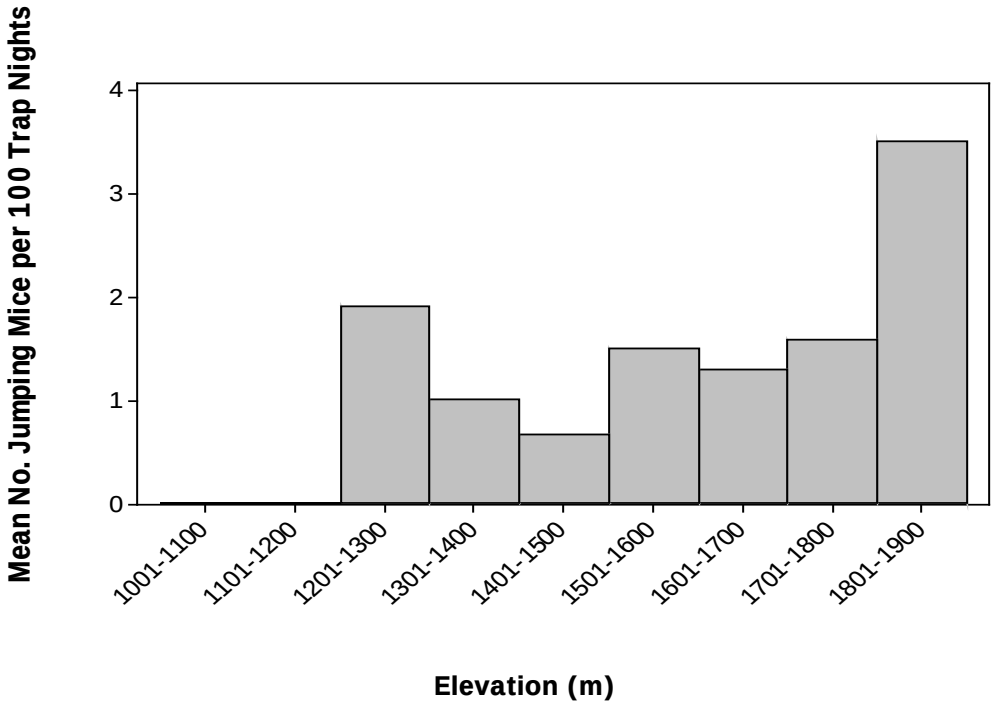
Edgemont


Mean No. Jumping Mice per 100 Trap Nights
4
3
2
1
0
1001-1100
1101-1200
1201-1300
1301-1400
1401-1500
1501-1600
1601-1700
1701-1800
1801-1900
Elevation (m)

Appendix A. Capture locations for each Bear Lodge meadow jumping mouse captured from June 2010 through July 2011 in the Black Hills of South Dakota.

Study site	*Sex*	*County*	*GPS Coordinates (UTM)*	*Elevation (m)*
Higgins Gulch	female	Lawrence	13T 0583707 4924150	1283
Higgins Gulch	male	Lawrence	13T 0583705 4924165	1279
Higgins Gulch	female	Lawrence	13T 0583697 4924234	1275
Higgins Gulch	male	Lawrence	13T 0583715 4924263	1267
Higgins Gulch	male	Lawrence	13T 0583704 4924180	1285
Higgins Gulch	male	Lawrence	13T 0583706 4924157	1281
Higgins Gulch	female	Lawrence	13T 0583707 4924150	1283
Higgins Gulch	male	Lawrence	13T 0583704 4924180	1280
Higgins Gulch	female	Lawrence	13T 0583710 4924218	1286
Higgins Gulch	female	Lawrence	13T 0583707 4924151	1299
Higgins Gulch	female	Lawrence	13T 0583690 4924131	1303
Higgins Gulch	female	Lawrence	13T 0583700 4924140	1308
Hanna Creek	female	Lawrence	13T 0592029 4902263	1712
Hanna Creek	unknown	Lawrence	13T 0592046 4902263	1716
Hanna Creek	male	Lawrence	13T 0592047 4902360	1740
Hanna Creek	male	Lawrence	13T 0592059 4902343	1726
Hanna Creek	male	Lawrence	13T 0592049 4902310	1726
Hanna Creek	male	Lawrence	13T 0592029 4902263	1712
Spring Creek	male	Pennington	13T 0610111 4857540	1651
Spring Creek	female	Pennington	13T 0610194 4857542	1630
Spring Creek	female	Pennington	13T 0610262 4857576	1631
Spring Creek	male	Pennington	13T 0610093 4857598	1635
Spring Creek	male	Pennington	13T 0610162 4857538	1636
Spring Creek	male	Pennington	13T 0610298 4857594	1643
Spring Creek	male	Pennington	13T 0610158 4857535	1637

Appendix A. continued

Spring Creek	male	Pennington	13T 0610093	4857598	1635
Elk Creek	male	Meade	13T 0614860	4905644	1438
Elk Creek	female	Meade	13T 0614017	4905665	1441
Tepee Gulch	female	Pennington	13T 0629731	4863808	1310
Tepee Gulch	male	Pennington	13T 0629721	4863811	1316
Tepee Gulch	female	Pennington	13T 0629664	4863835	1316
Castle Creek	male	Pennington	13T 0605206	4880187	1303
Castle Creek	female	Pennington	13T 0605167	4880164	1314
Victoria Creek	male	Pennington	13T 0628905	4975176	1291
Victoria Creek	male	Pennington	13T 0628963	4975313	1281
Victoria Creek	male	Pennington	13T 0628966	4975268	1285
Victoria Creek	male	Pennington	13T 0628965	4975261	1285
Victoria Creek	male	Pennington	13T 0628966	4975268	1285
City Creek	male	Lawrence	13T 0599432	4915518	1546
City Creek	male	Lawrence	13T 0599		
City Creek	male	Lawrence	13T 0599442	4915546	1548
City Creek	female	Lawrence	13T 0599463	4915680	1560
City Creek	male	Lawrence	13T 0599467	4915686	1557
City Creek	female	Lawrence	13T 0599453	4915588	1545
City Creek	male	Lawrence	13T 0599455	4915666	1554
City Creek	female	Lawrence	13T 0599512	4915567	1582
City Creek	male	Lawrence	13T 0599531	4915573	1583
City Creek	female	Lawrence	13T 0599455	4915666	1554

Appendix A. continued

City Creek	female	Lawrence	13T 0599456	4915650	1552
City Creek	female	Lawrence	13T 0599454	4915618	1549
City Creek	female	Lawrence	13T 0599402	4915591	1557
City Creek	male	Lawrence	13T 0599501	4915563	1571
Hell Canyon	female	Custer	13T 0594330	4841109	1566
Hell Canyon	female	Custer	13T 0594251	4841146	1565
N. Fork Boxelder	male	Lawrence	13T 0604280	4897533	1721
N. Fork Boxelder	female	Lawrence	13T 0604352	4897468	1727
N. Fork Boxelder	female	Lawrence	13T 0604331	4897497	1718
N. Fork Boxelder	male	Lawrence	13T 0604261	4897534	1719
N. Fork Boxelder	female	Lawrence	13T 0604367	4897495	1713
N. Fork Boxelder	male	Lawrence	13T 0604358	4897490	1715
N. Fork Boxelder	female	Lawrence	13T 0606341	4897472	1723
S. Fork Castle Creek	male	Pennington	13T 0591256	4870324	1889
S. Fork Castle Creek	female	Pennington	13T 0591242	4870338	1896
S. Fork Castle Creek	female	Pennington	13T 0591201	4870381	1900
S. Fork Castle Creek	male	Pennington	13T 0591240	4870369	1884
S. Fork Castle Creek	female	Pennington	13T 0591234	4870357	1896
S. Fork Castle Creek	male	Pennington	13T 0591277	4870310	1890
S. Fork Castle Creek	female	Pennington	13T 0591245	4870329	1893
S. Fork Castle Creek	male	Pennington	13T 0591235	4870350	1898
S. Fork Castle Creek	female	Pennington	13T 0591198	4870394	1900
S. Fork Castle Creek	male	Pennington	13T 0591187	4870387	1902
S. Fork Castle Creek	female	Pennington	13T 0591215	4870355	1909

Appendix A. continued

Rhoads Fork Creek	female	Pennington	13T 0591650	4887922	1823
Rhoads Fork Creek	female	Pennington	13T 0591638	4887889	1818
Rhoads Fork Creek	female	Pennington	13T 0591605	4887835	1827
Rhoads Fork Creek	male	Pennington	13T 0591626	4887895	1809
Rhoads Fork Creek	male	Pennington	13T 0591667	4887939	1816
Rhoads Fork Creek	female	Pennington	13T 0591585	4887802	1819
Rhoads Fork Creek	male	Pennington	13T 0591644	4887898	1814
Rhoads Fork Creek	female	Pennington	13T 0591639	4887890	1820
Rhoads Fork Creek	male	Pennington	13T 0591585	4887802	1819
Rhoads Fork Creek	female	Pennington	13T 0591644	4887898	1814
French Creek	male	Custer	13T 0604933	4847546	1697
French Creek	female	Custer			
Willow Creek	female	Custer	13T 0613723	4853388	1739
Willow Creek	female	Custer	13T 0613732	4853424	1740
Willow Creek	female	Custer	13T 0613725	4853419	1743
Willow Creek	female	Custer	13T 0613730	4853426	1740

PUBLICATIONS RESULTING FROM THIS STUDY

The report presented above will be submitted to one of the journals specializing in publishing papers concerning the natural history of mammals in the Great Plains region such as the Proceedings of the South Dakota Academy of Science or the Prairie Naturalist. In addition, the following paper has been published in the Prairie Naturalist in 2011.

The Prairie Naturalist 43(1/2):59–60; 2011

FIRST RECORD OF THE LEAST WEASEL IN THE BLACK HILLS OF SOUTH DAKOTA— The least weasel (*Mustela nivalis*) is a circumboreal species, occurring in North America from Alaska to the Appalachian Mountains (Jones et al. 1983). In the Great Plains, the least weasel recently expanded its range southward through Nebraska (Benedict et al. 2000) and Kansas (Choate et al. 1979, Bailey and Terman 1986) into Oklahoma (Clark and Clark 1988). Also, in recent decades, the least weasel has expanded from eastern and central Nebraska into western Nebraska (Benedict et al. 2000). In South Dakota, least weasels have been previously reported from the eastern 3/4 of the state (Jones et al. 1983, Higgins et al. 2000). Herein, I document the first record of the least weasel in the Black Hills of South Dakota, representing the western-most distributional record for the state.

On 7–8 July 2010, I captured two least weasels during a study of the distribution and abundance of the Bear Lodge meadow jumping mouse (*Zapus hudsonius campestris*). The study site was located 16.1 km southeast of Custer along an un-named creek paralleling Forest Service Road 336 in Custer County, South Dakota. This creek is a part of the headwaters of Beaver Creek, which flows southeast through Wind Cave National Park. On 6 July 2010, I set 100 folding Sherman Live Traps (7.6 × 8.9 × 23 cm) at 10-m intervals along four, 240-m transects. Two transects paralleled opposite sides of the creek and two ran perpendicular from the creek to the southwest. I baited the traps with a mixture of cracked corn, oats, wheat and molasses and checked them each morning for 3 consecutive days. All procedures were approved in advance by the Institutional Animal Care and Use Committee (IACUC) at Dakota Wesleyan University (approval no. 102). Voucher specimens were deposited in the Sternberg Museum of Natural History (MHP), Fort Hays State University, Hays, Kansas.

On 7 July 2010, I captured a subadult male least weasel (MHP no. 39055) approximately 170 m downstream of a small stock pond along the creek (43° 38' 53.935" N, 103° 32' 34.759" W, elevation 1552 m). Measurements of this specimen included total length (175 mm), tail length (30 mm), ear length (22 mm), hind foot length (10 mm), and condylobasal length (30.9 mm). On 8 July 2010, an adult male least weasel (MHP no. 39056) was captured about 20 m upstream of the stock pond (43° 38' 55.445" N, 103° 32' 38.784" W, elevation 1548 m). Measurements of the adult male included total length (208 mm), tail length (36 mm), ear length (26 mm), hind foot length (11 mm), and condylobasal length (33.3 mm). Both specimens lacked the distinct black tip found on the end of the tail of ermine (*M. erminea*) and showed no sign they were missing part of their tail.

The riparian zone where both specimens were captured was approximately 100-m wide and dominated by quaking aspen (*Populus tremuloides*), willow (*Salix* sp.), poison ivy (*Toxicodendron rydbergii*), and smooth bromegrass (*Bromus inermis*). Adjacent upland areas were dominated by ponderosa pine (*Pinus ponderosa*) with little to no understory.

Other species captured included the deer mouse (*Peromyscus maniculatus*), white-footed mouse (*P. leucopus*), southern red-backed vole (*Clethrionomys gapperi*), and long-tailed vole (*Microtus longicaudus*). I captured 37 deer mice were captured on this site, which was the greatest number of small mammals that I trapped across 8 study sites in the Black Hills during summer 2010. Least weasels are specialist predators on small mammals (Sheffield and King 1994) and local irruptions are known in the Northern Great Plains during periods of high prey density (Swanson and Fryklund 1935, Lokemoen and Higgins 1972). Sheffield and King (1994) suggested these irruptions are due to a high dispersal rate and the ability of *M. nivalis* to increase the number of litters and the proportion of females giving birth during periods of high prey density.

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DISTRIBUTION, ABUNDANCE AND HABITAT ASSOCIATIONS OF THE BEAR LODGE MEADOW JUMPING MOUSE IN THE BLACK HILLS OF SOUTH DAKOTA

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ABSTRACT

The Bear Lodge meadow jumping mouse (*Zapus hudsonius campestris*) is listed by South Dakota as a species of greatest conservation need in riparian/wetland ecosystems of the Black Hills. In the summer of 2010, systematic live trapping was conducted in eight separate watersheds as part of a two-year study to determine the abundance of the Bear Lodge meadow jumping mouse. A total of 100 Sherman live traps were set for three consecutive days on each area. Percent cover of grass, forbs, shrubs, rocks, litter, moss and logs was estimated with the Daubenmire method. Other habitat variables measured included soil moisture, soil compaction, average width of the stream, and canopy cover. Capture rates averaged 1.4 individuals/100 trap nights and were highest in the northern Black Hills (4 individuals/100 trap nights), but no jumping mice were captured in the two southern-most study areas. Jumping mouse captures were positively correlated with percent cover of rock (r = 0.726, P = 0.041), litter (r = 0.844, P = 0.008) and moss (r = 0.794, P = 0.019), and were negatively correlated with soil moisture (r = -0.755, P = 0.03) and percent grass cover (r = -0.865, P = 0.006). There were no significant correlations between captures and percent cover of forbs (r = -0.312, P = 0.452), shrubs (r = -0.197, P = 0.64), and canopy openness (r = -0.267, P = 0.563). Additional trapping is planned for the summer of 2011 to further elucidate the distribution of this species in the Black Hills.