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INCIDENTAL CAPTURES OF PLAINS SPOTTED SKUNKS IN CENTRAL SOUTH DAKOTA-

The plains spotted skunk (*Spilogale putorius interrupta*) had a historically broad distribution in the central United States, extending from the Mississippi River west to the Rocky Mountains. This subspecies of the eastern spotted skunk (*S. putorius*) has experienced population declines in recent decades possibly due to habitat loss and reduction of prey through conversion of grasslands and forests to croplands, as well as reductions in abandoned buildings, fence rows, creek bottoms, and wood piles throughout the region (Crabb 1948, Kaplan and Mead 1991, Gompper and Hackett 2005, Sasse 2017). Woody debris provides access to prey, and a dense understory and overhead cover provide camouflage and protection from avian predators (Lesmeister et al. 2013, Eng et al. 2018). Overharvest, disease, pesticide use, and expanding or increasing predator populations might also have contributed to population declines (Gompper and Hackett 2005, Gompper 2017). Because the plains spotted skunk is currently under consideration for federal protection under the Endangered Species Act (U.S. Fish and Wildlife Service 2012), it is important to communicate new information on abundance, distribution and ecology of the subspecies. Furthermore, limited data exist on incidental captures of plains spotted skunks by researchers and state agencies (Diggins et al. 2015, Sasse 2018). Data collected through live-capture and non-invasive techniques are needed to improve the effectiveness of management and the understanding of this subspecies (Hackett et al. 2007).

Plains spotted skunks are classified as furbearers in South Dakota and can be legally trapped and harvested year-round. Little information is known of their occurrence, distribution, and demographics in the state because the South Dakota Department of Game, Fish, and Parks (SDGFP) does not require reporting of harvested plains spotted skunks and only receives information provided voluntarily to the South Dakota Natural Heritage Program (K. Fisk, SDGFP, personal communication). In 2017–2018, for example, trapper reports summarized 240 plains spotted skunks harvested in Aurora, Beadle, Brule, Charles Mix, Davidson, Edmunds, Gregory, Hamlin, Hand, Hughes, Miner, Moody, Potter, and Tripp counties (SDGFP 2017). Such yearly information can be useful as an index of abundance for plains spotted skunks but does not provide reliable information on spatial distribution, habitat, or population demographics and health, which is necessary for management. In addition to trapper reports, a mail survey conducted by Blumberg et al. (1997) indicated that plains spotted skunks were present in South Dakota but did not provide detailed information about the population, suggesting a potential reduction in range of spotted skunks in the state. A conservation plan for the species in South Dakota reports that little information exists other than knowledge of occurrence in the state. Currently, no research is being conducted on plains spotted skunks in South Dakota (ESSCSG 2018).

While trapping and marking striped skunks (*Mephitis mephitis*) and northern raccoons (*Procyon lotor*) to understand composition of mesopredators and ground-nest predators in central South Dakota (IACUC approval number 17-103A), we captured a number of plains spotted skunks. Our captures were in Bryant and Saratoga townships in Faulk County and Alden and Fairview townships in Hand County, South Dakota. Both counties are rural; Faulk County has an average of 6.2 people and 3.1 housing units/km², whereas Hand County has an average of 7.8 people and 3.4 housing units/km². The landscape is a mosaic of croplands, pastures, and grasslands that surround farmsteads. We deployed 35 Tomahawk traps (Model 1010F and Model 105F) from 19 March to 12 May 2018. The specific number of traps open each night varied, and total number of trap nights was <1,890. We placed traps near occupied and abandoned buildings and agriculture equipment, culverts, fences, stacks of hay bales, and other anthropogenic features to target the aforementioned species. We occasionally moved traps to new locations depending on previous capture success (or lack thereof), landowner activities, or weather- and road-related conditions. We baited traps with sardines or wet cat food and rebaited as necessary. When a plains spotted skunk was captured incidentally, we recorded age, sex, weight (g), neck and chest circumference (cm), crown to rump length (cm), and fitted them with a uniquely-numbered ear tag. We followed the guidelines of the American Society of Mammalogists for the capture, handling, and care of mammals (Sikes et al. 2016).

We estimated that trapping success for plains spotted skunk was 1% in these counties, using Nelson and Clark's (1973) correction for sprung traps based on catch per unit effort calculations. Sprung traps included 70 occasions where we captured another species of mesocarnivore, had closed but empty traps, and captured another non-target species. Plains spotted skunks accounted for 17% (19/111) of captures. We captured 16 adult plains spotted skunks (two females, 14 males), with three recaptures. For plains spotted skunks, mean body mass was 670 ± 50 (SE) g, neck circumference was 14.9 ± 0.5 cm, chest circumference was 20.2 ± 0.6 cm, and crown-to-rump length was 28.5 ± 1.3 cm (Table 1). None of the individuals showed signs of external parasites (e.g., ticks, fleas, mites). We acknowledge that our measurements and observations are approximate, as we did not sedate animals. Of 19 captures, 10.5% were caught in woodpiles, 26.3% in pastures, 31.6% in shelter belts (i.e., a small forest patch with a few rows of trees adjacent to farmsteads), and 31.6% in farmsteads (e.g., next to buildings, either abandoned or active, with stacked hay bales and/or shelterbelts within 100 m). On average, captures were about 85 m from the closest road, 620 m from the closest farmstead if not captured at one, 315 m from the closest water source that was most commonly a stock dam, and 190 m from the closest shelterbelt if not captured in one. One pasture, where three captures occurred, had a nearby creek with a few trees

Table 1. Demographics and morphometric measurements of plains spotted skunks (*Spilogale putorius interrupta*) in South Dakota, March–April 2018.

Capture Date	County	Township	GPS Coordinates (WGS 84)	Individual ID	Age	Sex	Weight (kg)	Neck (cm)	Chest (cm)	Crown-Rump (cm)
27 Mar 2018	Hand	Alden	N44.670755, W99.172124	Notch Left	A	M	0.70	12.3	NA	32.6
3 Apr 2018	Faulk	Saratoga	N45.105212, W99.248557	Notch Right	A	F	0.45	13.3	17.5	27.5
6 Apr 2018	Faulk	Bryant	N45.071175, W99.247449	7006L/7005R	A	M	0.93	11.8	15.9	30.7
6 Apr 2018	Hand	Alden	N44.649731, W99.075793	7008L/7007R	A	M	0.52	13.9	21.2	33.5
8 Apr 2018	Faulk	Bryant	N45.071175, W99.247449	7012L/7011R	A	M	0.98	17.8	25.2	36.4
11 Apr 2018	Faulk	Saratoga	N45.106561, W99.247390	7017L/7018R	A	M	0.72	N/A	19.5	24.7
12 Apr 2018	Faulk	Saratoga	N45.106561, W99.247390	7035L/7036R	A	M	0.56	15.2	18.3	23.6
12 Apr 2018	Faulk	Saratoga	N45.104003, W99.249361	7034L/7032R	A	F	0.32	15.1	18.9	17.1
12 Apr 2018	Faulk	Bryant	N45.065901, W99.247597	7030L/7031R	A	M	0.78	17.5	21.4	31.8
13 Apr 2018	Faulk	Bryant	N45.043140, W99.266753	7046L/7044R	A	M	0.90	15.5	22.3	34.7
17 Apr 2018	Faulk	Saratoga	N45.100749, W99.257583	7045L/7051R	A	M	0.44	14.9	21.5	30.1
21 Apr 2018	Faulk	Bryant	N44.997723, W99.241364	7061L/7062R	A	M	0.87	13.6	19.4	25.5
26 Apr 2018	Hand	Alden	N44.719732, W99.149222	7070R/7071L	A	M	0.59	18.2	21.4	26.6
28 Apr 2018	Hand	Fairview	N44.782002, W99.072092	7074L/7076R	A	M	0.77	14.4	19.9	31.1
29 Apr 2018	Hand	Fairview	N44.782002, W99.072092	7077R/7078L	A	M	0.52	14.3	20.5	29.2
30 Apr 2018	Hand	Fairview	N44.782002, W99.072092	7082L/7084R	A	M	0.61	15.5	19.5	20.4

and stack of hay bales both within 100 m. There are no rocky outcrops on the greater landscape. Captures of other species occurred in similar habitats and conditions. We did not record microhabitat measurements at the time of capture, but such information is important to record in future studies to better understand the distributions and habitat use of plains spotted skunks.

Plains spotted skunks were relatively evenly distributed throughout the study area, with six captured in Hand County (three in Alden township and three in Fairview township) and 10 captured in Faulk County (five in Saratoga township and five in Bryant township; Table 1). However, we trapped multiple individuals in three different locations (Table 1). The majority of these captures occurred within or nearby sites with cover (i.e., farmsteads, shelterbelts, woodpiles and hay bales). We removed traps during the first week of May because we had accomplished the primary objectives of

our study. Plains spotted skunk detections rates have been observed higher from late September to early May in Arkansas and Missouri compared to others times of the year, possibly related to food availability or mating behaviors (Hackett et al. 2007, Lesmeister et al. 2009). A study in Alabama, however, reported successful trapping throughout the summer (Eng et al. 2018). It is unclear how trap success changes throughout the year in the Midwest. Our sample was male-dominated, which may be indicative of the mating season and increased male activity (Mead 1968, Kinlaw 1995). Additionally, we recaptured three individuals, which suggests the potential to conduct a study where multiple recaptures of the same individual are useful, such as evaluating health or estimating abundance. Finally, we used geographic distribution and placement of white markings to identify plains spotted skunks from western spotted skunks (*Spilogale gracilis*), which are present in this region (M. Ben-David, University of

Wyoming, personal communication). Using DNA diagnostic testing would have been preferable to determine species and subspecies, as there may be overlap in the distributions of western and eastern spotted skunks.

Our incidental captures provide data on individuals from a contemporary population of plains spotted skunks in South Dakota. Given the range-wide status of eastern spotted skunks as a species of concern, additional research into the demographics, size, movement patterns, habitat use, genetics, and health of this population is warranted. Furthermore, plains spotted skunks are infrequently encountered and understudied in the Great Plains (Choate et al. 1974, McCullough and Fritzell 1984, Boppel and Long 1994, Reed and Kennedy 2000, Hackett et al. 2007, Lesmeister et al. 2008, 2009, 2013, Hardy 2013, Dowler et al. 2017). Our results suggest that state agencies can gain considerable information on this species by requiring reports of incidental captures from researchers and trappers. Such efforts, combined with more focused studies, would allow for the creation of a database needed to appropriately assess the subspecific status as part of the federal listing process.

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