

## Porcupine Densities Estimated from Winter Aerial Surveys in North Dakota, 1964–1965

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**Abstract** – During the winter of 1964–1965, aerial counts of *Erethizon dorsatum* (Linnaeus) (North American Porcupine) were recorded while conducting deer surveys. In total, 443 North American Porcupines were observed on 5,722 km<sup>2</sup>, with an overall minimum density of ~0.1 individuals/km<sup>2</sup>. Densities appeared to be greatest in areas managed as national wildlife refuges and parks.

Limited information is available in the literature on *Erethizon dorsatum* (Linnaeus) (North American Porcupine) densities, particularly on the northern Great Plains. While recently archiving historical data sheets of winter aerial surveys for *Odocoileus virginianus* (Zimmermann) (White-tailed Deer) and *Odocoileus hemionus* (Rafinesque) (Mule Deer), conducted by the North Dakota Game and Fish Department, detailed observations on North American Porcupines were discovered. Although the primary purpose for these surveys was to observe and count deer, incidental notes and observations were made for other species. During the winter of 1963–1964, comments were made about the abundance of North American Porcupines observed, but the actual number sighted was not recorded. During the winter of 1964–1965, the number of North American Porcupines observed was dot tallied on datasheets. North American Porcupine observations were not regularly recorded in subsequent years. Herein we summarize the 1964–1965 incidental observations and provide minimum estimates of winter North American Porcupine densities by physiographic regions in North Dakota.

All flights were conducted in a Super Cub piloted by Elmer Homelvig, with big game biologist Jack Samuelson serving as observer and recorder. Winter aerial survey conditions for deer require snow depth >15 cm and uniform coverage throughout the study area. Surveys were conducted through intense searches of various habitats from a fixed-wing, light aircraft at altitudes from 76 to 107 m, and at flight speeds preferably below 129 km/hour (McKenzie 1958). Snow conditions permitted a total of 55 survey units to be flown in 17 deer hunting units (DHUs) from 2 December 1964 to 17 February 1965. Survey units ranged in size from 21 to 299 km<sup>2</sup>. North American Porcupine observations were recorded on 36 (65%) of the 55 survey units. Surveys were subsumed into the Badlands, Slope, Missouri Coteau, and Drift Prairie physiographic regions (Figure 1). In total, 443 North American Porcupines were observed on the 5,722 km<sup>2</sup> flown. The greatest overall densities were observed on the Drift Prairie, followed by Missouri Coteau, Slope, and Badlands, respectively (Table 1). North American Porcupine densities were greatest on survey areas that encompassed national wildlife refuges (NWR) (Upper Souris NWR: 0.98/km<sup>2</sup>; Des Lacs NWR: 0.44/km<sup>2</sup>), national parks (South Unit of Theodore Roosevelt National Park: 0.27/km<sup>2</sup>), and along major river systems (White Earth River: 0.71/km<sup>2</sup>, Missouri River: 0.47/km<sup>2</sup>). We caution that these were minimum counts and that sightability bias from an aerial survey was not ground-truthed and probably influenced these estimates.

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Estimated North American Porcupine densities in forested provinces and states generally range from 2 to 13/km<sup>2</sup> (e.g., New Brunswick: 2.7/km<sup>2</sup>, Reek 1942; Michigan: 3.5/km<sup>2</sup>, Earle and Kramm 1982; New York: 4.7/km<sup>2</sup>, Shapiro 1949; 10.7/km<sup>2</sup>, Roze 1984; Oregon: 12.6/km<sup>2</sup>, Smith 1977). However, in Upper Michigan, when coexisting with *Pekania pennanti* (Erxleben) (Fisher), North American Porcupine densities were significantly lower

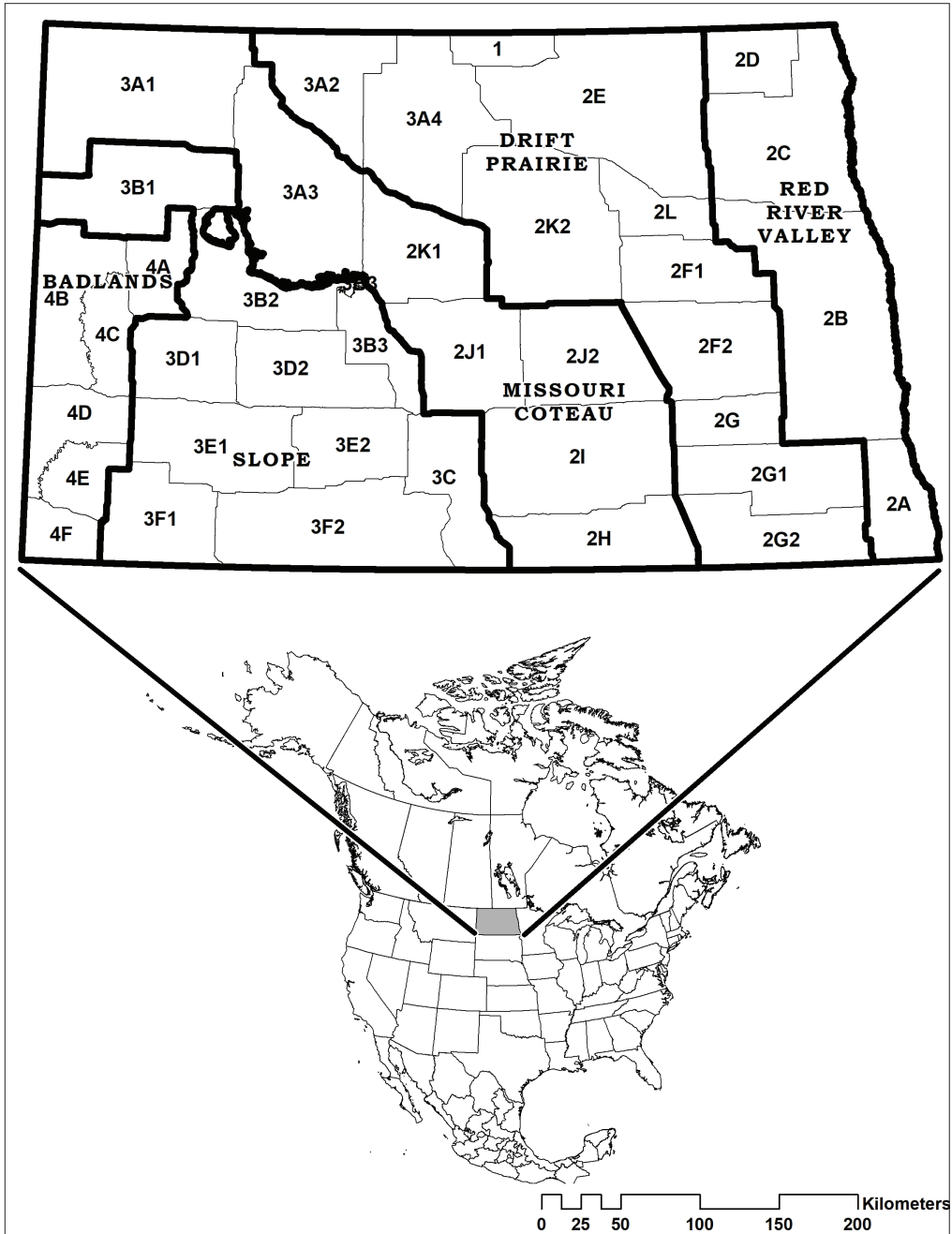


Figure 1. Deer hunting units subsumed into the five physiographic regions of North Dakota.

and averaged  $0.4/\text{km}^2$  (Earle and Kramm 1982). Density estimates for North American Porcupines in western grasslands and shrub habitats are limited. We are aware of only two estimates for North American Porcupine densities in western prairie states (Montana:  $6/\text{km}^2$ , Hendrick and Allard 1988; Wyoming:  $3.4/\text{km}^2$ , Band 1996). However, both those studies were based upon limited sample sizes. In Arizona, Taylor (1935) estimated densities ranging from 0.4 to 34 individuals/ $\text{km}^2$ ; those estimates were based upon the number of North American Porcupines killed per area, and thus preclude making comparisons. Ilse and Hellgren (2001) estimated porcupine densities in pinyon-juniper woodlands of Texas to be 1.9 individuals/ $\text{km}^2$ . Overall, a recent study suggested that the range distribution of North American Porcupines has expanded in recent years in south-central United States and northern Mexico (Barnes and Hoffman 2023).

Herein, we provided minimum density estimates for North American Porcupines in North Dakota, with an overall minimum winter density estimate of about 0.1 individuals/ $\text{km}^2$  in the early 1960s (Table 1). North Dakota is the least forested state in the union with <5% in forest cover (Seabloom 2020). More than 10% of the badlands is in shrub or forest canopy cover (Jensen 1988). Although the Badlands physiographic region appears to support the most and possibly some of the best forested habitat in the state for North American Porcupines, the observed overall density was the lowest. Cattle ranching and hunting are prominent land uses in the Badlands. Loggers, ranchers, and *Canis familiaris* Linnaeus (Dog) owners have a long history of killing North American Porcupines to protect trees, livestock, and Dogs (Bailey 1926, Roze 1989, Seabloom 2020). As a result, North American Porcupine densities may have been suppressed. Lower observed densities in the Badlands also likely were due to reduced ability to see individuals in thick stands of *Juniperus scopulorum* Sarg. (Rocky Mountain Juniper). National parks, wildlife refuges and heavily forested river bottoms may provide North American Porcupines with a level of security not found on private rangeland. Use of small fixed-wing planes to conduct low-altitude aerial surveys in open prairie terrain can provide a unique opportunity to determine winter population density estimates for North American Porcupines, particularly in areas without coniferous trees and shrubs. Future use of aerial surveys for North American Porcupines should include ground searches of survey areas to determine detection rates.

Since the 1960s, dramatic changes in habitat have occurred across North Dakota. Tree rows and shelterbelts are being removed at an increasing rate, road access to the Badlands and other areas has increased with energy development, and predators of North American Porcupines such as Fishers and *Puma concolor* (Linnaeus) (Mountain Lions) have become established in some areas. As a result, current densities of North American Porcupines in North Dakota might now be lower than they were in the 1960s.

Table 1. Winter North American Porcupine densities, by physiographic regions/deer hunting units (DHU), based upon aerial surveys conducted during the winter of 1964–1965.

Region (DHU)	Km <sup>2</sup> Surveyed (No. Units)	Porcupines per Km <sup>2</sup> [Range] (n)	SE
Badlands (4A, 4C, 4D, 4E, 4F)	1,209 (12)	0.02 [0.00 – 0.27] (19)	0.023
Slope (3D1, 3E1, 3E2, 3F1, 3F2, 3B1, 3B2, 3C)	2,788 (26)	0.04 [0.00 - 0.47] (112)	0.021
Missouri Coteau (3A1, 3A3, 2K1)	1,399 (11)	0.10 [0.00 – 0.71] (142)	0.062
Drift Prairie (3A2)	326 (6)	0.52 [0.00 – 0.98] (170)	0.144
Overall	5,722 (55)	0.08 [0.00 – 0.98] (443)	0.025

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