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Evidence of American Martens Populating the Turtle Mountains of North Dakota

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ABSTRACT American martens (*Martes americana*) were native to northeastern North Dakota but were considered extirpated by the early 1800s. Although there is no historic evidence of martens occurring beyond the northeast, forested habitat potentially suitable for martens exists in the Turtle Mountains region of northcentral North Dakota and southwestern Manitoba. From 1989–1991, the Turtle Mountain Trappers Association translocated 59 martens into the Canadian portion of the Turtle Mountains. During summer 2007, we used covered track-plates and/or remotely-triggered cameras placed at 123 survey sites distributed among 41 1-km² grid cells (a GIS-generated layer imposed on electronic maps of the study region) to determine if martens occupied the Turtle Mountains in North Dakota. Martens were detected at 26 (21%) sites, representing 20 of the 41 sample cells (49%) widely dispersed throughout the study area. Our study provided the first evidence of martens occurring in North Dakota since the early 1800s.

KEY WORDS American marten, *Martes americana*, North Dakota, Turtle Mountains

Fur-harvest records show that American martens (*Martes americana*) occupied forested areas in northeastern North Dakota, but the population was presumed to have been extirpated by the early 1800s (Bailey 1926). The Turtle Mountains of north-central North Dakota and southwestern Manitoba had and retains forested habitat conditions potentially suitable to sustain martens. However, the Turtle Mountains lie about 100 km west of the boundary delineating the historic distribution of martens in the upper Midwest (Hagmeier 1956, Strickland and Douglas 1987, Buskirk and Powell 1994, Gibilisco 1994, Proulx et al. 2004). A publication by the Fur Institute of Canada (2003) suggested that martens once occupied the Turtle Mountains in Manitoba, but information in the publication seemed largely anecdotal, provided no supporting documentation, and we were unable to locate published literature suggesting that martens historically occurred in the Turtle Mountains. Also, we were unable to locate evidence of martens historically occupying the portion of the Turtle Mountains in North Dakota. Regardless of historic occurrence, martens have occupied the Manitoban portion of the Turtle Mountains since 1989 when the Turtle Mountain Trappers Association initiated the translocation of 59 martens (individuals were released during 1989, 1990, and 1991); most were from the Duck Mountains and Porcupine Hills of Manitoba but several were from Ontario (Fur Institute of Canada 2003, Manitoba Conservation, unpublished reports).

In the mid-2000s, the North Dakota Game and Fish Department (NDGF) received unverified reports that martens were being incidentally trapped in the North Dakota portion of the Turtle Mountains (Bagherian 2008). Therefore, the objective of our study was to determine if martens were occupying the Turtle Mountains in North Dakota.

STUDY AREA

The Turtle Mountains ecoregion comprised a 1,680-km² plateau occupying almost equal areas in north-central North Dakota and southwestern Manitoba (Bryce et al. 1998). The plateau rose 180 to 240 m above the surrounding plains, and was characterized by a rolling topography of predominately thick, mature, upland deciduous forest interspersed with hundreds of small lakes and wetlands (Bryce et al. 1998, Henderson et al. 2002). The Turtle Mountains received approximately 4 cm more precipitation than the surrounding plains enabling the ecoregion to be forested (Bryce et al. 1998, Henderson et al. 2002). Dominant plant species included aspen (*Populus tremuloides*), bur oak (*Quercus macrocarpa*), green ash (*Fraxinus pennsylvanica*), paper birch (*Betula papyrifera*), boxelder (*Acer negundo*), sumac (*Rhus glabra*), Saskatoon serviceberry (*Amelanchier alnifolia*), snowberry (*Symphoricarpos albus*), and balsam poplar (*P. balsamifera*; Bluemle 2002, Henderson et al.

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2002). Our study was conducted in the North Dakotan portion of Turtle Mountains (excluding the Turtle Mountain Indian Reservation in the southeastern portion of the region), where the forest was less contiguous and distributed

more as various-sized patches than in the Manitoban portion of the Turtle Mountains (Henderson et. al. 2002, Bagherian 2008; Fig. 1).

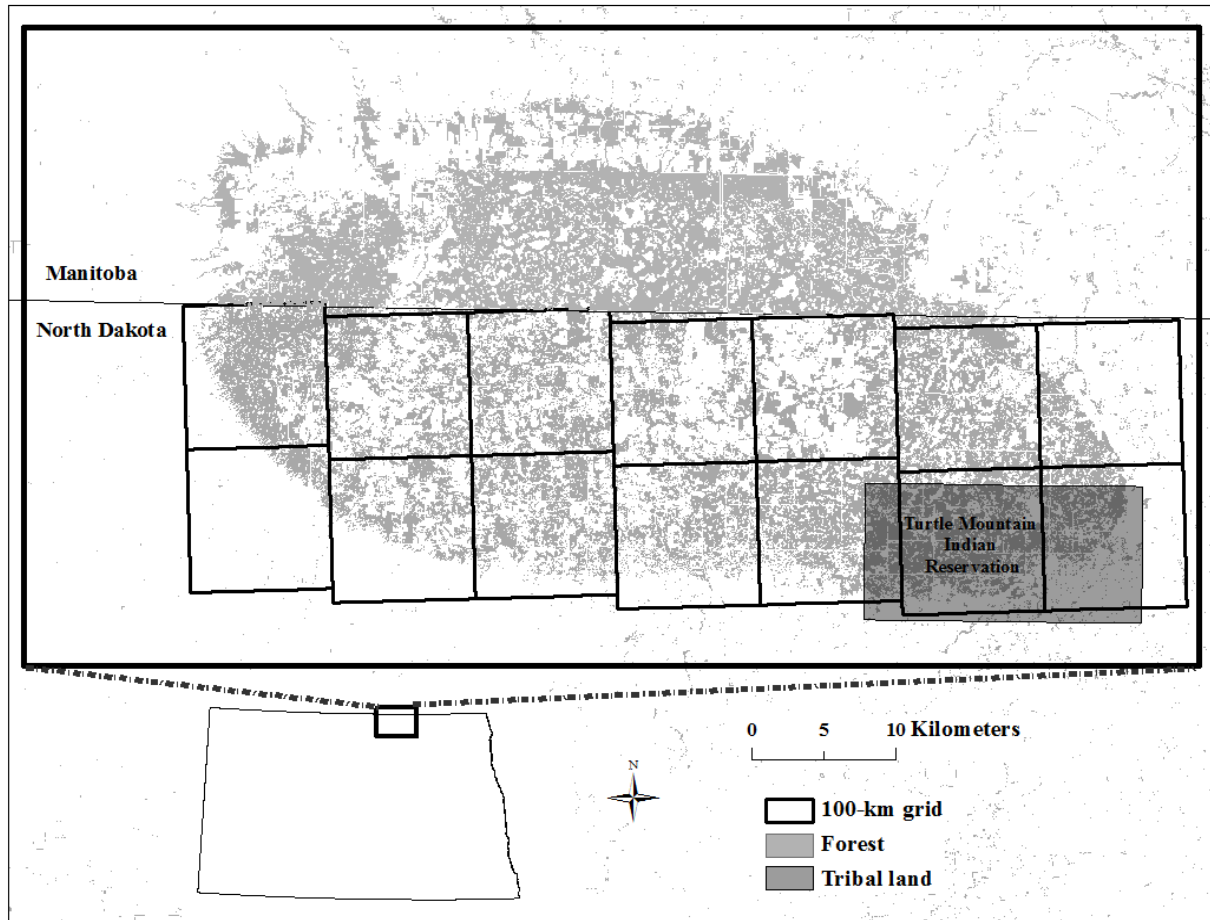


Figure 1. The Turtle Mountains region of North Dakota, USA and Manitoba, Canada. We assessed the occurrence and distribution of American martens in the North Dakota portion of the Turtle Mountains during summer 2007. Sampling locations for American martens were selected in a stratified random manner from within 12 of 14 100-km² units comprising a GIS-derived grid overlaying the study area. (note: The 2 100-km² units omitted from the study were mostly in an area under the jurisdiction of the Turtle Mountain Indian Reservation in the southeastern portion of the study region).

METHODS

During 19 June–30 July 2007, we conducted surveys to detect martens using 2 types of detection devices: a covered track-plate (hereafter track-plate(s); see Bagherian [2008] for details of materials and configuration) or a remotely-triggered camera (hereafter camera[s]; Reconyx, RECONYX, Inc., Holmen, WI; Cuddeback Digital, Non Typical, Inc., Green Bay, WI, USA) placed individually (41 sites with track-plates only and 58 with cameras only) or paired (24 sites) among 123 survey sites (e.g., the combination of individual and paired placement of detection devices resulted in 65 sites with track-plates and 82 sites

with cameras), following techniques for monitoring forest carnivores (Zielinski and Kucera 1995, Gompper et al. 2006, Long et al. 2008). To attract martens, at each survey site we placed beaver (*Castor canadensis*) meat (85–170 g per site) in the rear of track-plates or in the field of detection of cameras, and, as a general attractant, a perforated film canister containing beaver castor and skunk essence (Minnesota Trapline Products, Pennock, MN, USA; Dusty Hough's Fur Shed, Barnesville, MN, USA) suspended from monofilament fishing line about 2 m above the forest floor and within 4 m of the detection device. We maintained a survey site for 10 to 14 days. We checked sites and re-

baited (if needed) mid-way through a monitoring period (typically day 6).

We used a stratified random sampling design developed in a Geographic Information System (ESRI ArcGIS 9.3.1; Environmental Systems Research Institute, Redlands, CA, USA) to ensure that detection devices were distributed representatively in the region. Sampling involved partitioning the study area into 14 100-km² units (two of these 100-km² units occurred on the Turtle Mountain Indian Reservation in the southeastern portion of the study area and were excluded from the study because of time limitations for obtaining permission for access; Fig.1). We subdivided each of the remaining 12 100-km² units into 100 1-km² cells (hereafter candidate cells). From a National Land Cover database Homer et al. (2007), we determined the percentage of forest cover for each candidate cell. Martens typically use areas with high forest cover (Thompson 1994, Hargis et

al. 1999, Poole et al. 2004, Porter et al. 2005, Proulx 2006); therefore only candidate cells with ≥50% forest cover ($n = 515$ cells) were considered potential marten habitat and deemed suitable for sampling. Within each 100-km² unit we randomly selected 1 to 8 (typically 2 to 4) candidate cells to be sampled (hereafter sample cells) of which 41 were included in the study (Fig. 2). We randomly placed a single detection device at 3–4 survey sites (at least 1 of each type of detection device was included among survey sites within a sample cell) in a sample cell. Our randomization process for selecting a survey site was conditionally based on the criteria of a site being >0.4 km from roads, >0.16 km from walking trails, and being separated by >0.2 km. We recorded the GPS locations of each survey site. To describe detection rates we calculated the proportion of detections by 100-km² units, sample cells, survey sites, and detection device.

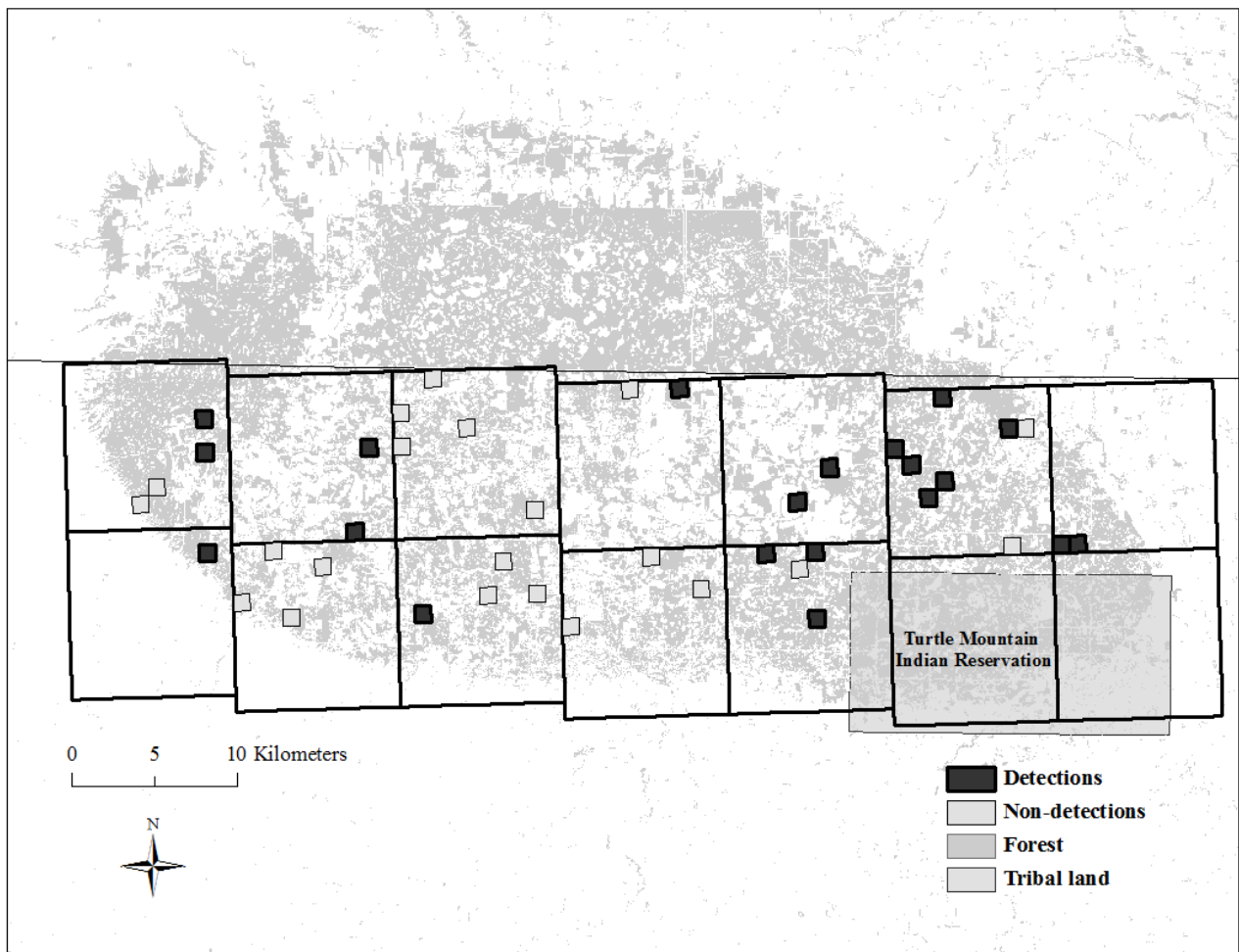


Figure 2. Distribution of 41 1-km² sample cells in which surveys for American martens were conducted in the Turtle Mountains of North Dakota, USA, summer 2007.

RESULTS

We detected martens at 9 of the 12 100-km² units (75%), 20 of the 41 sample cells (49%; Fig. 2), and 26 of the 123 (21%) survey sites, including 6 at 41 (15%) sites with track-plates only, 15 (26%) at 58 sites with cameras only, and 5 (21%) of 24 sites with track-plates and cameras. We detected martens using both devices at paired sites with detections (Fig. 3). By device, including sites with individual and paired devices, detections occurred at 11 of 65 (17%) sites with track-plates and at 20 of 82 (24%) sites with cameras.

DISCUSSION

We demonstrated that martens occupied much of the study area in the Turtle Mountains region of North Dakota, the first confirmation since the early 1800s. The Turtle Mountains are located approximately 100 km west of the

nearest potentially suitable, contiguous forested habitat associated with marten's historic distribution in North Dakota (e.g., the Pembina Hills; Bailey 1926). The plains (now largely converted to agriculture; Bryce et al. 1998) separating the Turtle Mountains from forested habitat further east in North Dakota is devoid of substantive forest cover, a condition that predominated prior to European settlement in the region (Bluemle 2002). Based on current understanding of marten habitat requirements (e.g., Thompson 1994, Hargis et al. 1999, Poole et al. 2004, Porter et al. 2005, Proulx 2006), the paucity of forest cover in the area separating the Turtle Mountains from the Pembina Hills would presumably be unsuitable to readily support eastward expansion of the population in the Turtle Mountains. However, fishers (*M. pennanti*) have been re-populating forested areas in eastern North Dakota, apparently by range expansion from Minnesota (Triska 2010, Triska et al. 2011).



Figure 3. Photograph taken with a remotely-triggered camera of an American marten leaving a covered track-plate in the Turtle Mountains of North Dakota, USA, summer 2007.

Fishers, like martens, were presumed to avoid moving through unforested areas (Powell 1993, Buskirk and Powell 1994), but their current distribution in North Dakota necessitated crossing unforested areas by dispersing individuals (see Triska [2010] for a review of plausible dispersal routes of fishers expanding from Minnesota to North Dakota). Given the paucity of current information about basic ecological aspects of martens in the Turtle Mountain region, the previous notions that martens will be unable to disperse eastward to suitable habitat could be unfounded. Consequently, there could be potential for the marten population now occupying the Turtle Mountains to expand into northeastern North Dakota. Regardless, expansion has yet to occur—martens were not detected during an extensive camera-trapping study (focusing on fishers) in 2008–2009 throughout the Red River of the North drainage in eastern North Dakota (Triska 2010, Triska et al. 2011).

We were unable to find historical evidence of martens occurring in the Turtle Mountains of North Dakota, and only unsubstantiated (e.g., largely anecdotal and no supporting literature) statements of their occurrence in adjacent portions of Manitoba (Fur Institute of Canada 2003). Consequently, our study does not provide evidence of martens re-populating what is considered their historic range in northeastern North Dakota (Bailey 1926, Strickland and Douglas 1987, Buskirk and Powell 1994, Gibilisco 1994, Proulx et al. 2004). Lack of evidence documenting the historic occurrence of martens in the Turtle Mountains could reflect a paucity of formal record keeping prior to the early 1800s, a period when martens could have been eliminated by over harvest, as was the case in northeastern North Dakota (Bailey 1926). Nevertheless, forest habitats (e.g., primarily climax deciduous forest) are similar to those described for the forest that occurred during the 1800s and earlier (Henderson et al. 2002). Thus, it is plausible that martens could have been native to the Turtle Mountains, occurring as a relatively disjunct population whose occurrence was undocumented.

Martens occur as disjunct populations in isolated mountain ranges in Wyoming, east of the Rocky Mountain divide (Buskirk 2002), which are presumably remnants of larger populations associated with the more contiguous forests that occurred in the region during the late Pleistocene, about 12,000 years ago (Graham 1986, Graham and Graham 1994). Similarly, the Great Plains region to the east was largely forested during the late Pleistocene and paleobiological evidence shows that martens occurred as far south as Nebraska (Graham and Graham 1994), which conceivably represented the southern extension of a contiguous population occupying at least portions of the upper Midwest. Eastern North Dakota was largely forested during the late Pleistocene, conditions that could have supported a marten population throughout the region. If so, the isolated forested conditions that persisted in the Turtle Mountains could have sustained a marten population in a

region that overall became increasingly dominated by prairie vegetation as the climate became more arid from 9,000 to 2,500 years ago (Severson and Sieg 2006).

Regardless of the historic occurrence of martens in the Turtle Mountains, our investigation demonstrates that a population now occupies that region of North Dakota, which we presume to have most likely resulted from the expansion of martens translocated to the adjacent area in Manitoba.

MANAGEMENT IMPLICATIONS

Although the Turtle Mountains are largely surrounded by unforested habitat, the presence of this population offers at least some potential for natural expansion or to serve as a source of individuals for translocation to northeastern North Dakota. Conservation of marten would benefit by studies assessing basic life history characteristics of the population, with emphasis on determining if habitat use and movements offer potential for natural expansion to northeastern North Dakota. Also, genetic studies would determine if genetic variation appears adequate for the long-term viability of the population, and as a source of individuals for translocation, and to assess the possibility of an extant population of martens having existed prior to translocations.

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