

## Evidence of Raccoon, *Procyon lotor*, Range Extension in Northern Alberta

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The northern limit of Raccoon (*Procyon lotor*) distribution in northeastern Alberta and northwestern Saskatchewan remains unclear. I report an observation of a Raccoon that supports claims that this species has expanded its range well into the boreal forest of northeastern Alberta. Agriculture, industrial activity, and global warming may be important factors in facilitating Raccoon range expansion in the boreal regions of Alberta and Saskatchewan.

Key Words: Raccoon, *Procyon lotor*, distribution, range extension, agriculture, northern Alberta.

The distribution of Raccoons (*Procyon lotor*) across much of their northerly extent remains unclear (Larivière 2004). In pre-Columbian times Raccoons were most abundant in the southwestern USA (Zelovoff 2002). It is believed that their northward range expansion to the Canada-United States border occurred in the late 1800s and early 1900s, although they likely remained uncommon in Canada (Zelovoff 2002; Larivière 2004). Currently, Raccoons are widespread throughout the prairies of Alberta and Saskatchewan (Smith 1993; Gehrt 2003). It is generally accepted that their expansion into the Canadian prairies occurred slowly throughout the early- to mid-1900s, gaining momentum in the latter part of the century (e.g., Houston and Houston 1973). However, uncertainty arises around how far north Raccoons have managed to penetrate into the northern agricultural zone and boreal forest in northeastern Alberta and northwestern Saskatchewan (Smith 1993).

Larivière (2004) suggests that the capture of a large male Raccoon in 1930 near a logging camp in the Birch Mountains, Lake Claire area (approximately latitude 58°00'N; longitude 112°20'W; Figure 1), northeastern Alberta, was probably an escaped pet or clandestine rider on logging trucks traveling to and from areas farther south (reported in Soper 1942). Raccoons had not been documented from this region of northeastern Alberta previously (Soper 1942). Larivière (2004) recommends that northeastern Alberta and northwestern Saskatchewan should not be included in the normal distribution of Raccoons. I report an observation in northeastern Alberta which indicates that this may not be correct, and suggest that although Raccoons are uncommon in the north they be increasing (Smith 1993).

In February and March 2004, I conducted a carnivore inventory near the town of Wabasca (latitude 55°57'N; longitude 113°49'W) in northeastern Alberta. The study area consisted of about 10 000 km<sup>2</sup> of boreal mixed-wood and peatland vegetation. With the exception of a small ranch on the west-central boundary of the study area, the nearest agriculture was approxi-

mately 50 km south of the southern boundary. I used hair removal sites ( $n = 116$ ) to assess the distribution of Wolves (*Canis lupus*) and Coyotes (*Canis latrans*) within the study area. Other species were also sampled incidentally at some of the hair snares. Hair removal sites consisted of 2 strands of barbed wire (approximately 30 and 60 cm above the ground) wrapped around four trees to form a 2 × 2 m grid. Sites were baited with a rotten Beaver (*Castor canadensis*) carcass and checked for hair on three occasions post baiting. Hair samples were collected, dried and placed in paper coin envelopes for subsequent DNA analysis. Species testing consisted of a sequence-based analysis of the 16S rRNA, mtDNA gene (see Johnson and O'Brien 1997 for further details). Results were compared with a comprehensive reference data set.

On 22 February 2004, I checked a site coded "515" (55°37'N; 113°02'W) for the first time post-baiting (10 February 2004) (Figure 1). Although snow conditions were poor due to an icy crust, I noted a set of tracks that were very unusual. In hindsight it seems most likely that these tracks were Raccoon, although I did not consider this option at the time as the northernmost extent of their range was supposed to be several hundred kilometres to the south (Smith 1993; Gehrt 2003; Larivière 2004). Unidentified hair was collected from site 515 on two occasions (22 February and 4 March) and sent for subsequent DNA analysis. DNA results positively indicated that both hair samples came from one or more Raccoons (we did not identify hair samples to the individual).

Site 515 was 592 m above sea level, and was characterized by a mosaic of small lakes, streams, boreal mixed-wood (Trembling Aspen, *Populus tremuloides*, and White Spruce, *Picea glauca*), and peatland (Black Spruce, *Picea mariana*, and Tamarack, *Larix laricina*) vegetation. The closest paved road was approximately 23 km to the west (although industrial roads associated with the oil and gas industry were common). The closest agriculture was more than 60 km south of this site (Figure. 1). Due to the scarcity of merchantable timber

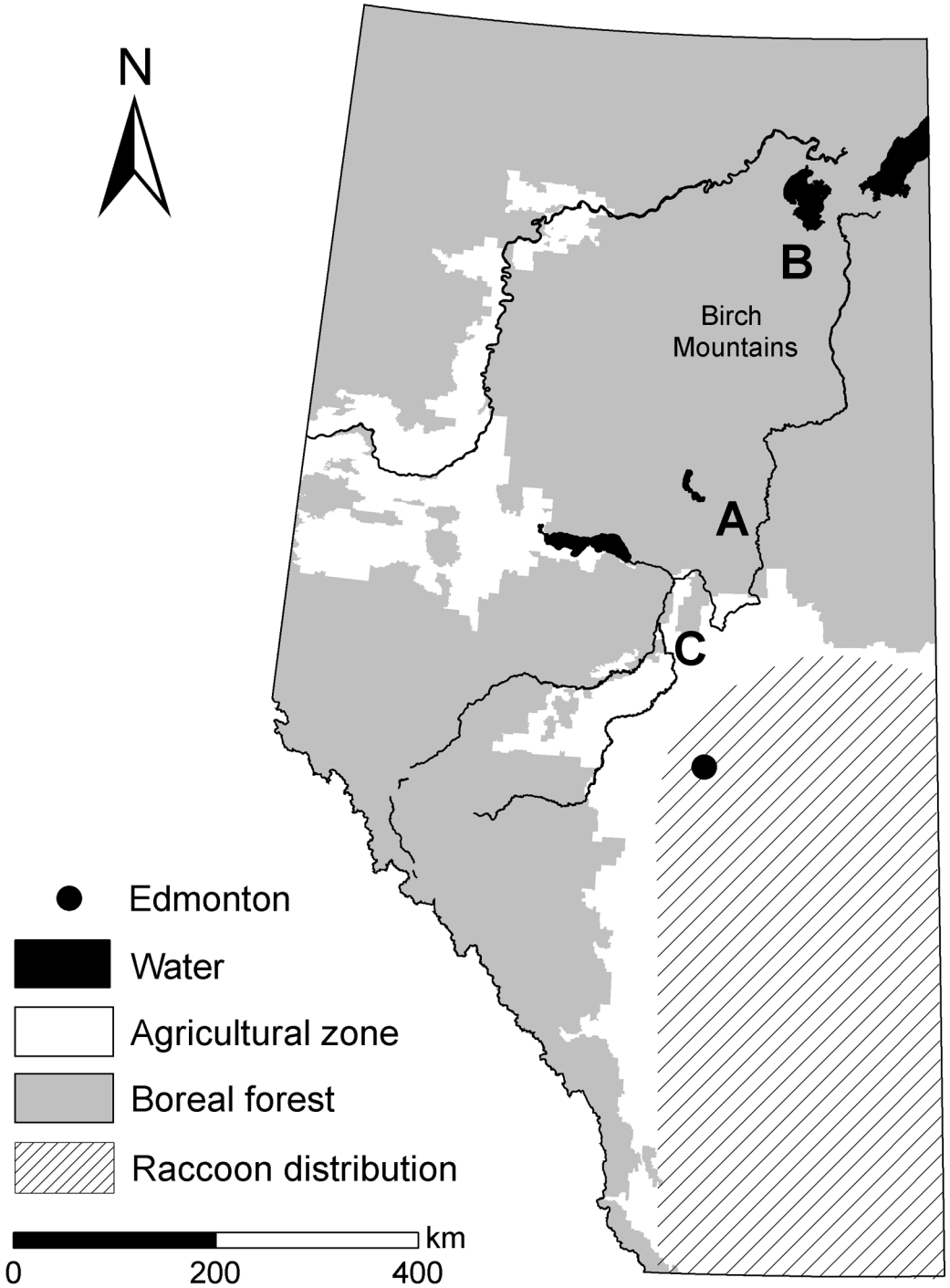


FIGURE 1. A map of Alberta, Canada, showing the extent of the agricultural and boreal forest zones, the current distribution of Raccoons, *Procyon lotor* (adapted from Smith 1993), and the locations within the boreal forest of northeastern Alberta where Raccoon presence has been identified. A represents site 515 where Raccoon presence was identified via DNA analysis of hair samples (the Athabasca River is located to the east of site A); B is the approximate capture location (near Lake Claire) of a male Raccoon in 1930 (reported in Soper 1942); and C is the location of a pilot study near the Pembina River that identified Raccoon tracks at one sample site.

in this peatland-dominated area logging is rare; the closest logging was approximately 10 to 15 km to the west of this site.

This observation provides support to earlier assertions that Raccoons are found in the boreal forest of northeastern Alberta (e.g., Hall and Kelson 1959). It is unlikely that this observation represents a case of an escaped pet or that the individual was perhaps transported to the area by a truck hauling logs or hay as suggested for an earlier observation (Larivière 2004). Site 515 was situated in a mix of large deciduous and coniferous trees, near streams and small lakes, and consequently appears to be suitable habitat for Raccoons (Wooding 1982; Smith 1993; Gehrt 2003). However, the greater habitat matrix surrounding site 515 was composed primarily of Black Spruce bogs and Black Spruce-Tamarack fens, a most unusual habitat for Raccoons.

I agree with Larivière (2004) that the most parsimonious explanation for the northern range expansion of the Raccoon in central Canada is the increase in food abundance associated with agriculture and perhaps human footprint more generally. Similarly, global warming has likely played a role (Voigt 1984; Larivière 2004); less severe winters could allow Raccoons to expand (at least temporarily) into more extreme environments. Some of the farmers on the boreal-agricultural fringe in northeastern Alberta claim that they frequently see Raccoons, particularly near rivers and streams. A pilot study conducted in 2003 along the Pembina River (near Fawcett; 54°32'N; 114°08'W; Figure 1) supports the claim of Raccoon presence near rivers in the boreal-agricultural fringe (A. D. M. Latham, unpublished data). This study used baited sooted-track plates to inventory small- to medium-sized carnivores in the region; Raccoon tracks were identified on a track plate at one of the sites that was assessed (A. D. M. Latham, unpublished data).

It is possible that riparian features serve as vectors to exploratory movements and range expansion (Smith 1993). Large rivers, such as the Athabasca River, and a finer network of smaller rivers and streams course throughout the boreal forest near Wabasca, and it is possible that the Raccoon observation noted here was a result of a dispersal event along such a riparian feature. As the current observation occurred toward the end of the Raccoon mating season (Voigt 1984), it could represent a wide-ranging movement by a male searching for mates. Interestingly, the individual reported from the Birch Mountains in 1930 was a male (Soper 1942), and consequently could have represented a

similar dispersal in search of mates, possibly along the nearby Athabasca River.

In summary, the current observation of a Raccoon well into boreal forest appears to suggest that Raccoons may have penetrated farther into the boreal forest in northeastern Alberta than previously thought (Larivière 2004). Further research is needed to help elucidate the distribution of Raccoons in northeastern Alberta, and to help shed light on the specific mechanisms responsible for northward range expansion.

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