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Point to Ponder

The Least Weasel, *Mustela nivalis*, An Orphan Small Carnivore Species in Canada

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Abstract

The Least Weasel (*Mustela nivalis*) is the smallest carnivore of Canada. Although it is found in many regions of the country, no ecological studies were conducted on this species. I found 17 papers published on this species in Canada from 1901 to 2012, and most of them (76.5 %) were published before 1960 and reported on the distribution of the species. The absence of field work on the Least Weasel in Canada means that reviews on the ecology of the species may not apply to all Canadian biomes. I argue that the lack of interest in Least Weasel research is due to its body size and elusive behavior, its difficulty to study, and its poor economic value.

Keywords: Least weasel, *Mustela nivalis*, Canada, wildlife research.

In his review of weasels of North America, Bangs (1896) reported the existence of a very small weasel, the smallest known carnivore, in the plains of Saskatchewan in western Canada. It ranged from Hudson Bay to the coast of Alaska and was exceedingly rare in collections. Bangs (1896) was referring to the Least Weasel (*Mustela nivalis*). In summer 2010, in a Red Fox (*Vulpes vulpes*) food cache, I found a dead Least Weasel among several Richardson's Ground Squirrels (*Urocitellus richardsonii*). Despite the availability of numerous field guides and publications on North American mammals (e.g., Haley 1975; Burt 1976; Bowers *et al.* 2004), I soon realized that most members of the general public and the scientific community knew very little about this species. This was surprising because, on the basis of museum and university collections reviewed by Hall (1951), the Least Weasel is found in many Canadian regions (although considered to be rare), except in the Maritimes, southern Ontario and Quebec, and the Pacific Coast (Banfield 1974). The objective of this paper is to demonstrate that research on the ecology of the Least Weasel in the different biomes of Canada is inadequate.

In order to assess how much work was conducted on the Least Weasel in Canada, I reviewed key syntheses and books on the Least

Weasel: Hall (1951), Banfield (1974), Sheffield and King (1994), Fagerstone (1987), Svendsen (2003), and King and Powell (2007). I also searched periodicals that were available digitally through the University of Alberta libraries, and I reviewed the Canadian Field-Naturalist (1869-2011) and the Canadian Journal of Zoology (1951-2012) where I expected most Canadian research on Least Weasel to be published. I compared the number of publications related to Canadian studies to those carried out in the USA, Europe, and Other Countries (e.g., Israel, New Zealand, Poland, Russia, etc.) The search of publications on Least Weasels inhabiting countries other than Canada was not exhaustive, and was limited to the above-noted syntheses. However, I considered that it was sufficient to demonstrate how research in Canada was deficient when compared to other countries.

I found 17 papers on the Least Weasel in Canada, 13 (76.5%) of them having been published between 1901 and 1960. Of these, 10 papers reported on the regional distribution of the species (e.g., Criddle and Criddle 1925; Soper 1919, 1942; Dunk 1946), and three reported casual observations on population fluctuations (Criddle and Criddle 1925; Saunders 1932) and food habits (Criddle and Criddle 1925; Criddle 1947), but findings were too limited to allow one to write up the ecology of the species in the different biomes of Canada. Simms (1979) studied resource utilization and distribution of North American weasels but his work focused almost exclusively on Long-tailed (*Mustela frenata*) and Short-tailed (*Mustela erminea*) Weasels. After 1960, scientific publications related to morphometric analyses (Van Zyll de Jong 1992; Reig 1997) with biogeographic and evolutionary implications for taxonomic classification (Reig 1997), or corresponded to incidental observations (e.g., O'Reilly and Hannon 1989). Only on the basis of syntheses reviewed for this paper, it appears that research of the Least Weasel outside Canada was also limited before 1960 (Figure 1). After 1960, however, research picked up considerably, i.e., at least 29 publications in USA, 93 in Europe, and 20 in Other Countries.

The absence of field work on the Least Weasel in Canada means that reviews on the ecology of the species (e.g., Svendsen 2003; King and Powell 2007), largely based on research conducted in the United States (often in captivity, e.g., Heidt *et al.* 1968; Derting 1989) and in Europe, may not apply to all the Canadian biological communities, which vary considerably from the Atlantic to the Pacific according to vegetation, soils, climate, prey base, carnivore community structure, and urban and industrial activities. The ecology of Least Weasel populations inhabiting the northern United States including New York, Minnesota, and Montana would likely be similar to that of Least Weasels inhabiting the southern portions of adjacent Canadian Provinces. However, the ecological needs and the behavior of the species may vary from one biome to another, as it was demonstrated for other Mustelids such as the Short-tailed Weasel (Raymond *et al.* 1984; Robitaille and Raymond 1995; Edward and Forbes 2003) and the American Marten (*Martes americana*) (Potvin *et al.* 2000; Proulx 2009; Hearn *et al.* 2010).

I attribute the lack of interest in Least Weasel research to its small

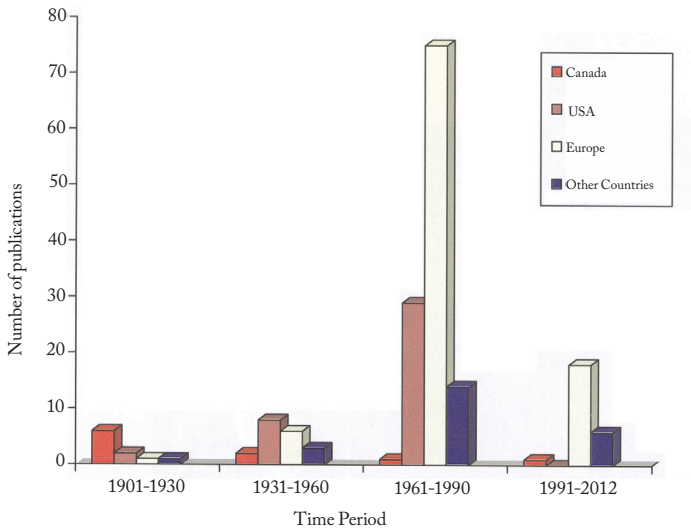

Figure 1. Frequency of scientific papers (n = 180) on the Least Weasel according to time periods and locations.

body size and elusive behavior, the difficulty in capturing and studying it, and its poor economic value. The Least Weasel is a nocturnal-crepuscular carnivore that hunts under vegetation cover or underground, and is as big as a mouse. In other words, people (including scientists) rarely see this species and when they do, they confuse it with small rodents. This lack of knowledge is expected for species that are elusive, and are also rare (e.g., Wilson and Tisdell 2005; Aubry and Jagger 2006).

From a research point of view, the Least Weasel is a very difficult species to study. First, Least Weasels are difficult to capture (Figure 2). Wire mesh traps used to capture larger weasels (e.g., Belant 1992) may not hold Least Weasels, which can escape through mesh holes. Properly set cage traps with solid walls can be used to capture Least Weasels (Edgar 1962; Proulx *et al.* 2012) but the tripping force of the trigger must be properly set, and the door must shut perfectly, otherwise weasels will squeeze out (Proulx, unpublished data). The small size of the animals means greater difficulty in marking and following the individuals. The Least Weasel has a long and skinny body. Short fur and the high surface-to-volume ratio of Least Weasels are associated with high thermal energetic costs (Morrison 1960; King 1989). Least Weasels would be expected to pay high energetic costs to rest at ambient temperatures in winter; decreases in prey density would likely increase Least Weasel mortality and cause population fluctuations (e.g., Criddle and Criddle 1925; Saunders 1932). The high metabolism of the species means shorter trapping intervals. Low population densities mean larger study areas to secure an adequate population size. The Least Weasel definitely is a challenge for researchers wishing to learn about its movements and ecological needs.

In Canada where Mustelids have played an important role in the fur industry (Proulx 2000), all species of weasels harvested are marketed as "weasel" or "ermine" pelts. Graders differentiate between "Longtails" and "Shorttails" on the basis of body length (Obbard 1987). In the

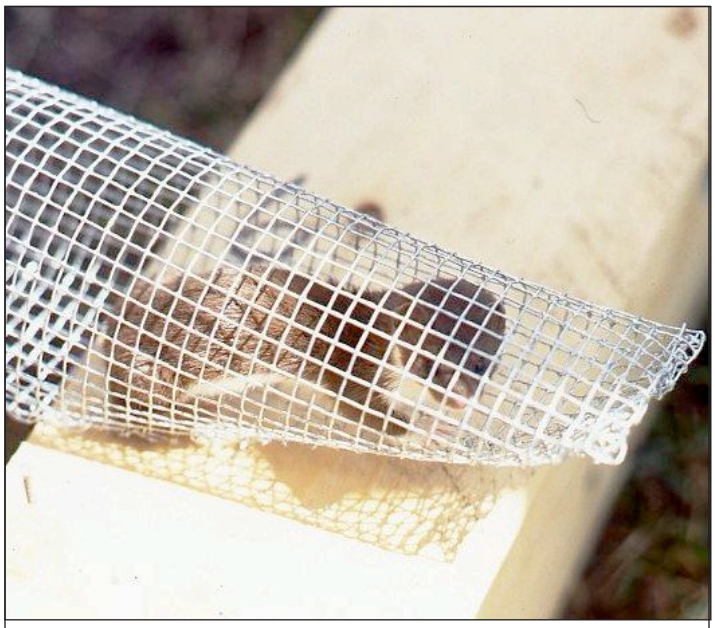

Figure 2. Because of its small size, the Least Weasel is a difficult animal to capture, handle, mark and follow. Photo: G. Proulx.

past, most trappers and fur buyers did not distinguish between the Least Weasel and small individuals of the Short-tailed Weasel. Despite the distinctive lack of black tip on the tail (Figure 3), the occasionally trapped Least Weasel was usually thought of as being a young Short-tailed Weasel of a late litter or a "runt" of this species (Beer 1950). It is unlikely that the Least Weasel played an important role in the fur industry because of its diminutive size; its relatively low value would have resulted in low interest among trappers and the public.

Describing ecology of the Least Weasel in Canada on the basis of research conducted in other countries and different biomes is inadequate from a conservation point of view, and this may lead to undetected population extirpations and an impoverishment of wildlife communities. For example, in the grassland where I found the Least Weasel in the Red Fox food cache, massive poisoning campaigns were conducted across private land to control Richardson's Ground Squirrel population outbreaks (Proulx 2011). Farmers used large amounts of strychnine and chlorophacinone (anticoagulant) across landscapes, which resulted in the loss of predators through secondary poisoning (Proulx 2011; Proulx and MacKenzie 2012). Since these poisons were not selective, many small rodents were also poisoned and eaten by terrestrial and avian predators. Because of their small size or low population densities, dead or dying Least Weasels were not found. However, knowing that other predators (e.g., Long-tailed Weasels) died ≤ 9 days after the application of poison baits (Proulx 2011), it is likely that Least Weasels also perished during these poisoning campaigns after eating contaminated prey. Townsend *et al.* (1984) reported that the Least Weasel was susceptible to secondary poisoning from rodenticides.

Figure 3. Although the Least Weasel is very small and has no black tip on the tail, it may be misidentified by people. Photo: G. Proulx.

In order to ensure the conservation of Least Weasels, research on the ecology of the species must be initiated, first in agricultural and urban areas where the species may be subject to high mortality levels due to factors such as habitat loss and poisoning, and second in the various forested biomes of the country. Studies should focus on population distribution and densities, macro- and micro- habitat requirements for protection against weather and predators, food habits, reproduction, and movements. Armed with a basic understanding of the ecology of the species, wildlife researchers and managers would then be able to properly assess the status of the species, and the need for special management measures to ensure the persistence of populations.

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