

Diversity and Distribution of the Terrestrial Mammals of the Yukon Territory: A Review

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The diversity and distribution of the terrestrial mammals of the Yukon has not been systematically reviewed since 1975, a time when the occurrences of many species were not well known. Since then, single species and community studies, biological collections and expert observations have increased our knowledge of the land mammals of the Yukon. Taxonomic studies have resulted in some additional species. We provide an update on the diversity and distribution of recent land mammals of the Yukon, including previously unreported range extensions, and include a revised checklist. Research in adjoining jurisdictions has contributed more hypothetical species for the Yukon. The mammalian fauna of the Yukon is in a relatively dynamic state, and human-induced changes, particularly climate warming, will undoubtedly influence mammalian diversity and distributions in the coming decades.

Key Words: biological diversity, Beringia, checklist, distribution, Mammalia, Yukon.

Philip Youngman (1975) provided the most comprehensive survey of the recent mammals of the Yukon. That information was based on a survey of observations and biological collections from the late 1800s to mid-1970s, and is now over 30 years old. A recent increase in interest in mammals, particularly non-harvested species, rare species, and species at risk, has resulted in new information and corrections to previously reported distributions. The evolution of the territorial wildlife management agency, the establishment of a conservation data centre, several university-based research projects (most notably near Kluane Lake; see Krebs et al. 2000), documentation of local and traditional knowledge, and a number of resident and visiting naturalists have all contributed much new information. Changes in taxonomy and nomenclature have also occurred since Youngman (1975), with the former particularly advanced with the use of phylogeographic analyses to differentiate taxa. DNA analyses have also helped detect the presence of cryptic species (e.g., *Myotis*, *Myodes*, and *Peromyscus* spp.) that are difficult to identify to the species level in the field. Herein, we provide an update of the terrestrial mammals of the Yukon Territory; an interesting zoogeographic area of Canada with both Beringian and post-glacial immigrant species from southern refugia.

Methods

We reviewed information from published and unpublished work, collections, and sightings made since Youngman (1975), primarily chronicling the period from the mid-1970s to the present. We identified and report on changes in species known to be present and update their distributions since Youngman (1975) and others (e.g., Banfield 1974; van Zyll de Jong 1983, 1985). Species without noteworthy changes are not discussed in our review; however, all documented species occurring in the Yukon are provided in a checklist (Table 1). Scientific names and English common names follow Wilson and Reeder (2005) except Caribou which replaces Reindeer. In addition, we have also extrapolated ranges of species found in neighboring jurisdictions to compile a list of hypothetical species. We did not consider the marine mammals of the Beaufort Sea.

Order Soricomorpha (Insectivores)

Seven species of soricomorphs, representing one family (Soricidae), are recorded from the Yukon (van Zyll de Jong 1983; Table 1). Few surveys specifically for shrews have been undertaken in the Yukon and because they are most efficiently captured in pitfall traps (Prince 1941; MacLeod and Lethiecq 1963), they are likely undersampled using standard methods for small rodents (i.e., live-traps or snap-traps).

TABLE 1. Checklist of the terrestrial mammals of Yukon. Scientific and English common names follow Wilson and Reeder (2005).

Order / Family	Scientific Name	English Common Name
SORICOMORPHA		
Soricidae	<i>Sorex arcticus</i>	Arctic Shrew
	<i>Sorex cinereus</i>	Cinereus Shrew
	<i>Sorex hoyi</i>	American Pygmy Shrew
	<i>Sorex monticolus</i>	Dusky Shrew
	<i>Sorex palustris</i>	American Water Shrew
	<i>Sorex tundrensis</i>	Tundra Shrew
	<i>Sorex ugunak</i>	Barren Ground Shrew
CHIROPTERA		
Vespertilionidae	<i>Eptesicus fuscus</i>	Big Brown Bat
	<i>Myotis lucifugus</i>	Little Brown Myotis
	<i>Myotis septentrionalis</i>	Northern Myotis
LAGOMORPHA		
Ochotonidae	<i>Ochotona collaris</i>	Collared Pika
Leporidae	<i>Lepus americanus</i>	Snowshoe Hare
RODENTIA		
Sciuridae	<i>Glaucomys sabrinus</i>	Northern Flying Squirrel
	<i>Marmota caligata</i>	Hoary Marmot
	<i>Marmota monax</i>	Woodchuck
	<i>Spermophilus parryi</i>	Arctic Ground Squirrel
	<i>Tamias minimus</i>	Least Chipmunk
	<i>Tamiasciurus hudsonicus</i>	Red Squirrel
Castoridae	<i>Castor canadensis</i>	American Beaver
Cricetidae	<i>Dicrostonyx groenlandicus</i>	Nearctic Collared Lemming
	<i>Dicrostonyx nunatakensis</i>	Ogilvie Mountains Collared Lemming
	<i>Lemmus trimucronatus</i>	Nearctic Brown Lemming
	<i>Microtus longicaudus</i>	Long-tailed Vole
	<i>Microtus miurus</i>	Singing Vole
	<i>Microtus oeconomus</i>	Root Vole
	<i>Microtus pennsylvanicus</i>	Meadow Vole
	<i>Microtus xanthognathus</i>	Taiga Vole
	<i>Myodes gapperi</i>	Southern Red-backed Vole
	<i>Myodes rutilus</i>	Northern Red-backed Vole
	<i>Neotoma cinerea</i>	Bushy-tailed Woodrat
	<i>Ondatra zibethicus</i>	Common Muskrat
	<i>Peromyscus keeni</i>	Northwestern Deermouse
	<i>Peromyscus maniculatus</i>	North American Deermouse
	<i>Phenacomys ungava</i>	Eastern Heather Vole
<i>Synaptomys borealis</i>	Northern Bog Lemming	
Dipodidae	<i>Zapus hudsonius</i>	Meadow Jumping Mouse
	<i>Zapus princeps</i>	Western Jumping Mouse
Erethizontidae	<i>Erethizon dorsatum</i>	North American Porcupine
CARNIVORA		
Canidae	<i>Canis latrans</i>	Coyote
	<i>Canis lupus</i>	Wolf
	<i>Vulpes lagopus</i>	Arctic Fox
	<i>Vulpes vulpes</i>	Red Fox
Ursidae	<i>Ursus americanus</i>	American Black Bear
	<i>Ursus arctos</i>	Grizzly Bear
	<i>Ursus maritimus</i>	Polar Bear
Mustelidae	<i>Gulo gulo</i>	Wolverine
	<i>Lontra canadensis</i>	North American River Otter
	<i>Martes americana</i>	American Marten
	<i>Martes pennanti</i>	Fisher
	<i>Mustela erminea</i>	Ermine
	<i>Mustela nivalis</i>	Least Weasel
Felidae	<i>Neovison vison</i>	American Mink
	<i>Lynx canadensis</i>	Canadian Lynx
	<i>Puma concolor</i>	Cougar

TABLE 1. (continued)

Order / Family	Scientific Name	English Common Name
ARTIODACTYLA		
Cervidae	<i>Alces americanus</i>	Moose
	<i>Cervus elaphus</i>	Elk
	<i>Odocoileus hemionus</i>	Mule Deer
	<i>Odocoileus virginianus</i>	White-tailed Deer
	<i>Rangifer tarandus</i>	Caribou
Bovidae	<i>Bison bison</i>	American Bison
	<i>Oreamnos americanus</i>	Mountain Goat
	<i>Ovibus moschatus</i>	Muskox
	<i>Ovis dalli</i>	Dall's Sheep

Stewart et al. (2003) reported a specimen of Pygmy Shrew, *Sorex hoyi*, from the Ogilvie Mountains which would be a northern range extension; however the coordinates given for the specimen align with Dawson City (64°03'N, 139°25'W). Subsequently, a specimen was retained in 2005 from the Blackstone River in the Ogilvie Mountains (65°05'N, 138°11'W; Jung et al. 2007), representing a northern range extension of about 110 km.

The range of the American Water Shrew, *S. palustris*, has been extended northward since Youngman (1975) and van Zyll de Jong (1983) and it is now known to as far north as the Tombstone Range of the southern Ogilvie Mountains (Jarrell 1986; Cook et al. 1997). It has been observed near the tree line on Hamilton Creek, 30 km southeast of the Tombstone Campground (64°19'N, 137°38'W; J. Schou, personal communication).

The Tundra Shrew, *S. tundrensis*, is known from the northern Yukon south to Fortymile (64°26'N, 140°32'W Youngman 1975), where three additional specimens were obtained in 2003 (B. Slough and T. Jung, unpublished data). In the late 1970s five Tundra Shrews were trapped in alpine and subalpine habitats on the Haines Road in British Columbia within 20 km of the southwest Yukon, and about 500 km south of its previously known limits (Nagorsen and Jones 1981). It was thought to be limited to Beringia, a region unglaciated during the Wisconsin glaciation; however, the British Columbia locations are 500 km from the limits of Beringia and confound the expected distribution pattern (Nagorsen and Jones 1981). It may yet be found in the intervening area in the Yukon.

The Arctic Shrew, *S. arcticus*, remains known only from a single skull collected in 1965 (Youngman 1975), despite substantial subsequent survey effort for shrews (e.g., T. Jung and colleagues, unpublished data; J. Cook and colleagues, unpublished data). Further collections are required to assess its distribution in the Yukon.

Order Chiroptera (Bats)

Three species of bats, representing one family (Vespertilionidae), are reported from the Yukon (Table 1).

Youngman (1975) reported only the Little Brown Myotis, *Myotis lucifugus*, from the Yukon, where it is widespread and common south of 64°N. Since Youngman (1975), the Northern Myotis, *M. septentrionalis*, has been confirmed (Jung et al. 2006a) and another species, either the Big Brown Bat (*Eptesicus fuscus*) or Silver-haired Bat (*Lasiurus noctivagus*), has been recorded via acoustic sampling (B. Slough, unpublished data). Until recently, few mist-net or echolocation monitoring surveys for bats had been undertaken in the Yukon, and it is likely that the Order remains undersampled. Based on surveys in adjacent jurisdictions, there may be other species of bats present in the Yukon that are not yet documented.

The Northern Myotis, *M. septentrionalis*, was first found in the Yukon in 2004 when three individuals were captured at the La Biche River (60°08'N, 124°04'W; Jung et al. 2006a). Five additional specimens were captured in 2007 near Watson Lake (60°07'N, 128°49'W; Lausen et al. 2008). This species has also been captured at several locations in the Liard watershed of northern British Columbia (Wilkinson et al. 1995*; Bradbury et al. 1997*; Crampton et al. 1997*; Vonhof et al. 1997*; Vonhof and Wilkinson 1999*) and in the southern Northwest Territories as far west as Nahanni National Park (van Zyll de Jong 1985; Lausen 2006*).

Youngman (1975) had listed the Big Brown Bat, *E. fuscus*, as a hypothetical species for the Yukon based on a record from interior Alaska (Reeder 1965). In September 1999, B. Slough (unpublished data) made a recording of a bat echolocation call sequence with an AnaBat II bat detector (Titley Electronics, Ballina, New South Wales, Australia) at Morris Lake (60°25'N, 131°38'W) that was most likely *E. fuscus* (C. Corben, personal communication; Keinath 2004*). This is possibly the first record of the species from the Yukon, although it may be difficult to distinguish the echolocation calls of *E. fuscus* from those of Silver-haired Bats, as recorded with an AnaBat detector (Betts 1998). There is a single record from central Alaska (Reeder 1965) and unsubstantiated reports exist for southeast Alaska (MacDonald and Cook 1996). *E. fuscus* had been recorded on bat detectors in the Liard watershed in northern British Columbia (Wilkinson et al. 1995*;

Bradbury et al. 1997*; Crampton et al. 1997*) and southwestern Northwest Territories (Lausen 2006*).

Order Lagomorpha (Pikas and Hares)

As noted by Youngman (1975), two species of lagomorphs, representing two families (Ochotonidae and Leporidae) are recorded from the Yukon (Table 1).

The southeastern limit for the Collared Pika, *Ochotona collaris*, shown by Youngman (1975) was the Logan Mountains. It has since been sighted approximately 200 km east-southeast in the Kotanelee (2004; 60°27'N, 124°12'W) and La Biche (1998; 60°14'N, 124°32'W) ranges (B. Bennett, personal communication).

Order Rodentia (Rodents)

There are 26 known species of rodents, representing five families (Sciuridae, 6 species; Castoridae, 1 species; Cricetidae, 16 species; Dipodidae, 2 species; Erithizontidae, 1 species), recorded from the Yukon (Table 1).

The Northern Flying Squirrel, *Glaucomys sabrinus*, occurs throughout the forests of the southern Yukon (Youngman 1975). It has been observed near the tree-line on Hamilton Creek in the Ogilvie Mountains (64°20'N, 137°39'W; J. Schou, personal communication), confirming the northern range limit projected by Youngman (1975).

The Hoary Marmot, *Marmota caligata*, has been confirmed in the La Biche Range in the extreme south-east Yukon (60°14'N, 124°32'W; B. Bennett, personal communication).

The Woodchuck, *Marmota monax*, apparently has a broad range through the southern Yukon; however, sightings and specimens indicate a geographic separation of at least 370 km between the southern (Ross River; 61°59'N, 132°27'W) and central (Klondike; 63°39'N, 138°40'W) populations which Youngman (1975) shows as contiguous.

The Least Chipmunk, *Neotamias minimus*, was reported by Youngman (1975) at Bonnet Plume Lake. It has since been sighted approximately 100 km northwest on the Bonnet Plume River (seven locations from Bonnet Plume Lake to Fairchild Creek (64°58'N, 133°46'W; B. Slough, unpublished data) and approximately 80 km northwest on the Wind River (65°03'N, 134°54'W; S. Gilbert, personal communication). The species appears well distributed in the Wernecke Mountains.

The distribution of the Ogilvie Mountains Lemming, *Dicrostonyx nunatakensis*, is poorly understood, since it is known from only 13 specimens collected at Angelcomb Peak in the Ogilvie Mountains (64°36'N, 138°16'W; Youngman 1964, 1967, 1975), two of which were recorded recently (T. Jung and B. Slough, unpublished data).

Krebs and Wingate (1976, 1985) captured Nearctic Brown Lemmings, *Lemmus trimucronatus*, near the Alaska Highway south of Kluane Lake and from the

Chilkat Pass, near the Haines Road, in British Columbia, extending its known range about 170 km southwest of that reported by Youngman (1975).

The Singing Vole, *Microtus miurus*, is known at present only from the British Mountains, the southern Ogilvie Mountains, and from the Kluane region of the southwestern Yukon (Youngman 1975; Krebs and Wingate 1976, 1985). Krebs and Wingate (1976, 1985) trapped extensively in the Kluane region and found the southern limit of distribution to be the Slims River area at the south end of Kluane Lake (61°N, 138°31'W). Nagorsen (2002) reported that it has not been found south to the British Columbia border as suggested by Banfield (1974) and Youngman (1975).

Jung et al. (2006b) reported the Southern Red-backed Vole, *Myodes gapperi*, from the Yukon at the La Biche River (60°08'N, 124°04'W). Youngman (1975) did not report *M. gapperi* from the Yukon; however, he considered *M. gapperi* and the Northern Red-backed Vole (*M. rutilus*) to be conspecific. Based on the distribution of *M. gapperi* in adjacent northeastern British Columbia and southwestern Northwest Territories (Banfield 1974; Nagorsen 2005) we suspect that *M. gapperi* may be more widespread in the Liard River watershed.

Youngman (1975) gave the northwestern limit of the Bushy-tailed Woodrat, *Neotoma cinerea*, as Kluane Lake. It has since been observed on Ogilvie Island, Yukon River, near Youngman's projected northern limit (63°34'N, 139°44'W; B. Bennett, personal communication). In 2003, a nest of this species was observed at Bear Creek (64°02'N, 139°15'W; B. Slough, unpublished data), representing a 160 km northward range extension.

Muskrat, *Ondatra zibethicus*, inhabit wetlands across the territory (Youngman 1975). The northernmost observations were made in the Arctic wetlands of the Mackenzie Delta in the Yukon (68°46'N, 136°32'W; B. Slough, unpublished data).

The Northwestern Deermouse, *Peromyscus keeni*, had been confirmed through DNA analysis as being present in the Coast Mountains and adjacent areas of the southwestern Yukon (Wike 1998; Lucid and Cook 2004; M. Lucid, personal communication) within the range of the former *P. maniculatus algidus*.

In July 2005, a North American Deermouse, *P. maniculatus*, was captured in the Ogilvie Mountains (64°30'N, 138°13'W; T. Jung et al. unpublished data); representing a 70 km northward range extension, but within the range projected by Youngman (1975).

Interestingly, Lucid and Cook (2007) provide DNA evidence of an undescribed species of *Peromyscus* in southwestern Yukon. Wike (1998), working in central Yukon, also reported the possibility of an undescribed species of *Peromyscus* in the Yukon.

Banfield (1974) and Youngman (1975) show the Northern Bog Lemming, *Synaptomys borealis*, ranging throughout the Yukon north to the Porcupine River drainage. Smits et al. (1989) reported *S. borealis* teeth

and bone fragments in the scat of an Arctic Fox, *Vulpes lagopus*, collected in 1985, on Herschel Island, extending the range of *S. borealis* about 150 km north to the Beaufort Sea (69°35'N, 139°05'W).

The Western Jumping Mouse, *Zapus princeps*, is known from only two specimens collected in 1944 (Rand 1945; Youngman 1975) and another collected in 1980 (S. Beare, unpublished data); all three specimens are from the South Canol Road, near the Rose and Nisutlin rivers.

Order Carnivora (Carnivores)

Sixteen species of carnivores, representing four families (Canidae, 4 species; Ursidae, 3 species; Mustelidae, 7 species; Felidae, 2 species), are recorded from the Yukon (Table 1).

Coyotes, *Canis latrans*, expanded northward from 55°N to southern Alaska between 1829 and 1907 (Banfield 1974). The earliest reported sighting for the area is from "near Whitehorse, on the Alsek River Alaska, in February 1907" (J. A. Allen 1908, reported in Hall 1981). Cairnes (1909) reports the presence of Coyotes in the southern Yukon in 1908. The range has been represented as the entire Yukon (Banfield 1974; Youngman 1975); however, trapper and hunter returns and observations suggest that Coyotes are absent or scarce north of 65°N (Yukon Department of Environment, unpublished data). Extraordinary observations, such as a sighting at Old Crow (67°N, 135°W, C. P. Charlie reported in Youngman 1975) should be considered as extra-limital and not evidence of range expansion.

The Arctic Fox, occurs on the Yukon Coastal Plain and Herschel Island, roughly northward of the 150 m ASL contour (Smits and Slough 1993). There is no evidence of denning or other range use further inland, therefore extraordinary specimens from the Old Crow Flats and the Porcupine River (reported in Youngman 1975) should be considered as extra-limital and not evidence of range expansion. Similarly, extraordinary observations of Polar Bear, *Ursus maritimus*, near Old Crow (reported in Youngman 1975) should be considered as extra-limital and not evidence of range expansion. The Yukon range of Polar Bears is also restricted to the North Coastal Plain and Herschel Island.

An analysis of fur harvest data from registered trappers to 2006 shows that the Fisher, *Martes pennanti*, is largely confined to the Liard River watershed in the southeast Yukon, ranging west to the Teslin River (60°28'N, 133°18'W) as projected by Youngman (1975). Youngman's northern limit was approximately 61°N; however, the species ranges 80 km north to 61°40'N (upper Hyland River and Finlayson Lake; B. Slough and T. Jung, unpublished data). Several observations have been made west of the Teslin River, and Fishers have been trapped north of Whitehorse (Klusha Creek; 61°13'N, 135°58'W) and near Haines Junction (60°51'N, 137°36'W). We believe that the species is expanding its range northwards and westwards.

The Least Weasel, *Mustela nivalis*, occurs throughout the Yukon (Banfield 1974) and, contrary to Youngman (1975), it is present in the Liard watershed. Individuals have been captured by trappers in the Liard watershed (B. Slough, unpublished data; Yukon Department of Environment, unpublished data).

American Mink, *Mustela vison*, occurs throughout the Yukon, as far north as the Old Crow Flats (Youngman 1975) where it has been captured by trappers (Yukon Department of Environment, unpublished data) but does not appear to be a regular inhabitant north of the treeline (68°25'N; Bee and Hall 1956; Banfield 1974) as suggested by Youngman (1975).

Similarly, the North American River Otter, *Lontra canadensis*, occurs throughout the Yukon, as far north as the British and Richardson mountains (Youngman 1975), but does not likely inhabit the Arctic Coastal Plain (north of the 150 m ASL contour, Bee and Hall 1956; Banfield 1974) as suggested by Youngman (1975). We suggest that an observation from Herschel Island (Wildlife Management Advisory Council (North Slope) and the Aklavik Hunters and Trappers Committee 2003*) was an extra-limital movement. A similar occurrence was reported for the Beaufort Sea of northeastern Alaska by Haskell (2006). Additionally, we suggest that the Arctic range for Canadian Lynx, *Lynx canadensis*, shown by Youngman (1975) is extra-limital, and occurs only following years during a population crash.

The range of Cougar, *Puma concolor*, in the Yukon remains somewhat obscure, given the species' propensity for long-distance extra-limital movements. Sporadic sightings have occurred throughout the southern half of the territory. Although most sightings are unsubstantiated, they occasionally occur in concurrent geographic clusters and are often associated with the occurrence of Mule Deer, *Odocoileus hemionus*, (Yukon Department of Environment, unpublished data), providing some credibility to the sighting data. The first Yukon specimen was found dead at Watson Lake (60°04'N, 128°43'W) in November 2000 (Jung and Merchant 2005). Successful breeding by *P. concolor* in the Yukon has not been documented.

Order Artiodactyla (Even-toed Ungulates)

Ungulates have long been the management priority in the Yukon, and consequently the best known Order. Nine species of ungulates, representing two families (Cervidae, 5 species; Bovidae, 4 species), are recorded from the Yukon (Table 1). Since Youngman's (1975) review, White-tailed Deer, *Odocoileus virginianus*, have been recorded in the Yukon (Hoefs 2001).

Since Youngman (1975), introduced populations of Elk, *Cervus elaphus*, north and west of Whitehorse have grown substantially and now may number over 200 animals, although no reliable estimates are available. In addition to introduced populations, Elk have been reported regularly since 1977 in southeastern Yukon, primarily in the Hyland, Beaver, Coal, La-

Biche, and Liard river valleys (Hoefs et al. unpublished data*). The most recent reported location in southeast Yukon is from October 2004 at Beaver River, where the resident trapper has seen Elk with some regularity over the past several years (60°N, 124°25'W; D. MacDonald, personal communication). Whether these animals in the southeast represent populations expanding their range northward from British Columbia (Shackleton 1999), or are extra-limital movements, is unknown.

Mule Deer, *Odocoileus hemionus*, appear to have extended their range in the Yukon since the review by Youngman (1975). They are now found throughout the Yukon, south of the Ogilvie Mountains (64°05'W) and including westward to Alaska (Hoefs 2001). Hoefs (2001) reported a 1998 observation north of the Ogilvie Mountains at Chapman Lake (64°50'N, 138°25'W). We regard this observation, however, as an extra-limital movement and not evidence of Mule Deer being distributed north of the Ogilvie Mountains.

Reliable observations of White-tailed Deer, *Odocoileus virginianus*, some including photographs, have been made in the Yukon (Hoefs 2001). The first observation was reported in 1975 near Tagish Lake (60°10'N, 134°20'W, Hoefs 2001). Mayo (63°05'N, 135°53'W) appears to be the most northern location that White-tailed Deer have been observed in the Yukon (M. O'Donoghue, personal communication). Hoefs (2001) reported an antlered skull found near Ross River (62°N, 132°25'W) as further evidence of White-tailed Deer in the Yukon.

American Bison (*Bison bison*) (Wood Bison subspecies, *B. b. athabasca*) have been reintroduced to the Yukon since the review by Youngman (1975). An attempt in 1951 to establish a small herd of Plains Bison, *B. b. bison*, in the Yukon, by releasing five animals from Alaska, had failed (Youngman 1975). Three Wood Bison herds may now be found in the Yukon; all are reintroduced. The Aishihik Herd ranges in southwestern Yukon, near Aishihik Lake (61°36'N, 137°30'W). Two other, smaller herds – the Nahanni and Nordquist herds – mainly range in the Northwest Territories and British Columbia; Shackleton 1999), respectively, but a portion of their annual range is in southeastern Yukon. The Nahanni Herd ranges into the LaBiche River valley (60°07'N, 124°03'W); the Nordquist Herd ranges along the Alaska Highway, north of Liard Hot Springs in British Columbia, and into the Yukon at Contact Creek (60°01'N, 127°37'W). Both of the southeastern herds were also reintroduced to their native range in the 1990s (Gates et al. 2000).

Muskox, *Ovibos moschatus*, were reintroduced to Barter Island (70°08'N, 143°38'W) and the adjacent mainland in northern Alaska in 1969 and 1970. Muskox were sighted almost yearly in the Yukon since the reintroduction but they did not appear to establish a year-round breeding population at the time of Youngman (1975). The first mixed sex groups including calves were reported in the Yukon in 1986 (D. Cooley, per-

sonal communication). They currently range as far east as the Blow River (ca. 137°W; D. Cooley, personal communication). Summer movements to the Old Crow Flats (ca. 68°N, 140°W) have been somewhat common since 1995. A new resident breeding population appears to have formed in the Richardson Mountains (ca. 68°N, 137°W) that remains all year in the mountains (D. Cooley, personal communication).

Hypothetical Species

The following species are found in neighbouring Alaska, British Columbia or the Northwest Territories, and their ranges may extend into the Yukon (Table 2). Some taxa, such as shrews and bats, are undersampled, as are some of the more remote geographic areas.

The Alaskan Tiny Shrew, *Sorex yukonicus*, likely occurs in the Yukon (Table 2), but has yet to be collected outside Alaska. This species has been recently described from seven specimens from Alaska in 1993 (Dokuchaev 1997). Subsequently, other specimens (ca. 30) have been obtained from Alaska as a result of directed pitfall trapping efforts (Peirce and Peirce 2000; MacDonald and Cook 2001*; Cook and MacDonald 2003*), indicating that the species is widespread, but uncommon, in Alaska. Specimens were obtained from Yukon-Charley Rivers National Preserve and Wrangell-St. Elias National Park and Preserve only 50 km and 12 km, respectively, from the western Yukon border (MacDonald and Cook 2001*; Cook and MacDonald 2003*). Directed sampling effort in 2003 near the abandoned village of Fortymile (64°25'N, 140°32'W) failed to secure a specimen (B. Slough and J. Jung, unpublished data).

Youngman (1975) noted the Long-legged Bat, *Myotis volans*, as a hypothetical species for the Yukon, based on a record near Atlin, British Columbia, reported by Swarth (1936). The species was recently captured in the southwestern Northwest Territories (Lausen 2006*). In addition to *M. volans*, we add the Western Long-eared Bat, *M. evotis*, and Silver-haired Bat, *Lasionycteris noctivagans*, to the list of hypothetical bat species in the Yukon. All three of these hypothetical species have recently been captured within 150 km of the Yukon border in northeastern British Columbia (see: Wilkinson et al. 1995*; Bradbury et al. 1997*; Crampton et al. 1997*; Vonhof et al. 1997*; Vonhof and Wilkinson 1999*; Lausen 2006*) and occur in southeast Alaska (Parker et al. 1997). These captures, however, have not been substantiated with a specimen, echolocation recording or a genetic sample (D. Nagorsen, personal communication). Acoustic records also exist for the Hoary Bat, *Lasiurus cinereus*, and the Eastern Red Bat, *L. borealis*, from the southwestern Northwest Territories (Lausen 2006*), suggestive that these species may also occur in southeastern Yukon. Parker and Cook (1996) reported Keen's Myotis, *Myotis keenii*, from southeastern Alaska (north to ca. 58°N), and it may yet be reported from in or near Klunane National Park Reserve in southwestern Yukon.

TABLE 2. Hypothetical terrestrial mammals that may occur in the Yukon.

Order / Family	Scientific Name	English Common Name
SORICOMORPHA		
Soricidae	<i>Sorex yukonicus</i>	Alaskan Tiny Shrew
CHIROPTERA		
Vespertilionidae	<i>Lasionycteris noctivagans</i>	Silver-haired Bat
	<i>Lasiurus borealis</i>	Eastern Red Bat
	<i>Lasiurus cinereus</i>	Hoary Bat
	<i>Myotis evotis</i>	Long-eared Myotis
	<i>Myotis keenii</i>	Keen's Myotis
	<i>Myotis volans</i>	Long-legged Myotis
LAGOMORPHA		
Leporidae	<i>Lepus arcticus</i>	Arctic Hare
	<i>Lepus othus</i>	Alaskan Hare
RODENTIA		
Sciuridae	<i>Marmota broweri</i>	Alaska Marmot
Muridae	<i>Mus musculus</i>	House Mouse
CARNIVORA		
Memphitidae	<i>Mephitis mephitis</i>	Striped Skunk

In addition to the resident Snowshoe Hare, *Lepus americanus*, Youngman noted the possibility of Arctic Hare, *L. arcticus*, or Alaskan Hare, *L. othus*, being found in northern Yukon. There is an unsubstantiated sight record of *L. arcticus* from the eastern Richardson Mountains of the Yukon in the 1970s (P. Frankish, personal communication).

The Alaska Marmot, *Marmota broweri*, may occur in the Yukon, but it has not yet been recorded from there. *M. broweri* is found as far east in Alaska as the Brooks Range in the Arctic National Wildlife Refuge (Bee and Hall 1956); it may also range in the British Mountains in Ivvavik National Park, Yukon. The Wildlife Management Advisory Council (North Slope) and the Aklavik Hunters and Trappers Committee (2003*) reports "two people said they remembered seeing (marmots) in 1960s and 1970s in the Babbage and Firth River areas".

The House Mouse, *Mus musculus*, occurred in the vicinities of Dawson and Whitehorse in the 1970s (Youngman 1975); however, no further specimens have been obtained. This species may be periodically introduced, but does not appear capable of sustaining commensal populations in the Yukon.

Banfield (1974) shows the Striped Skunk, *Mephitis mephitis*, entering the Yukon in the extreme southeast (La Biche River region) and coming very close in the Teslin area. It has not been documented from the Yukon with the nearest record being two skins taken at the junction of the Fort Nelson and Liard rivers in British Columbia (Rand 1944; Hatler et al. 2008), about 52 km SE of the Yukon. In the Northwest Territories, it is present at Fort Smith, and is expected at Fort Liard (S. Carrière, personal communication), the latter being only 30 km from the Yukon border.

Conclusions

Knowledge of the diversity and distribution of the terrestrial mammals of the Yukon has improved steadily since the last review was published in 1975 (Youngman 1975). Excluding Humans, there are now 63 species of terrestrial mammals that are believed to occur in the Yukon, representing 40 genera, 15 families and 6 orders (Table 1). There are an additional 11 hypothetical species (Table 2). All species, except *Mus musculus*, are native. Only one species, *Dicrostonyx nunatakensis*, is endemic. Populations of some species native to the Yukon have been introduced (*Cervus elaphus*) or reintroduced (*Martes americana*, *Oreamnos americanus*, *Bison bison*).

The mammalian fauna of the Yukon is in a relatively dynamic state. Several species have colonized the Yukon in the past 125 years (e.g., *Canis latrans*, *Odocoileus hemionus*, and *Puma concolor*). The history of mammal colonization and evolution in Yukon and neighbouring Alaska have been discussed by Youngman (1975) and MacDonald and Cook (1996). Approximately one-third of the recent terrestrial mammals of the Yukon originated in Beringia; the remainder are southern immigrants (Youngman 1975). Many of the southern immigrants have limited distributions in the Yukon today. For example, the newly recorded bat species are likely southern immigrants, and Chiropterans may still be colonizing northwestern North America (Jung et al. 2006a). *Myodes gapperi* and *Peromyscus keenii* are similarly southern immigrants. Further cryptic species may be present in the Yukon, for example, in the genus *Peromyscus* (Lucid and Cook 2007) and *Myotis* (Jung et al. 2006a). Human-induced changes, particularly climate change, will undoubtedly affect mammalian diversity and distributions, particularly in

northern regions (e.g., Humphries et al. 2002, 2004). Ranges of some species in the Yukon will likely grow with anthropogenic habitat changes and climate warming (e.g., Mule Deer), while others may contract (e.g., Caribou). Detailed mapping of distribution in the Yukon can assist in monitoring any change in distributional patterns.

Appropriate sampling techniques for species typically undersampled, such as echolocation monitoring and mist-netting for bats and pitfall trapping of shrews, has rapidly increased our knowledge of these secretive and cryptic species in the Yukon. Sampling in remote areas not well surveyed for mammals will also likely yield interesting records. Further mammal surveys, particularly for the smaller species (<1 kg) and in geographic areas with inadequate sampling, will continue to improve our understanding of Yukon mammals. Such knowledge is imperative for the conservation of biodiversity and predicting the impact of climate change and landscape change on the diversity, distribution and conservation status of Yukon's mammals.

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