A Range Extension for the Rock Vole, *Microtus chrotorrhinus*, in Labrador

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Rock Voles (*Microtus chrotorrhinus*) were previously documented only from the southern coast of Labrador and the Strait of Belle Isle south of Hamilton Inlet. During two field seasons in 2000 and 2001, both in July, six Rock Vole specimens were collected on Southern Island, off the north-central coast of Labrador, extending the range of the subspecies *Microtus chrotorrhinus ravus* approximately 250 km to the central Labrador coast north of Hamilton Inlet. Rock Voles were trapped primarily in stunted Black Spruce (*Picea mariana*) forest and areas associated with rocks, thick brush, and water.

Key Words: Rock Vole, *Microtus chrotorrhinus*, Labrador, distribution.

Rock Voles (*Microtus chrotorrhinus*) occur from the Ungava Peninsula of Labrador to the southeastern United States, and west into Minnesota, but their distribution in Labrador is not well documented. Two subspecies of *Microtus chrotorrhinus* are currently recognized in Canada: *M. chrotorrhinus chrotorrhinus*, distributed widely across eastern Canada and into the midwestern portions of the United States (Anderson 1946; Banfield 1974; Kirkland and Jannett 1982; Komarek 1932) and *M. chrotorrhinus ravus*, recorded only from the Ungava Peninsula of Labrador and apparently restricted to the coastal regions (Anderson 1946; Banfield 1974; Kirkland and Jannett 1982; Komarek 1932). In this study, Rock Voles were trapped in the Adlavik Islands, Labrador, and are most likely identified to *M. chrotorrhinus ravus*, which is known from the type locality of Black Bay, Strait of Belle Isle, and from L'Anse-au-Loup, Red Bay, Mary's Harbour, and Hare Harbour, Labrador (Anderson 1946; Harper 1961; Peterson 1962; Whitaker and Martin 1977). Banfield (1974) documented *M. chrotorrhinus ravus* on Anticosti Island in the Gulf of St. Lawrence, but Cameron (1958) did not collect this subspecies on the island. To my knowledge, the only confirmed island population of Rock Voles has been reported from Cape Breton Island, Nova Scotia (Roscoe and Majka 1976). Thus, not only does this study extend the range of Rock Voles farther north in Labrador but also documents a second population of Rock Voles on an island.

Throughout their range, Rock Voles are generally associated with habitats that feature rocks or talus slopes (Kirkland 1977; Kirkland and Knipe 1979; Roscoe and Majka 1976; Timm et al. 1977). Rock Voles usually occur in moist mossy areas near streams and ponds, thick brush, and open-canopy forests (Buech et al. 1977; Kirkland and Jannett 1982; Kirkland and Knipe 1979), although Nagorsen and Peterson (1981) collected Rock Voles on ridges of dry upland coniferous forest near lake margins. Groundcover and berry plants are an important component of Rock Vole microhabitats. Rock voles are often trapped in association with important food sources, including Labrador Tea (*Rhododendron groenlandicum*), Bunchberry (*Cornus canadensis*), Bakeapple or Cloudberry (*Rubus chamaemorus*), Alpine Bilberry (*Vaccinium uliginosum*), and Partridgeberry (*Vaccinium vitis-idaea*) (Kirkland and Jannett 1982; Timm et al. 1977; Whitaker and Martin 1977). Roots, seeds, grass stems and leaves, and larvae of insects have also been recorded in the stomach contents of Rock Voles (Whitaker and Martin 1977).

Study Area

During two field seasons in Labrador, surveys of small mammals were conducted in the vicinity of Adlavik Harbour (55º01'N, 58°49'W; Datum: NAD 27; see also Canada, Surveys and Mapping Branch 1964a,b) on Southern Island in the Adlavik Islands (Figure 1). The Adlavik Islands consist of 11 primary landmasses and are off the north-central coast of Labrador, approximately 25 km south of the small coastal community of Makkovik (Figure 1). From the most southern point on Southern Island to the nearest point on the mainland is 3.75 km. Trapping sites are approximately 10 km from the mainland. During the winter, Southern Island is connected to the mainland by ice, which would allow small mammals to traverse from the mainland to the islands.

The Adlavik Islands are characterized by stands of stunted black spruce (*Picea mariana*) forest that shelter dwarf thickets and brush, carpets of moss and lichen, and rocky tundra on the upper slopes and summits of the hills; habitat that is consistent with previous descriptions of vegetational communities along the central Labrador coast (Fitzhugh 1972; Tanner 1947). The Ecological Stratification Working Group (1996) places the Adlavik Islands in the taiga shield ecozone, specif-

ically the coastal barrens ecoregion, which is characterized by long cold winters and short wet summers. Mean temperatures range from –13.5ºC in the winter to 7ºC in the summer and annual precipitation can range from 600-1000 mm (Ecological Stratification Working Group 1996). The coastal barrens are part of the Atlantic low subarctic ecoclimatic region and are dominated by stands of black spruce and understories of Dwarf Birch (*Betula* sp.), Labrador Tea, Lichen (*Cladina* sp.), and moss (Ecoregions Working Group 1989).

Methods and Results

Small mammals were trapped from 11 July to 27 July 2000 and from 4 July to 22 July 2001. Trapping sites were located in representative vegetational communities on the hillside above Adlavik Harbour. During the 2000 field season, five traplines were set 0.08 km SW of Adlavik Harbour (55º01.426'N, 58º49.050'W, Datum: NAD 27) at an elevation between 15 and 20 m above sea level. Four traplines with 10 traps each ran vertically up the hill; two traplines with five and four traps, respectively, were initially located on open, moist, grass-covered rocks of the lowland coastline, approximately 3 m above sea level. After two days, these latter two traplines were condensed into one trapline now with 10 traps and positioned horizontally across the hill near the other lines, as specimens were not trapped along the coastline. Each of the five traplines encompassed multiple microhabitats such that 19 traps were set in dense microhabitat (thick stunted spruce forest microhabitat with numerous water sources), 27 traps in less dense microhabitat (typically more open bush microhabitat with thick brush, mosses and lichens, and rocks), and four traps in open microhabitat (microhabitat with dry, gravelly soil beneath boulders with little or no brush). Traps were not set along the summit of the hill, which was only sparsely vegetated.

During the 2001 field season, five traplines (0.15 km SW of Adlavik Harbour, 55º01.419'N, 58º48.976'W) were set adjacent to the trapping area of the 2000 field season at an elevation between 15 and 40 m above sea level. Four traplines were positioned horizontally across the hill and 1 line ran vertically up the hill. After five days of trapping, one trapline was moved to the rocky knoll next to camp (0.56 km NE of Adlavik

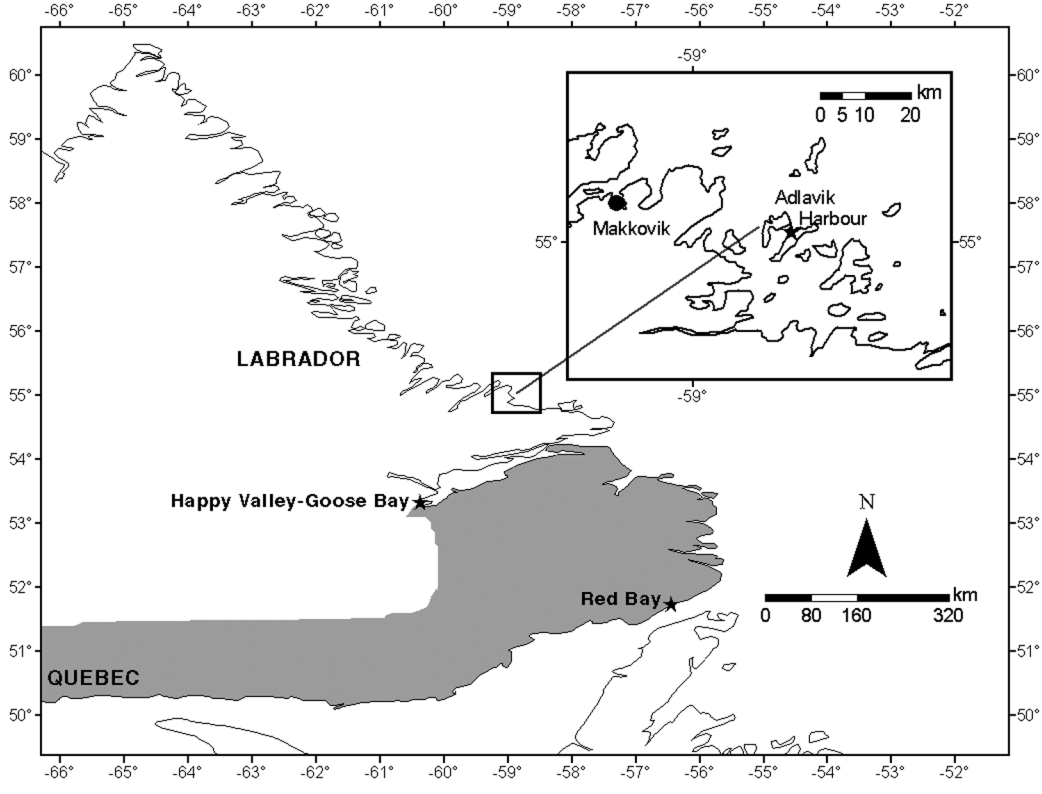

FIGURE 1. Map showing the previously documented range (gray shading) of Rock Voles (*Microtus chrotorrhinus*) in Labrador and the current trapping results in the vicinity of Adlavik Harbour, Southern Island.

TABLE 1. Total length (TL), tail vertebra length (TV), hindfoot length (HF), ear length (EAR), and weight (WT) of male and female *Microtus chrotorrhinus* from Southern Island.

	TL	TV	HF	EAR	WT (g)
Adult Female					
FMNH 168637	149	44	20	18	33
FMNH 168638	149	50	21	16	39
FMNH 176626	127	41	21	15	19
Mean	**141.67**	**45**	**20.67**	**16.33**	**30.33**
Sub-adult Female					
FMNH 168640	132	35	21	15	20
Juvenile Male					
FMNH 168639	119	35	20	13	15
FMNH 168641	118	40	22	15	22

Harbour; 55º01.757'N, 58º49.217'W; 10 m) and 2 of the remaining lines were shifted to the same spruce and open bush habitat sites that were trapped in 2000 and were oriented vertically up the hill. From 4 July to 8 July 2001, traps were set in dense spruce microhabitat (n=11), in less dense bush microhabitat (n=33), and in open habitat of boulders and gravel (n=6). From 11 July to 22 July 2001, traps were located in dense spruce microhabitat (n=22), in less dense bush microhabitat (n=14), and in open microhabitat (n=14). All 10 traps on the rocky knoll above camp were on a talus slope in open microhabitat with boulders and gravel.

Each trapline usually consisted of 10 Museum Special traps spaced at 5-m intervals; traplines were approximately 10 m apart. Traps were placed in different microterrains, including beneath rock overhangs, beside logs, along runways in the vegetation, and under small bushes and brush. If traplines were vertical to the slope of the hill, traps were also vertically oriented and vice versa for horizontally positioned traplines. Traps were baited with a mixture of peanut butter and rolled oats and checked twice per day, once in the early morning and once in the early evening. Specimens were prepared as skins and skeletons or as fluid specimens in the field. Skeletons and skulls were cleaned by a dermestid beetle colony at the Field Museum of Natural History. Cleaned skulls were measured, following the methods in Martin, Pine, and DeBlase (2001), using Mitutoyo digital calipers to the nearest 0.01 mm. Specimens are deposited at the Field Museum of Natural History in Chicago, Illinois, USA (museum numbers: 2000 – FMNH 168599-168649, 2001 – FMNH 176624-176629).

During the 2000 field season, 51 small mammals, representing six species were trapped: Pygmy Shrew (*Sorex hoyi*, n=10), Deer Mouse (*Peromyscus maniculatus*, n=7), Southern Red-backed Vole (*Clethrionomys gapperi*, n=21), Rock Vole (n=5), Meadow Vole (*Microtus pennsylvanicus*, n=1), and Heather Vole (*Phenacomys intermedius*, n=7). During trapping in 2000, four Rock Voles were found in dense habitats of stunted spruce forest, thick brush, mosses, lichens, and berry plants with intermittent water sources and one was in relatively thick brush near trickling water. Three Rock Voles were trapped beneath rock overhangs and two beneath bushes in more open habitat. The Rock Voles (n=5) obtained include adult females (n=2), subadult females (n=1), and juvenile males (n=2). Two female Rock Voles displayed large mammae, perforated vaginas, and no embryos (FMNH 168638 and 168640). One female had small mammae, an imperforated vagina, and no embryos (FMNH 168637). Two males had scrotal testes (FMNH 168639: testes size 7 mm long by 5 mm wide; FMNH 168641: testes size 11 mm long by 6 mm wide).

During the 2001 field season, only 6 individuals were trapped: Deer Mouse (n=5) and Rock Vole (n=1). The single Rock Vole was trapped in dense habitat of stunted spruce forest beneath a rock overhang and a stunted spruce. This individual was an adult female with small mammae, a perforated vagina, and no embryos.

Body measurements of Rock Voles from different age classes are presented in Table 1. Several other studies have reported similar body measurements for this species (Banfield 1974; Kirkland 1977; Kirkland and Jannett 1982; Komarek 1932; Timm 1974; Timm et al. 1977). Cranial measurements of adult female Rock Vole specimens are presented in Table 2. Skulls were measured only if all sutures were fused, indicating adult status. Komareck (1932) reports average cranial measurements for seven specimens of Rock Voles of unknown sex and Timm (1974) documents select cranial measurements for a male and female Rock Vole, which are similar to the sampled Adlavik specimens. Although body and cranial measurements for the adult female Rock Vole trapped in 2001 are small in comparison to the two adult females from 2000, the specimen exhibits equivalent fusion of cranial sutures, degree of toothwear, and closure of dentine triangles on molars. Since the small mammal population appears to have declined on Southern Island in 2001, changes in resource availability could have contributed to the small size of the adult female Rock Vole trapped during that field season.

Discussion

In this study, Rock Voles were trapped in rocky wet habitats associated with dense cover or under thick bushes in more open areas. As noted by most authors

TABLE 2. Cranial measurements of three adult female *Microtus chrotorrhinus* from Southern Island.

Skull Measurements	FMNH 168637	FMNH 168638	FMNH 176626	Range
Greatest length of skull	24.57	24.83	23.72	23.72 - 24.83
Condylobasal length	24.87	25.15	23.67	23.67 - 25.15
Least interorbital breadth	3.74	4.01	3.92	3.74 - 4.01
Nasal length	7.41	7.39	6.86	6.86 - 7.41
Palatal length	12.55	12.82	12.44	12.44 - 12.82
Mastoid breadth	10.92	10.88	10.21	10.21 - 10.92
Zygomatic width	13.67	14.44	12.92	12.92 - 14.44
Basilar length	22.02	22.24	21.01	21.01 - 22.24
Basal length	23.35	23.64	22.54	22.54 - 23.64
Maxillary tooth row	5.67	6.00	5.64	5.64 - 6.00
Mandible length	13.33	14.14	12.74	12.74 - 14.14

(for an exception, see Nagorsen and Peterson 1981), across their range Rock Voles prefer rocky densely covered environments with abundant water sources (Kirkland and Jannett, 1982; Kirkland and Knipe, 1979; Timm et al., 1977). The Ecological Stratification Working Group (1996) notes that steep talus slopes, usually a component of Rock Vole habitat, are a common feature of the coastal barrens ecoregion.

The winter prior to the 2001 survey was very harsh, exceptionally cold and snowy, which could explain the paucity of small mammals trapped that season. Voles are known to cycle through high and low population densities, although the causes of cyclic population fluctuations are still debated. Pruitt (1972) documented synchronous fluctuations in small mammal populations on the island of Newfoundland and mainland Labrador, which are separated by the Strait of Belle Isle. Pruitt (1972) suggests that changes in ecosystem productivity could be the primary factor controlling population fluctuations.

Prior to this study Rock Voles were documented only from south of Hamilton Inlet in Labrador and from one coastal island. The surveys on Southern Island extend the range of Rock Voles approximately 250 km north of Hamilton Inlet and provide the second record of Rock Voles on a coastal island. Southern Island is located in close proximity to mainland Labrador and ice connects both landmasses during the winter such that small mammals could become established on islands. Since many of the Adlavik Islands are not far apart and close to mainland and share similar habitat features, Rock Voles could be expected to occur on other islands. Future sampling in Labrador could expand the known distribution of Rock Voles farther north in Labrador and provide further data on diet, habitat preferences, and measurements.

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