

The Recent Mammals of Kejimikujik National Park

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Abstract

The mammalian fauna of Kejimikujik National Park in southwestern Nova Scotia was systematically sampled during the summer of 1971. An aerial survey for deer and moose abundance and distribution was flown in February 1972. Thirty-four species of mammals were found to occur within the Park.

Kejimikujik National Park, 147 square miles of wild country in the interior of southwestern Nova Scotia, is characterized by wooded hills, shallow, rock-strewn lakes and rivers, with abundant marshes and flood plains. Remnants of the Park's glacial history are evident in boulder fields, drumlins and eskers. The climate of the park, due to mixing of air masses from the Atlantic Ocean and continental North America, is marked by cooler summers, longer autumns, milder winters, later and shorter springs and more precipitation than comparable mainland latitudes.

Kejimikujik lies within two forest districts described by Loucks (1960). The northeastern half of the Park, including the Kejimikujik Lake basin is in Loucks' LaHave District of the Sugar Maple-Hemlock-Pine Zone. The southwestern half of the Park lies in Loucks' Fisher Lake-Halifax District of the Red Spruce-Hemlock-Pine Zone. Division between the two corresponds closely to the margin between the deeper, richer slate-argillite soils in the Kejimikujik Lake basin and the more shallow, infertile quartzite-granite soils of the western uplands (Loucks 1960).

The forest of the LaHave District is mainly beech, (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and red oak (*Quercus borealis*), with white pine (*Pinus strobus*) abundant on lower slopes and valley floors. Red spruce (*Picea rubens*) and hemlock (*Tsuga canadensis*) are found on moist sites, and white pine forms pure stands on abandoned fields (Loucks 1960:116). In the Fisher Lake-Halifax District, white pine, red spruce and hemlock are the common species on areas that have not been burned. Beech, sugar maple and red oak cover exposed slopes and hill tops, and fire stands of red oak, red maple (*Acer rubrum*), and white birch (*Betula papyrifera*) are abundant. Balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*) dominate moist sites (Loucks 1960:131).

Kejimikujik Lake lies in the centre of the traditional Micmac canoe route between the Bay of Fundy and the Atlantic coast, and this migratory people used the Park area seasonally as a hunting ground. The first European settle-

ments were established in the early 1800's. Logging for the ship-building industry was begun in the area about the same time, and forest-cutting for various species continued until the Park was established in 1964. Few areas have escaped the influence of forest-cutting or fire, and much of the forested area of the Park is now a rich mixture of second growth mixed wood and mixed softwood.

The purpose of this study was to inventory the mammalian fauna of Kejimikujik National Park, and describe, in general terms, the abundance, distribution and habitat preferences of each species.

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Methods

No systematic ecosystem classification of the Park existed at the start of this study. Because much of the Park is complex second growth, without obviously dominant life form, for purposes of this study much of the Park forest was categorized merely as mixedwood or mixed softwood. Other ecosystems, such as heath meadows, river flood-plains, pure hardwood and conifer stands were considered, where definable, as separate habitat classifications.

Thirty-four sampling areas (Fig. 1) were each sampled for 500 trap-nights with Museum Special snaptraps during the summer of 1971. Trap lines 25 chains long, consisting of 50 stations at half-chain intervals, two traps to a station, were set for 5 consecutive nights in each area. Traps were baited with a mixture of peanut butter, rolled oats and bacon grease, and were continuously relocated within a 25-foot radius of each station to maximize capture rate. Habitat types and dates sampled are listed in Table 1. Air photographs detailing specific location of each sampling area and black-and-white photographs of vegetational cover of each area are on file in a report to Parks Canada (Wood 1972).

In August, arboreal sets, using large snaptraps, were made for red and flying squirrels in mixedwood (34 trap-nights), red oak (42 trap-nights), white pine (55 trap-nights) and mixed spruce and pine (62 trap-nights). Sets for mink, muskrat and weasel (239 trap-nights), using Conibear and Oneida steel traps were made in seven areas of the Park, and mist netting for bats was carried out for 5 evenings over lawns, marshes and streams (Wood 1972).

Table I
Collection areas and dates of sampling habitat types.

HABITAT TYPE	COLLECTION AREAS	DATES SAMPLED
Black Spruce Bog	1,20	May 18-23, June 29-July 4
Heath Meadow	10,16,18	June 2-7, 15-20, June 29-July 4
River and Lake		
Flood-Plains	8,30	May 26-31, July 25-30
Grassy Islands	24	July 10-15
Stream and River		
Banks	8,14,21,26,28	June 2-7, 9-14, July 4-9, 10-15, 20-25
Lake Shore	17,34	June 15-20, Aug. 14-19
Old Field	2,32	May 10-14, July 25-30
Park Roadside	31	July 25-30
Spruce Barren	27	July 20-25
White Pine	33	August 9-14
Balsam Fir	3	May 18-23
Hemlock	7,12	May 26-31, June 9-14
Mixed Softwood	13,22,29	June 9-14, July 4-9 20-25
Mixedwood	4,19,23	May 18-23, June 29-July 4, July 4-9
Red Oak	5,6,11	May 18-23, 26-31, June 2-7
Beech	15,25	June 15-20, July 10-15

All specimens were weighed, measured, aged, and sexed, and data on reproductive activity and general body condition were recorded. Skulls were saved from all specimens, and museum study skins prepared from most. Skulls and skins were identified and catalogued at the National Museum of Canada.

An aerial survey of the Park for deer and moose was conducted on February 3, 1972, using a Cessna 172 and two observers. A total of 219.5 miles of survey lines, spaced 0.67 miles apart, was flown at an altitude of 300 feet (Fig. 2). A strip 300 feet wide was observed on either side of the aircraft, giving a total observed area of 25.0 square miles (17% of the Park area).

Reference used for nomenclature and classification was Roland (1945) for plants and Peterson (1966) for animals.

Results and Discussion

A total of 655 small mammals, comprising 15 species, were caught in the snap-trap program. Table II illustrates the percentage distribution by habitat type of each of the 15 species collected and Table III shows the percentage species composition by habitat type of animals captured.

The general abundance of all species increased as the summer progressed as reflected in captures per trap-night (Table IV). Therefore direct comparison of capture rates between habitat types as an indication of relative abundance, cannot be made because habitat types were sampled at different times. However, the data probably illustrate habitat selection by the more common species and species composition within the habitats sampled.

Arboreal sets for squirrels produced one red squirrel (*Tamiasciurus hudsonicus*). Mink, muskrat and weasel sets produced one ermine weasel (*Mustela ermineae*). Mist netting for bats produced three little brown bats (*Myotis lucifugus*) and two eastern long-eared bats (*M. keenii*).

Table V gives the numbers of species present in the Park by orders and genera. Hypothetical species are not included. The following list describes the mammals of Kejimikujik National Park, using results of this study as well as observations recorded throughout periods in the field, findings of previous investigators and records on file in the Park headquarters (Mullen 1970). Estimates of abundance and habitat preference are included where such data were available.

Table IV
Monthly trap effort and unit capture

	May	June	July	August
Total trap-nights	4000	4500	7500	1000
Number of animals captured	88	117	396	54
Captures per trap-night x 100	2.2	2.6	5.3	5.4

Table V**Generic distribution of mammalian species in Kejimikujik National Park.**

ORDER AND GENERA	NUMBER OF SPECIES
Insectivora (insect eaters)	
<i>Sorex</i> (shrews)	3
<i>Blarina</i> (shrews)	1
<i>Condylura</i> (moles)	1
Chiroptera (bats)	
<i>Myotis</i>	2
<i>Lasionycteris</i>	1
<i>Pipistrellus</i>	1
Lagomorpha (rabbits and hares)	
<i>Lepus</i> (hares)	1
Rodentia (rodents)	
<i>Tamiasciurus</i> (red squirrels)	1
<i>Tamias</i> (chipmunks)	1
<i>Glaucomys</i> (flying squirrels)	2
<i>Castor</i> (beaver)	1
<i>Peromyscus</i> (mice)	2
<i>Synaptomys</i> (bog lemmings)	1
<i>Clethrionomys</i> (red backed vole)	1
<i>Microtus</i> (meadow vole)	1
<i>Ondatra</i> (muskrat)	1
<i>Zapus</i> (meadow jumping mouse)	1
<i>Napaeozapus</i> (woodland jumping mouse)	1
<i>Erethizon</i> (porcupine)	1
Carnivora (flesh eaters)	
<i>Vulpes</i> (red fox)	1
<i>Ursus</i> (black bear)	1
<i>Procyon</i> (raccoon)	1
<i>Mustela</i> (weasel and mink)	2
<i>Martes</i> (fisher)	1
<i>Lutra</i> (otter)	1
<i>Lynx</i> (bobcat)	1
Artiodactyla (ungulates)	
<i>Odocoileus</i> (deer)	1
<i>Alces</i> (moose)	1
TOTAL	34

Class MAMMALIA

Order Insectivora

Family Soricidae

Sorex cinereus Kerr — Common or Mask Shrew

Common throughout the Park. The most abundant non-rodent collected. Found in a wide variety of habitat types, but most common in stream and river-bank areas. Prefers moist areas with considerable ground cover. Significantly lacking from balsam fir, beech and oak communities, and open lake-shore and roadside areas. Absence from grassy river islands was probably due to seasonal flooding of these areas.

Sorex fumeus Miller - Smoky Shrew

One specimen was taken in 1971, a sexually mature male, on the eastern shore of Kejimikujik Lake. This is the first record of this species from the Park, but records exist from surrounding areas of southwestern Nova Scotia (Peterson 1966) where abundance is described as quite sporadic. The smoky shrew appears to be uncommon in Kejimikujik.

Sorex palustris Richardson — Water Shrew

Relatively common in open, moist habitat types, but not nearly as abundant as *Microtus*, *Clethrionomys* or *Sorex cinereus* in these areas.

Microsorex hoyi (Baird) — Pygmy Shrew

Peterson (1966) described four locations in southwestern Nova Scotia where pygmy shrews have been taken, three near Digby and one, of a capture in 1895, at Caledonia, Queens County, just east of the Park. The current status of *Microsorex* in the Park is not known. Since water-trapping, the only effective way to capture the species (Peterson 1966) was not used in 1971, and this shrew has been described as a rare mammal all over North America (Anthony 1928), it is impossible to conclude whether or not it is present in the Park.

Blarina brevicauda (Say) — Big Short-tailed Shrew

Common in many habitat types, particularly old-field and lake-shore associations. Found to a lesser extent in beech woods, mixed woods and on stream and river banks. Sheldon (1936) considered this "one of the most common of the small mammals" of the area and Dodds *et al.* (1969) took large numbers from the Tobeatic Game Sanctuary southwest of the Park.

Family Talpidae

Condylura cristata (Linnaeus) — Star-nosed Mole

Probably moderately common throughout moist areas in the Park. One specimen taken on a stream bank, and another captured and carried home by a domestic cat just outside the Park. Dodds *et al.* (1969) took four in the Tobeatic Game Sanctuary.

Order CHIROPTERA

Family Vespertilionidae

Myotis lucifugus (LeConte) — Little Brown Bat

Very commonly seen in open areas of the Park. Roosts in caves, buildings and other sheltered areas (Peterson 1966). Three specimens collected in this study. Sheldon (1936) also considered this species to be common.

Myotis keenii (Merriam) — Eastern Long-eared Bat

Two specimens collected in this study and another in the Park collection. Mullen (1970) concluded that it was probably fairly common in more remote areas of the Park.

Lasionycteris noctivagans (LeConte) — Silver-haired Bat

Probably rare. None collected in this study. The Nova Scotia Museum of Science has one specimen of this species, and it is from the Park area (Bleakney 1965a).

Pipistrellus subflavus (Cuvier) — Eastern Pipistrelle

Probably uncommon. This species was not recorded from Nova Scotia until 1959, when one specimen was taken at Grafton Lake in the Park. Since then two have been recorded from the Tobetic Game Sanctuary (Bleakney 1965b).

Lasiurus borealis (Muller) — Red Bat

A possible migratory visitor to the Park, though not recorded. Two specimens have been taken at sea off southwestern Nova Scotia (Bleakney 1965a).

Lasiurus cinereus (Beauvois) — Hoary Bat

A possible migratory visitor to the Park, though not recorded. Three specimens have been taken near Halifax (Bleakney 1965a).

Order LAGOMORPHA**Family Leporidae****Lepus americanus** Erxleben — Snowshoe Hare

Common throughout the Park, but not abundant during the summer of 1971. Favoured habitat is areas of young softwood and mixedwood with dense brushy cover. Uncommon in mature forest where undergrowth is sparse (Wood, unpublished).

Order RODENTIA**Family Scuridae****Tamiasciurus hudsonicus** (Erxleben) — Red Squirrel

Common throughout the Park, but not abundant during 1970 (Mullen 1970) or 1971. Work in other areas suggests population fluctuations related to cone abundance (Wood 1967). During 1971, most observations were made in mature softwood and mixedwood areas. Only two specimens were collected during this study.

Tamias striatus (Linnaeus) — Eastern Chipmunk

Common in most areas of the Park, particularly in mixed softwood type, but also in bogs and grassy areas, mixedwood, white pine and red oak. This species was abundant in 1971. Sheldon (1936) and Bleakney (1958) also noted great abundance of chipmunks in the area.

Glaucomys volans (Linnaeus) — Eastern Flying Squirrel

Two specimens of flying squirrels were collected in this study: one, a pregnant female, just southeast of Grafton Lake; the other, a male in breeding condition, south of Peskawa Lake. Both have been identified as eastern flying squirrels, not previously recorded in the Maritimes (Wood and Tessier, 1974).

***Glaucomys sabrinus* (Shaw) — Northern Flying Squirrel**

This species has been collected in a number of locations in Nova Scotia, including the Park area (Peterson 1966). One specimen in the Park collection was taken in 1969 at Jacques Landing, just upstream from the point where the Mersey River flows into Kejimkujik Lake. Another, at the University of Michigan, was collected in Queens County, probably within or just south of the Park. These specimens, both adult males, have been identified as *G. sabrinus* on the basis of pelage characteristics and measurements (Wood and Tessier, 1974).

Flying squirrels are probably common in the Park, but are seldom seen because of their nocturnal habits. The relative abundance of the two species is not known because of the low incidence of observation.

Family Castoridae

***Castor canadensis* Kuhl — Beaver**

Beaver had almost disappeared from Nova Scotia by 1907, when they became totally protected. By the 1930's the population was expanding in the western part of the province. Beaver were abundant in western Nova Scotia until 1945, when the population declined again (F.C. van Nostrand, pers. comm.). Beaver are common in the northeastern area of the Park, where soils are deeper, but less common in the southwest where soils are shallower and less fertile. P. Tufts (pers. comm.) indicated beaver seldom build dams in southwestern Nova Scotia, but live most often on large flood plains which have woody vegetation. Tufts pointed out the difficulty of censusing beaver in southwestern Nova Scotia, because while most colonies build conspicuous lodges, others den in stream and lake banks; and while most colonies store large food caches for winter consumption, some colonies do not store winter food.

Family Cricetidae

***Peromyscus maniculatus* (Wagner) — Deer Mouse**

Not abundant during 1971 when only two specimens were collected. Mullen (1970) indicated that the species has been very numerous in the past. Sheldon (1936) described *Peromyscus spp.* as being very numerous in certain years, however, in 1933, very few were evident in the park area. Both of our specimens were taken in mixedwood.

***Peromyscus leucopus* (Rafinesque) — White-footed Mouse**

Six specimens of this species were collected in 1971, in a variety of cover types. Dodds *et al.* (1969) found in the Tobetic Game Sanctuary that of 110 specimens of *Peromyscus spp.* collected, 59% were *P. leucopus*, 19% *P. maniculatus* and the remainder could not be identified to species. Sheldon (1936), who made no distinction between the two species, noted that *Peromyscus spp.* was very abundant in some years, but scarce in others.

The white-footed mouse is an example, along with *Glaucomys volans*, of a small mammal whose occurrence in the Maritimes is restricted to southwestern and central Nova Scotia. Its range elsewhere in eastern North America extends only as far north as southern Ontario and Quebec, and southern Maine (Hall and Kelson 1959).

Synaptomys cooperi Baird — Southern Lemming Mouse

Uncommon occurrence during 1971, with only four specimens collected, in a variety of cover types. Sheldon (1936) also found them very scarce and Dodds *et al.* (1969) found them uncommon in the Tobetic Game Sanctuary.

Clethrionomys gapperi (Vigors) — Red-backed Mouse

Abundant in the Park in 1971. Taken in every habitat type except old fields, but most common in forested areas, particularly mixedwood and red oak stands. This was the most abundant mammal taken in 1971. Sheldon (1936) remarked on population fluctuations of this species in the area; in 1928 and 1933 they were very numerous and in 1929 very scarce.

Microtus pennsylvanicus (Ord) — Meadow Vole

Abundant in treeless habitats in the Park, particularly grassy river islands, stream and river banks and flood plains. Completely lacking from most forested areas. This was the second most abundant mammal collected during 1971. Sheldon (1936) noted years when they were very abundant, and one year (1933) when they were very scarce. Dodds *et al.* (1969) found this species to be the most abundant mammal collected during their study in the Tobetic Game Sanctuary in 1965-66.

Ondatra zibethicus (Linnaeus) — Muskrat

None were collected in the present study, but several were observed during the summer, and their houses and feeding stations were common in marshy areas throughout the Park.

Family **Zapodidae****Zapus hudsonicus** (Zimmermann) — Meadow Jumping Mouse

Moderately abundant in all treeless habitat types, and also occurred at lower densities in mixed softwood and white pine types. Sheldon (1936) and Dodds *et al.* (1969) both found the species to be moderately common in the area.

Napaeozapus insignis (Miller) — Woodland Jumping Mouse

Uncommon in Park. Four specimens taken in 1971, all in heavily forested areas. Sheldon (1936) and Dodds *et al.* (1969) both found this species to be less common than the meadow jumping mouse.

Family **Erethizontidae****Erethizon dorsatum** (Linnaeus) — Porcupine

Porcupines and evidence of their activity such as feeding, droppings, runways and dens were commonly observed in all regions of the Park. Sheldon (1936) and Dodds *et al.* (1969) also found porcupines to be very numerous in the region.

Order **CARNIVORA**Family **Canidae****Canis lupus** (Linnaeus) — Timber Wolf

Extirpated in Nova Scotia about the end of the 19th century (Dodds *et al.* 1966).

Vulpes vulpes (Linnaeus) — Red Fox

Several red foxes were observed during the study. A den was observed in the Park in which young were produced in both 1970 and 1971. The red

fox is probably fairly common in occurrence throughout most areas of the Park, but not in great abundance. Sheldon (1936) noted that foxes were very scarce in the 1920's and early 1930's.

Family Ursidae

Ursus americanus (Pallas) — Black Bear

Bears and their sign were common throughout all regions of the Park in 1971. Bears used to congregate at the park garbage dump until it was filled in 1971 and garbage carried out of the Park for disposal. Several incidents of bears disturbing garbage pails in campgrounds occurred in 1971, but none had serious consequences. Sheldon (1936) concluded that bears were "fairly abundant in the wildest parts of the country".

Family Procyonidae

Procyon lotor (Linnaeus) — Raccoon

One specimen was collected, after being struck by a car eight miles north of the Park entrance. Another juvenile was captured in a mink trap, in the Park, and released uninjured, and a raccoon skeleton was found on the bank of Grafton Brook. No other observations were made during 1971, and few tracks were seen in muddy stream banks. No incidents of raccoons disturbing food at campsites were reported, which indicates low abundance. Sheldon (1936) made no mention of the species in the Park area. The numbers of raccoons in the Park are probably low.

Family Mustelidae

Mustela erminea Linnaeus — Ermine

One specimen was taken in 1971. No others or signs of their activity were seen. Sheldon (1936) noted that "trappers often catch them in winter" in the Park area. Dodds *et. al.* (1969) reported one from the Tobeatic Game Sanctuary. Ermine are probably uncommon in the Park.

Mustela vison Schreber — Mink

No mink were collected or observed in 1971. Sheldon (1936) observed that they were very numerous around lake shores. Two were observed in the Park in 1968 and two in 1969 (Mullen 1970). Mink are probably not common in the Park.

Martes americana (Turton) — Marten

This species, which once occurred in the area, was probably wiped out of the park area by overtrapping.

Martes pennanti (Erxleben) — Fisher

No observations were made in 1971. The fisher was greatly reduced in numbers by overtrapping several decades ago (P. Tufts, pers. comm.). The Nova Scotia Department of Lands and Forests released several in the Tobeatic Game Sanctuary and they seem to have become re-established there (Benson 1959). One was trapped at the head of Grafton Lake, near the Park, in the winter of 1968-69 (Mullen 1970).

Mephitis mephitis (Schreber) — Striped Skunk

Skunks, once fairly numerous in Nova Scotia, were apparently eradicated from the province by distemper in the 1920's and 1930's (Dodds 1969). The present range of the skunk in Nova Scotia lies east of a line from Windsor to Halifax, but seems to be expanding towards the Park.

***Lutra canadensis* (Schreber) — Otter**

Otter are uncommon in the park area. None were observed in the present study, but Mullen (1970) indicated that two or three are sighted each year. Sheldon (1936) described this species as "practically unknown" in the area, but stated that "an occasional pair has been seen on Little and West Rivers."

Family Felidae***Felis concolor* — Cougar**

No reliable evidence exists of cougars in western Nova Scotia, but Peterson (1966) includes the park area as part of its former range. The animal was thought to have been extirpated in eastern Canada around 1860, but in recent years evidence has been accumulating of a low population in New Brunswick and parts of eastern Nova Scotia (B.S. Wright, pers. comm.).

***Lynx rufus* (Schreber) — Bobcat**

No specimens were collected nor observations made of this species in 1971. Sheldon (1936) however, noted that they were "plentiful around Kejimkujik Lake . . . especially the Mount Tom country", and Dodds *et al.* (1969) observed that they "have been numerous for the past six years", but noted that their numbers fluctuate in Nova Scotia. I saw one near Kejimkujik Lake in July 1967 and one near Loon Lake during the aerial survey in February 1971. There are three recorded sightings in park files, and observations of scats are common. Considering the secretive nature of this species, it is not surprising that few are sighted. The bobcat is probably relatively abundant throughout most of the Park.

Order ARTIODACTYLA**Family Cervidae*****Odocoileus virginianus* (Zimmermann) — White-tailed Deer**

White-tailed deer bones have been found in Indian middens from circa 1000 AD (Erskine 1960), but they appear to have been absent from Nova Scotia when French settlers arrived in the early 1600's. Deer were re-introduced to western Nova Scotia in the 1880's and 1890's and the population grew until the mid-1940's, when it began to decline. Sheldon (1936) found them very common in the area. Presently the population of western Nova Scotia is low, but appears stable.

Thirty-three deer were observed during the aerial survey of February 3, 1972, distributed as shown on Figure 2. It was possible to observe deer only in hardwood and open mixedwood stands. As they were readily distinguishable I was confident that few were missed in those habitats, but deer under the heavy softwood canopy would not have been observed. However, probably few deer were in the softwood areas, because on the day of the survey the weather was clear, not cold (20F), with little wind, and snow accumulation was only 5-6 inches. Because approximately 1/6 of the Park area was covered in this survey, we estimated a minimum of 200 deer occupied the Park at that time.

The deer population of the Park is concentrated in winter in two areas, as shown in Figure 2; the Mount Tom Brook-Minard Bay area, and the Big Dam Lake-Little River-Central Lake area.

Alces alces (Linnaeus) — Moose

Moose were described as very numerous in the area by Sheldon (1936). In recent years they have become rare, probably because of the parasite *Paralapastrongylus tenuis* carried by the introduced deer. There are indications that moose are gradually increasing again (Mullen 1970). Four sightings were made in spring 1970 (Mullen 1970). In May 1971, the carcass of a young cow (2-3 years old) in good physical condition, was found in the shallow water of Peskowsk Lake. Apparently she had fallen through the spring ice and drowned. In October 1971, a cow and bull were seen together near Joe Tom Bog, and several were observed in the Tobetic Game Sanctuary in November 1971. None were seen during the aerial survey in February, 1971.

Rangifer tarandus (Linnaeus) — Caribou

This species was extirpated from Nova Scotia in the last years of the 19th century. Previous to that caribou were quite numerous in the region of the Park.

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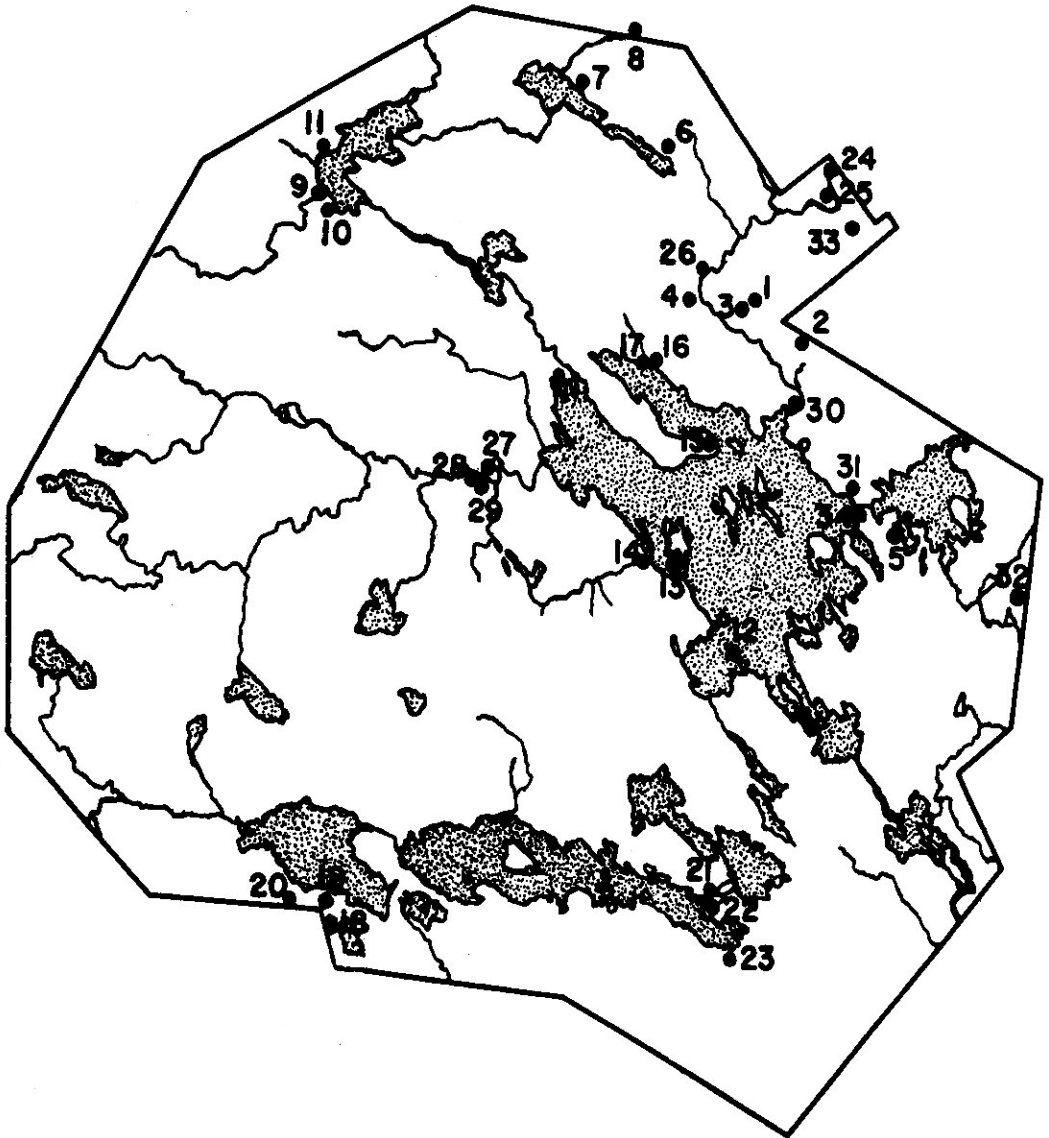


Fig. 1 Map of Kejimikujik National Park showing locations of mammal sampling areas.

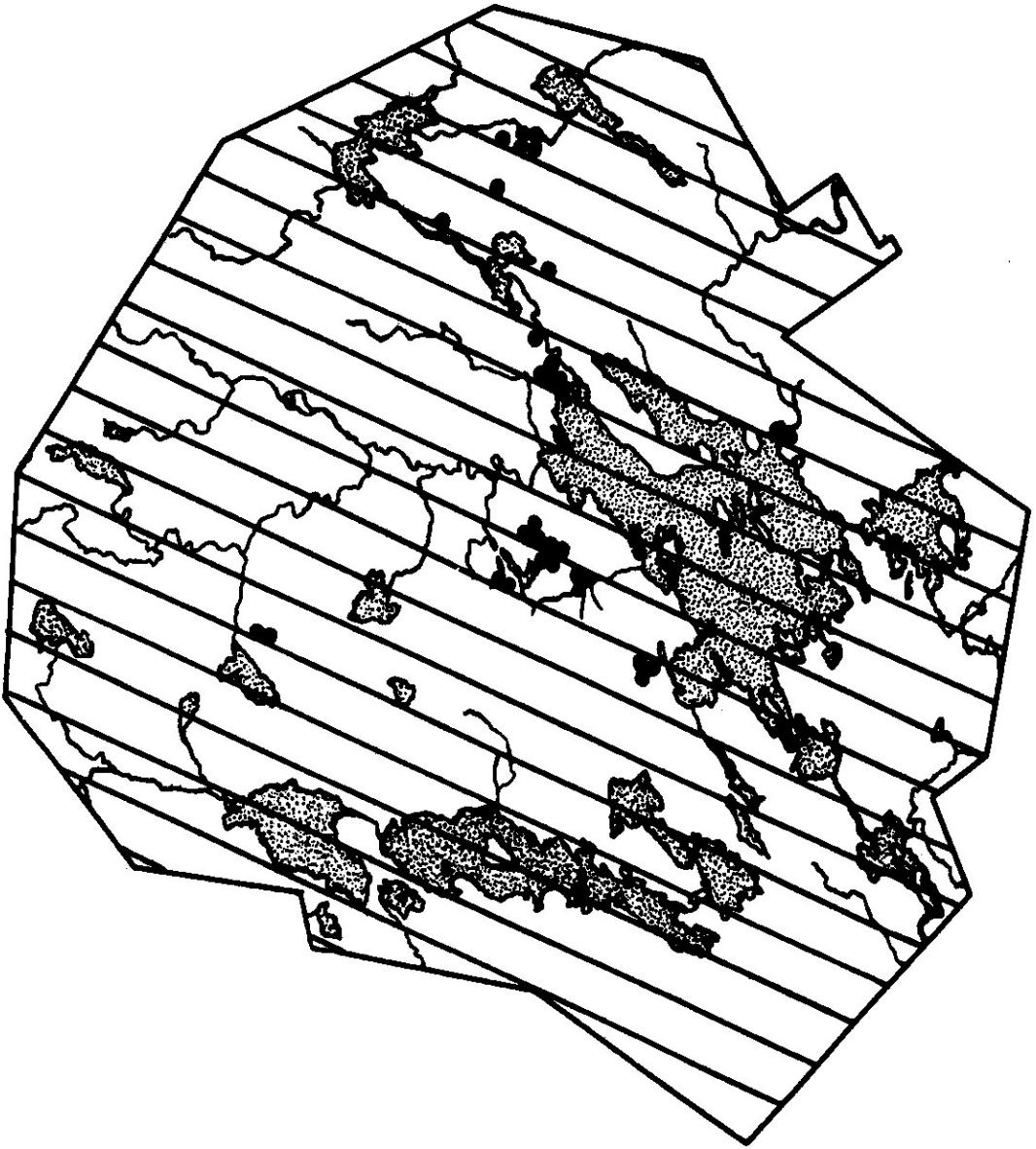


Fig. 2 Map of Kejimikujik National Park showing aerial flight lines and locations of deer observations (solid circles).