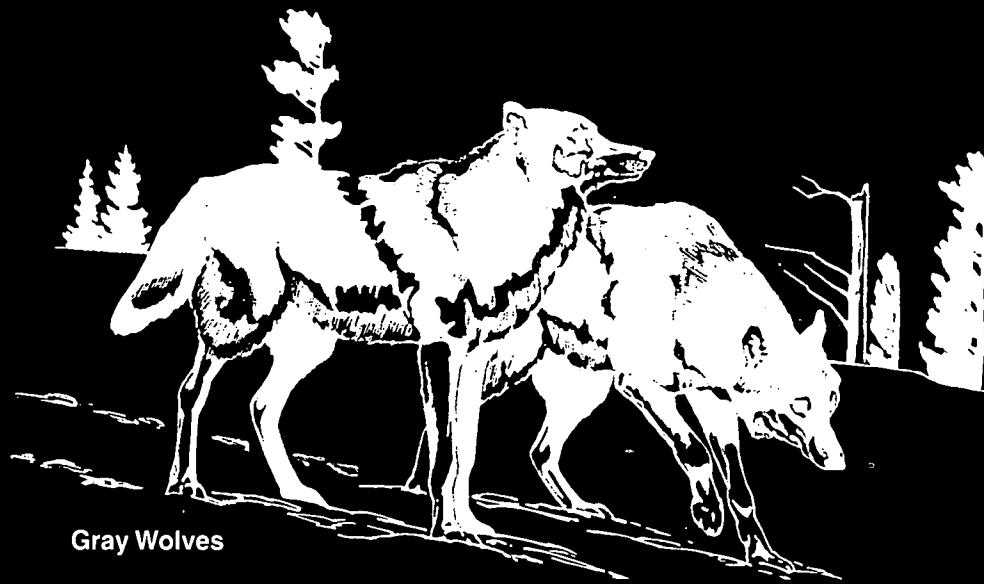


MAMMALS OF ITASCA STATE PARK



Gray Wolves

by
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MAMMALS

OF

ITASCA STATE PARK

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March, 2003

MAMMALS

OF

ITASCA STATE PARK

What is a mammal? Basically, the term mammal applies to all animals with a backbone (the vertebrates) whose females nourish their young with milk. Another characteristic of mammals is the presence of hair, though the amount varies considerably among the species. Two types of hair form the coat of most mammals: the soft underhair, or fur, which lies next to the skin; and the long, coarse, guard hairs which extend beyond the underhair. Mammals are also warmblooded, a characteristic they share with birds.

The existence of 80 different kinds of wild mammals has been documented in Minnesota, with perhaps 50 or more found at the present time in Itasca State Park. Some species, like the grizzly bear, bison, and woodland caribou, are extirpated in our state, victims of changing land use. Others, like the white-tailed deer, are more common today than in years past.

Mammals comprise a widely diversified class of animals. The pygmy shrew weighs less than a dime; the moose a half-ton or more. Some mammals never see the light of day, existing underground all their lives. Others live in trees, dropping to the ground only to forage for food. Some species, like the beaver and otter, prefer an aquatic home, where they spend most of their waking hours in lakes, rivers and ponds.

Some mammals can fly! Some appear to fly, but are just adept gliders. Some species can outrun a thoroughbred; for others, an inch is a mile. Some, like the timber wolf, may roam thousands of miles a year; others never wander from a field or woodlot. Wild mammals, and all wild critters for that matter, are important ecologically and nice just to have around.

Taken from - Minnesota Mammals, William Longley and Charles Wechsler, Minnesota Department of Natural Resources, Bureau of Information and Education, 1977.

INTRODUCTION

This brief introduction consists of selected statements taken from the two previous publications on the Itasca State Park mammals. They were "Wildlife of Itasca Park" by Gustav Swanson, The Flicker, 15:41-49, 1943, and "Mammals of Itasca State Park" by A. B. Sargent and W. H. Marshall, The Flicker, 31:116-128, 1959. The Flicker was the journal of the Minnesota Ornithologists Union, today renamed The Loon.

"Since discovery of the Mississippi's source in 1832, the Lake Itasca area has been of historic importance and biological interest to many Minnesotans. In April of 1891, after months of heated debate, legislation establishing Itasca State Park was passed. Itasca State Park has grown and developed to the extent that it now includes approximately 32,000 acres within its boundaries. The park contains deciduous and coniferous forest, bogs and open water areas, as well as grassy fields which combine to form a wide array of habitat available to the wild life of the area. The mammals of all sizes are an important component of the park's natural history features." Sargent and Marshall, 1959.

"Itasca State Park contains all of the forest types associated with the northern coniferous forest of Minnesota and as a result has a fine representation of typical forest-inhabiting mammals. The Park has numerous lakes and waterways which provide homes for such aquatic forms as mink, otter, beaver, muskrat, and water shrew. It has considerable areas of deciduous trees which add to the variety and are probably responsible for the occurrence of animals like the gray squirrel; and, finally, some of the mammals are there solely because of the developments for which man is responsible. The few buildings in the Park, which are necessary to assure proper park administration and use by the public, and the associated openings around the buildings have all made a change in the habitat which has naturally influenced the distribution of some mammals. Several of these are drawn to the vicinity of man's activities because they have learned to scavenge. Some, including the ground squirrels and meadow mouse, were undoubtedly rare until a few openings had been created in the forest and grass grew up as ground cover. All in all, the great variety of habitat types in Itasca State Park has made it very rich in mammalian life." Gustav Swanson, 1943.

"Early in the history of the area there was some clearing of the land which undoubtedly resulted in several species of mammals moving into the Park. Itasca State Park is fast becoming an isolated but relatively undisturbed habitat in a settled and developed region. This history of change makes faunal lists of importance in recording the variations of wildlife populations of the Park." Sargent and Marshall, 1959.

MAMMALS LIST

The following list indicates present (2002) mammalian species which are present in Itasca State Park. Mammal populations are never static and population numbers and species distribution are constantly changing. An example would be the prairie shrew, the only mammal on this list which has not been positively identified as being within the park boundary, i.e., a well documented museum specimen. This could be due to lack of collecting in the right habitat or the difficulty in identification.

Vegetation Community: D = deciduous forest C = coniferous forest

G = grassland

Preferred Habitat: R = rivers and streams L = lakes W = wetlands

T = terrestrial

Abundance: R = rare C = common A = abundant

Order: Insectivora

Family: Soricidae — Shrews

	Vegetation Community	Preferred Habitat	Abundance
<i>Blarina brevicauda</i> – Northern Short-tailed Shrew	D,C,G	T	C
<i>Sorex arcticus</i> – Arctic Shrew	C	W,T	R
<i>Sorex cinereus</i> – Masked Shrew	D,C	T	C
<i>Sorex haydeni</i> – Prairie Shrew	G	T	?
<i>Microsorex hoyi</i> – Pygmy Shrew	C	T	R
<i>Sorex palustris</i> – American Water Shrew	C	R,L	C

Family: Talpidae — Moles

<i>Condylura cristata</i> – Star-nosed Mole	C	T	C
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Order: Chiroptera

Family: Vespertilionidae — Bats

<i>Eptesicus fuscus</i> – Big Brown Bat	D,C,G	T	R
<i>Lasionycteris noctivagans</i> – Silver-haired Bat	D,C	T	R
<i>Lasiurus borealis</i> – Red Bat	D,C,G	T	R
<i>Lasiurus cinereus</i> – Hoary Bat	D,C,G	T	R
<i>Myotis lucifugus</i> – Little Brown Bat	D,C,G	T	A
<i>Myotis septentrionalis</i> – Northern Myotis	D,C	T	R

Order: Lagomorpha

Family: Leporidae — Hares and Rabbits

<i>Lepus americanus</i> – Snowshoe Hare	C	T	C
<i>Sylvilagus floridanus</i> – Eastern Cottontail	D,C,G	T	R

Vegetation
Community

Preferred
Habitat

Abundance

Order: Rodentia

Family Sciurinae — Squirrels

<i>Marmota monax</i> – Woodchuck	D,C,G	T	A
<i>Sciurus niger</i> – Fox Squirrel	G	T	R
<i>Sciurus carolinensis</i> – Gray Squirrel	D	T	C
<i>Spermophilus franklinii</i> – Franklin's Ground Squirrel	G	T	C
<i>Spermophilus tridecemlineatus</i> – Thirteen-lined Ground Squirrel	G	T	C
<i>Tamias minimus</i> – Least Chipmunk	C	T	R
<i>Tamias striatus</i> – Eastern Chipmunk	D,C	T	A
<i>Tamiasciurus hudsonicus</i> – Red Squirrel	D,C	T	A
<i>Glaucomys sabrinus</i> – Northern Flying Squirrel	C	T	C
<i>Glaucomys volans</i> – Southern Flying Squirrel	D	T	R

Family Geomyidae — Pocket Gopher

<i>Geomys bursarius</i> – Plains Pocket Gopher	G	T	C
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Family Castoridae — Beaver

<i>Castor canadensis</i> – Beaver	D,C,G	T	C
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Family Dipodidae — Jumping Mice

<i>Zapus hudsonius</i> – Meadow Jumping Mouse	D,C,G	T	C
<i>Napaeozapus insignis</i> – Woodland Jumping Mouse	C	T	R

Family Muridae — Mice

<i>Peromyscus maniculatus</i> – Deer Mouse	D,C,G	T	C
<i>Peromyscus leucopus</i> – White-footed Mouse	D,C	T	A
<i>Clethrionomys gapperi</i> – Southern Red-backed Vole	C	T	A
<i>Microtis pennsylvanicus</i> – Meadow Vole	D,C,G	T	C
<i>Synaptomys cooperi</i> – Southern Bog Lemming	C	W,T	R
<i>Ondatra zibethicus</i> – Muskrat	D,C,G	W	C
<i>Mus musculus</i> – House Mouse	dwelling	T	R

(constant reintroductions)

Family Erethizontidae — Porcupines

<i>Erethizon dorsatum</i> – Porcupine	C	T	C
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Order: Carnivora

Family Canidae — Dogs

<i>Vulpes vulpes</i> — Red Fox	D,C,G	T	C
<i>Urocyon cinereoargenteus</i> — Gray Fox	D	T	R
<i>Canis latrans</i> — Cōyote	D,C,G	T	C
<i>Canis lupus</i> — Gray Wolf	C	T	C

Family Felidae — Cats

<i>Lynx rufus</i> — Bobcat	C	T	R
<i>Puma concolor</i> — Mountain Lion	D,C,G	T	R

Family Mustelidae — Weasels & Relatives

<i>Lontra canadensis</i> — River Otter	D,C	R,L	C
<i>Martes pennanti</i> — Fisher	C	T	R
<i>Mustela erminea</i> — Ermine	D,C	T	R
<i>Mustela frenata</i> — Long-tailed Weasel	D,G	T	R
<i>Mustela nivalis</i> — Least Weasel	D,C,G	T	R
<i>Mustela vison</i> — Mink	D,C,G	R,L,W	C
<i>Taxidea taxus</i> — Badger	G	T	R

Family Mephitidae — Skunks

<i>Mephitis mephitis</i> — Striped Skunk	D,C,G	T	C
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Family Procyonidae — Raccoons

<i>Procyon lotor</i> — Raccoon	D,G	T	C
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Family Ursidae — Bears

<i>Ursus americanus</i> — Black Bear	C	T	C
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Order: Artiodactyla

Family Cervidae — Hoofed Mammals

<i>Odocoileus virginianus</i> — White-tailed Deer	D,C	T	A
<i>Alces alces</i> — Moose	C	T	R

Cervus elaphus — American Elk Originally present, eliminated by 1900, reintroduced ca. 1916, transferred to Northern Minnesota ca. 1938.

MAMMALS OF ITASCA STATE PARK

Order: Insectivora

Family: Soricidae - Shrews

Masked Shrew - *Sorex cinereus*

Prairie Shrew - *Sorex haydeni*

American Water Shrew - *Sorex palustris*

Arctic Shrew - *Sorex arcticus*

Pygmy Shrew - *Microsorex hoyi*

Northern Short-tailed Shrew - *Blarina brevicauda*

The insectivorous shrews have a very ancient lineage, although the modern day species are of relatively recent development and quite different from the fossil record. They are quite small; the largest shrew occurring in the park is mouse-sized, and adults of the smallest species may weigh only 2.5 grams. Shrews require a large amount of food to provide energy for their high rate of metabolism. Though shrews search for food throughout the 24 hour cycle, their peak of activity is at night.

Shrews are most commonly mistaken for mice by people unfamiliar with native small mammals. However, they can be easily distinguished by their teeth, all of which are characterized by sharp cusps or points designed to pierce and fragment the bodies of the invertebrates that they eat. All rodents, from the beaver to the smallest mouse, have a pair of front incisors with a gap between the incisors and cheek teeth. This gap is lacking in shrews. Shrews have a long, pointed rostrum or muzzle that extends well beyond the front teeth and is in almost constant motion. The eyes of shrews are tiny and often overlooked. In fact, many people seeing shrews for the first time ask if they have eyes at all! Shrews of the park also lack external ear flaps.

Shrews are insectivores, and as the name suggests, they subsist mostly on invertebrates, including insects and worms. Some species will also consume fungi, snails, vegetation, and even small vertebrates. Shrews are widespread, and 31 species are found in North America. They were thought to be quite rare by early naturalists exploring this country. This mistaken impression occurred because early traps were not efficient at capturing animals as small as shrews. We now know that shrews are among the most common of small mammals. However, they are seldom observed because most of their activity is under cover of leaf litter and dense vegetation. Most shrews have musk glands that give them a strong odor which may deter some mammalian predators. Despite this, they are commonly eaten by owls, snakes, and, upon occasion, even by fish.

Because of their high metabolic rate, shrew life expectancy is quite short. Most never reach adulthood, though the occasional individual may live to 18 months. This

high metabolism accelerates all aspects of shrew natural history. Most species can breed before they are 50 days old. As would be expected, young are also weaned at a very early age. Shrews are induced ovulators, meaning that the stimulation of copulation is required before ovulation can occur. For one species found in the park (the northern short-tailed shrew) at least six matings per day are needed to induce ovulation.

The park is inhabited by five and perhaps six species of shrews. The largest of these, the northern short-tailed shrew, is the most likely to be seen by park visitors. Short-tailed shrews, as well as the other species may occasionally be seen foraging among the leaf litter, but the more likely scenario is to find short-tailed shrews dead on roads where they have been hit by automobiles. Individuals of at least some of the other species of shrews will be killed by cars as well, but they are less likely to be noticed because of their small size.

Northern Short-tailed Shrew

This species is distinguished by its large size (118-140 mm and 15-30 grams) and short tail relative to body size. They have chestnut-colored teeth, like all shrews, and dark gray to blackish fur with the belly only slightly lighter than the back. Short-tailed shrews have a particularly strong musky smell and can be identified by any experienced naturalist with a keen nose. Short-tailed shrews are also unique among the shrews of the park in that they have a toxic saliva. The saliva contains both neurotoxins and hemotoxins, similar to snake venom. It attacks both the nervous and the circulatory system of prey. Fortunately, this venom must be chewed into the prey, so it poses little threat to humans. Short-tailed shrews use the venom to subdue mice and larger prey and to paralyze invertebrates so they may be cached and consumed later—a form of suspended animation!

Arctic Shrew

The arctic shrew is characterized by having distinctly tri-colored fur. Their backs are dark brown to black, sides are lighter brown, and the underparts are grayish-brown. Arctic shrews are 100-125 mm and weigh 5-14 grams; their tails are slightly shorter than the length of the head and body.

Masked Shrew

Masked shrews are fairly nondescript animals. They are brown on the back with grayish-white underparts. They range in size from 80-100 mm and weigh 2.2-5.4 grams. Like the arctic shrew, the tail is shorter than the head and body.

Prairie Shrew

The prairie shrew has only recently been recognized as a distinct species, and their status or occurrence within the park is unknown. Distinguishing between prairie and masked shrews requires examination of skull characters or DNA analysis and is a task best left to experts. They cannot be distinguished based on external characters (RS).

Pygmy Shrew

The tiny pygmy shrew is the smallest mammal in the park. They have a total length of 78-91 mm and may weigh as little as two grams. In coloration, they are identical to the masked shrew. Because of the overlap in size and the similarity in color, these species are easily confused.

Water Shrew

Water shrews, as the name suggests, are most often encountered around water. This fascinating animal makes its living eating both terrestrial and aquatic invertebrates, but will readily take small fish. About half of their diet is made up of aquatic invertebrates. Water shrews are excellent swimmers and frequently forage along stream bottoms where they must paddle swiftly to stay submerged due to the tiny air bubbles trapped in their fur. To aid in their aquatic locomotion, the hind feet of water shrews possess a fringe of stiff hairs that acts as webbing and thereby increase paddling surface. The water shrew also uses these stiff hairs as a "comb" to groom their fur. These fringes are quite distinct and serve to distinguish water shrews from all other species found in the park. The fringes also trap air bubbles, which allow water shrews to scurry across the surface of the water for short distances.

Water shrews are the largest of the long-tailed shrews found here. They are 136-164 mm in total length and weigh 11-19 grams. They are quite similar in color to the masked shrew.

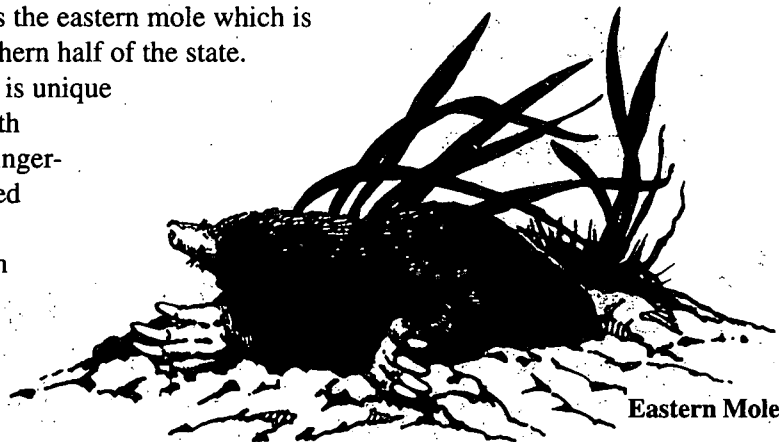
Order: Insectivora

Family: Talpidae - Moles

Star-nosed Mole - *Condylura cristata*

The star-nosed mole is the only mole found in Itasca State Park and throughout much of northern and eastern Minnesota. The only other mole in Minnesota is the eastern mole which is restricted to the southern half of the state.

The star-nosed mole is unique among mammals with twenty-two fleshy, finger-like feelers distributed around the tip of its nose, a feature which gives the animal its name. Reaching a



Eastern Mole

total length (body and tail) of six inches, this mouse-like mammal prefers swamps, bogs and low, wet meadows—common habitats in Itasca State Park.

Seldom seen and difficult to study, the star-nosed mole spends most of its time underground but does appear above ground. Frequently it can be observed swimming, often swimming beneath the ice during the winter months. Many of its tunnels are just below the surface which are developed when the mole "shovels the dirt aside with its big front feet, twists the forward part of the body sideways and pushes upward with its fore feet" creating the mole ridge. It is these surface tunnels, whose visible roofs we see, that provide the main path of finding food such as earthworms and insects.

A second type of structure is the deep tunnel, from six inches to two feet below the surface, used during the winter months and for developing its living quarters. With its large front feet it digs extensive tunnels deep in the ground, pushing the excavated soil back to an opening which results in a "molehill" on the surface. Part of the star-nosed mole's deep tunnel system is a birth chamber, some five by eight inches in size, often lined with dead leaves or dry grass and usually located under a stump, boulder or bush for added protection. Mating in March, the mole produces from two to six young some six weeks later. This low replacement rate indicates that the mole has comparatively few enemies.

Although the star-nosed mole is not known to store food, it does have a unique structure believed to be a reserve food supply. The middle of its 2-3 inch tail develops an area which is swollen with stored fat. Because of its habitat (underground) and habits (active at night), the star-nosed mole is rarely observed by the park visitor. The star-nosed mole has been observed recently at both the Ozawindib Lake access roads and along the foot-trail to the headwaters (BM, PC, BT).

Order: Chiroptera

Family: Vespertilionidae - Bats

Red Bat - Lasiurus borealis

Little Brown Bat - Myotis lucifugus

Northern Myotis - Myotis septentrionalis

Silver-haired Bat - Lasionycteris noctivagans

Big Brown Bat - Eptesicus fuscus

Hoary Bat - Lasiurus borealis

Few visitors will see any sign of what is arguably the park's most delightful group of mammals—the bats. Daytime visitors will miss them entirely, and even those who stay in the park into the night will not catch much more than a fleeting glimpse as these mammals go about their business of removing insects from the night sky. Bats

are unique in that they are the only group of mammals with capability of sustained flight; flying squirrels actually only glide.

The park hosts six species of bats, all in the family Vespertilionidae. A bat wing is made up of the same bones found in a human arm and hand, but the bones are greatly elongated and lightened. The bones of the arm, hand, legs, and tail are covered with skin, which forms the flight membrane or "patagium." Because this is a living membrane, it is well supplied with blood vessels and even bands of muscle. To capture food, bats swerve after insects and catch them in the web of their wing or tail membrane, much as a baseball fielder would catch a ball in the web of his glove. Bats of Minnesota seldom land to consume their prey, but rather eat "on-the-wing." In fact the only trace of a successful attack is moth wings fluttering to the ground!

One problem with a steady diet of insects is that it becomes difficult for bats to make a living as the days get shorter and the temperature drops. Consequently, all species of bats found in the park have developed strategies to deal with these seasonal changes. Of the six species inhabiting Itasca, three are migratory and simply leave for warmer areas. The other three hibernate through the winter months. Unlike bears, bats are true hibernators, and their body temperature will decline until it remains just a degree or two above freezing. Similar dramatic decreases occur in heart and respiration rates.

One common misunderstanding is that bats are blind. This is not true, but they do rely on vision far less than many other mammals. Instead, bats use ultrasonic vocalizations as a form of radar (perhaps more similar to sonar) to locate their prey and navigate around obstacles. The sensitivity of this natural radar system is such that they can fly through forests and navigate twists and turns in a pitch-black cave. It also allows them to locate insects with ease. However, natural selection has been at work for their prey as well. Some species have the ability to disrupt the bat's radar system much as military instruments can jam the radar of opposing forces.



Bats, like all species of mammals, can carry rabies. However, available data suggest that the incidence of rabies among the natural populations is probably exceedingly small. Nevertheless, it is a good idea to leave any bat one discovers on the ground, in daylight, or in unusual places alone because these are unlikely places to encounter healthy specimens.

Three species of bats found in the park are referred to as "tree bats" because their preferred roosting and hibernating sites are under loose bark or in hollows of trees and because they tend to forage in forest habitats. The remaining species are cave bats,

whose preferred roosting and hibernating sites are caves or mines, though human structures are frequently used. Tree bats are seldom found in large congregations that are typical of some of the cave species. Tree bats of the park are the beautiful silver-haired bat, the red bat and our largest species, the hoary bat. None of these is particularly common in the park, but neither are they rare. Mammalogy classes at the University of Minnesota Biological Station have captured both hoary and silver-haired bats using special nets set up over water where bats congregate to drink and capture insects. While no red bats have been captured in the park in recent years, their presence is virtually a certainty given the range of this species. It is very unlikely that visitors will have an occasion to see any of the tree species, as all of these animals are rather solitary and stay well hidden in daylight hours.

Silver-haired Bat

Silver-haired bats are black to dark brown with silvery hairs on their back that give them their distinctive appearance and name. They are 90-109 mm in length and weigh 8-13 grams. Females give birth, usually to twins, in June after a gestation of 50-60 days. The young are weaned three to four weeks later.

Red Bat

The red bat is slightly larger than the silver-haired bat (105-125 mm and 8-14 grams) and is characterized by a reddish-orange to chestnut fur on its back. Some individuals will appear frosted on their backs as a result of white-tipped hairs. This species differs from other Minnesota bats in that it frequently produces and rears litters of three to five young, whereas the other species rear only one to two young per year.

Hoary Bat

Our largest species, the hoary bat, measures 133-150 mm in total length and weighs 13-35 grams. The fur of this species varies from yellowish to mahogany and its ears are ringed in black. The fur on the back is washed with silver, giving the bat a grizzled (hoary) appearance. Like the red bat, hoary bats typically use trees as daytime roosts. Roosting bats are usually well concealed from above to prevent predation by hawks and owls, but they may occasionally be observed from below.

Northern Myotis

Big brown bats, little brown bats, and northern myotis are similar in appearance with dark membranes and rich brown fur. Of these, the northern myotis is the least likely to be observed by park visitors. Northern myotis are widely distributed throughout the eastern U.S. and southern Canada, but are seldom found in large clusters. Northern myotis usually hibernate in caves and mines, but in the summer months will often move to abandoned or little-used, man-made structures to rear young and to use as daytime roosts. Other favored roosts are behind loose bark of trees, behind shutters, or under shingles of old buildings. Repeated disturbance will usually cause the animals to leave. This species was called the Keen's little brown bat in older publications.

Little Brown Bat

The little brown is the most common bat in the park and the one visitors are most likely to observe. Little brown bats are 80-100 mm in length and typically weigh less than 10 grams. These bats readily take up residence in buildings where they may be considered pests because of the accumulation of feces (guano). Maternity roosts may be used by several thousand females and are commonly located in warm, open attics of buildings or in large tree cavities. Little brown bats are common in many buildings of the park, and many bat houses of different designs have been constructed and placed strategically to encourage them to establish additional colonies (or hopefully to move their existing colonies out of the buildings). Actually, any of the old log buildings will usually provide a good bat roosting site. One place that visitors might see these bats is at the old woodshed in Bear Paw Campgrounds. Constructed by the Civilian Conservation Corps in the mid-1930s, this log building is a long established nursery site and frequently houses several hundred mothers and their young during the summer. The nursing mothers obviously should not be disturbed, but visitors interested in seeing bats might wish to watch this building at dusk to observe the mothers flying out for a night of foraging. The lights around the campground provide hunting sites for hungry bats.

Big Brown Bat

The big brown bat is a bit larger than either the northern myotis or the little brown bat. They measure 112-130 mm in length and weigh 13-25 grams. These bats may be locally abundant and often establish nursery colonies in buildings. Hibernacula tend to be caves or buildings where temperatures frequently drop to near freezing.

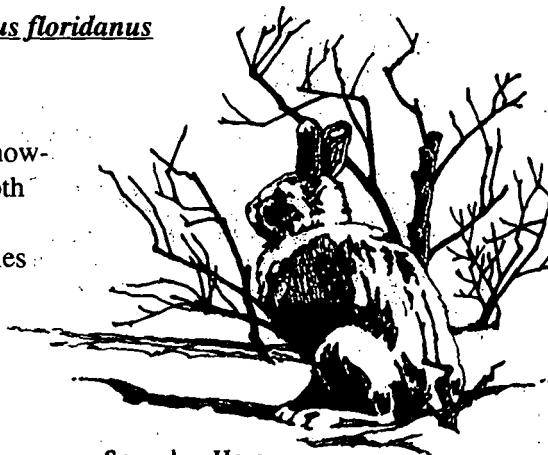
Order: Lagomorpha

Family: Leporidae - Hares and Rabbits

Eastern Cottontail Rabbit - *Sylvilagus floridanus*

Snowshoe Hare - *Lepus americanus*

This family is represented by the snowshoe hare and the cottontail rabbit. Both hares and rabbits feed mainly on plant material, eating a wide variety of species in summer and consuming twigs and bark of small trees and shrubs in winter. They are primarily nocturnal, but occasionally are seen during the day.



Snowshoe Hare

During summer, the fur of both species is mottled gray and brown, providing good camouflage. In winter, snowshoe hares molt into a pure white pelage which blends perfectly with the snow.

Cottontails are very rare in the park. The only recorded observations were at the Biological Station in the 1950s. Many long-time residents of the area point out that they have never seen a cottontail rabbit in the Itasca State Park area.

Numbers of snowshoe hares fluctuate widely, reaching peaks about every 10 years. At peak populations, they can be observed almost anywhere in the park. However, during the past 20 years, even peak populations have been quite low; and few hares have been observed.

Snowshoe hares have three or four litters per year. The young remain near their nest while the mother searches for food in the surrounding forest. At the same time each evening, the mother returns to the birthplace, and the young nurse for three to five minutes. She then leaves and does not return until 24 hours later. The young are weaned just a day or two before the next litter is born.

Order: Rodentia

Family: Sciuridae - Tree Squirrels

Red Squirrel - *Tamiasciurus hudsonicus*

Gray Squirrel - *Sciurus carolinensis*

Fox Squirrel - *Sciurus niger*

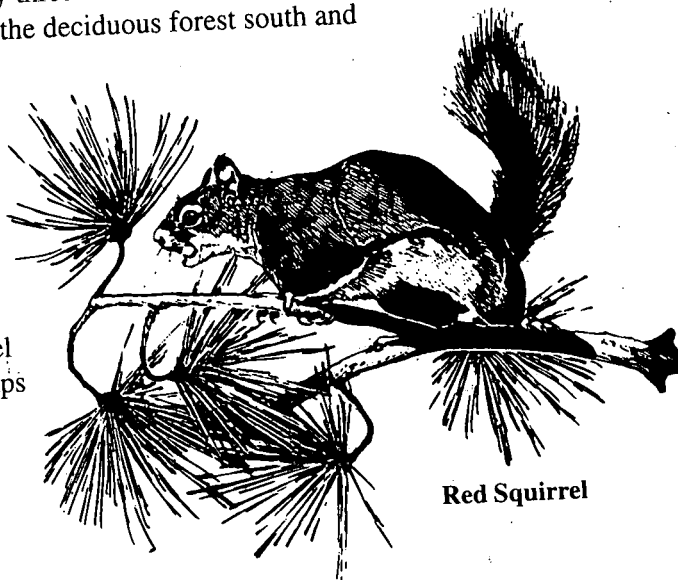
Three species of tree squirrels — red, gray and fox — can be found in the park at the present time. The current population of each species is directly related to its habitat requirements. During the past forty years, countless alterations, mainly influenced by human activity, have taken place throughout the park and surrounding area regarding the habitat occupied by each species. All three are active throughout the year and are commonly found living in hollows that develop after upper trunk limbs have been storm-damaged or the tree dies.

The red squirrel is by far the most common tree squirrel found in the park; and, although found throughout Minnesota, it would be typical of the northern coniferous forest. Indeed, not too many years ago, the red squirrel was the only species that most park visitors would ever see during their visit to Itasca. The small size, bright red-brown color, and its scolding trill make this species well-known to most park visitors.

Its ability to cut, transport and store the mature spruce, fir and pine cones in the fall of the year provides the much needed food during the winter months. It is remarkable that they can open the cones, one scale at a time, to get out the seeds and then drop the extremely sticky cone scale as if their paws were coated with Teflon.

The gray squirrel was very rare in Itasca State Park until the late 1960s when the population began a slow but steady increase. The 1959 report indicated that gray squirrels were rare, with only three records for the park at that time. It was considered a dweller of the deciduous forest south and west of the park area.

Seeing 15-30 gray squirrels during the summer season in different areas of the park would not be uncommon today. Some would say that the increase in the mast crop (acorns) could account for the gray squirrel abundance today, but perhaps it is beyond explanation at this time.



Red Squirrel

The 1959 report indicated that the fox squirrels were rare or absent in the park. The only record at that time was "Dr. Gustav Swanson reported in 1943 that Dr. C. O. Rosendahl had seen a fox squirrel in the park." Dr. Swanson was professor of wildlife and Dr. Rosendahl was a professor of botany at the University of Minnesota, both having taught for a number of years at the Lake Itasca Forestry and Biological Station. Today the fox squirrel would be classified as abundant by some, especially around bird feeders during the winter months. During the winter of 1983-84, a fox squirrel was frequently observed at a bird feeder near the Itasca State Park headquarters. With many hours of observation, only one was ever observed at a time and it was assumed to be the only one in the immediate area (CH). Fox squirrels were observed at a bird feeder adjacent to the park for some five seasons in the early 1990s, with a total of 4 being the highest count (AK, KT). During the past decade, fox squirrels have been observed throughout the Itasca area, and many sightings were made in Itasca State park as well. Although still not a common squirrel of the park, like other tree squirrels, their winter survival depends primarily on fat reserves and mast stores, making the winter bird feeders the ideal observation spots.

Order: Rodentia

Family: Sciuridae - Thirteen-lined and Franklin's Ground Squirrels

Thirteen-lined Ground Squirrel - Spermophilus tridecemlineatus
Franklin's Ground Squirrel - Spermophilus franklinkii

The thirteen-lined (striped gopher) and Franklin's ground squirrels (gray gopher) are the only representatives of this group found in Itasca State Park. Both ground squirrels are diurnal in their activities, herbivores and winter hibernators. They live in a system of burrows and are often seen standing erect near one of their entrances.

The ground squirrels were not native to the park, but they apparently came into the area from the prairie habitat west of the park as a result of settlement and land clearing. Their distribution is limited to open areas with a heavy cover of grass. Therefore, they are abundant in many areas outside of the park boundaries. At the present time, a few are occasionally seen along the roadways near the park and could establish populations in the park as well. During the past 40 years, the ground squirrel population in the park had declined with no apparent reason other than habitat changes.

The 1959 report on the status of Itasca State Park mammals recorded Franklin's ground squirrel populations in the Picnic Grounds, Pine Ridge Campgrounds and at the Biological Station. They were so numerous at the Biological Station that in the 1960s, a Masters Thesis was written (BH) regarding a 3-year study of the Franklin's ground squirrel population found on the campus grounds. Since the 1980s the Biological Station's population has vanished. Likewise, during campfire programs at the Picnic Grounds, the Franklin's ground squirrel mounted specimen was usually never taken out of the storage case, as there were always a few lively ones within a few feet of the campfire site. In the mid-1970s the population disappeared, and it was not until 1984 that two specimens were observed in the picnic grounds. None have been observed since (BT). A similar event occurred at Pine Ridge Campgrounds (site of a former Civilian Conservation Corps camp) when it was being developed into a campgrounds in the mid-1960s. One of the crew members (AK) recalls that "they were common in Pine Ridge when we were developing the area, but I haven't seen one for many, many years . . . very few starting around 1980 or so, even outside the park." The sharp decline of both ground squirrels is one of the many "animal mysteries" of the park.

Order: Rodentia

Family: Sciuridae - Chipmunks and Woodchucks

Eastern Chipmunk - Tamias striatus

Least Chipmunk - Tamias minimus

Woodchuck - Marmota monax

Nearly all park visitors observe chipmunks. Their quick movements, chirping calls, and saucy nature make them an attractive daytime addition to campgrounds and picnic sites.

Two species, eastern and least, live in the park. They are found throughout the forest, but seem to prefer brushy edges around clearings. Both species were common in the past, but today the least chipmunk is scarce. It is possible that the increasing maturity of the Itasca forests, with their dense brush and old trees, has created habitat that is more suitable for the eastern than the least chipmunk (DC). The program of prescribed burning, which began in 1995, will reduce the density of brush and small trees in the park's forests. This change in habitat may result in an increase in least chipmunks.

The least chipmunk has black stripes on its back that extend to the base of the tail, which is held up in the air when it runs. The stripes on the eastern chipmunk do not extend to the tail, which is held horizontal when running. Chipmunks are constantly searching for food in the park's campgrounds, and, as with any wild animal, they should not be fed. Chipmunks have sharp teeth and will bite.

Chipmunks nest in burrows under rocks and trees, and store food in the burrows and in other places called food caches. When feeding, they fill their cheek pouches with seeds, nuts, and other food to bring to the cache. During late summer and early fall, they spend all day eating and storing food to prepare for winter. Both species hibernate in their burrows, using stored body fat to sustain them during the cold winter.

The woodchuck is the largest member of the squirrel family Sciuridae and can weigh ten pounds or more and measure nearly 1.5 feet in length. It is a burrowing mammal that is primarily diurnal in its activities. It is herbivorous; garden plants are a favorite, much to the dismay of gardeners. Because it hibernates for some six months each year, winter survival depends on stored fat. Needing a proper winter burrow, many woodchucks find the small cavities beneath many of the park cabins to be ideal winter habitat. Often such cavities develop into year-round quarters. Perhaps no mammal has been so often misidentified in the park. It has been "positively" identified as some specific mammal ranging in size from a weasel to a wolf—and almost everything between.

Order: Rodentia

Family: Sciuridae - Flying Squirrels

Northern Flying Squirrel - *Glaucomys sabrinus*

Southern Flying Squirrel - *Glaucomys volans*

Both the northern and southern flying squirrels have been recorded in the park during the past sixty years. Both species are similar in appearance and field identification in most situations would be extremely difficult. The southern flying squirrel, although relatively scarce in this region of Minnesota, was first captured in the 1930s; and the record was published (DH) in the Journal of Mammalogy. The more common northern flying squirrel was first captured in 1946, and since then it has been shown that it is far more abundant than the southern species.



Northern Flying Squirrel

Both are strictly nocturnal and require specific techniques to successfully capture them for scientific study. One such study, conducted during the late summer of 1969 on the Biological Station grounds

(MC) resulted in 29 northern flying squirrels being ear-tagged after capture either by the use of mist nets or in live-traps. This project, conducted by the vertebrate ecology class, indicated a rather typical population for the northern flying squirrel. This species reproduces only once each year and has from three to six young per litter. The flying squirrels handled in this project all came from a wooded area some 200 by 1,100 feet along the shore of Lake Itasca (20 juveniles, 5 adult females and 4 adult males).

Although called "flying squirrels," a better term would be "gliding squirrels" as they cannot maintain or increase altitude. As one author wrote, "It is pointless to ask how far they can glide, since this depends primarily on the vertical distance between the point of take-off and landing." A loose fold of skin, the patagium, extends on each side of the body from the front to the hind legs. The surface area of this skin fold is not attached directly to the front leg, but to a small protruding cartilage structure on the wrist, thus increasing the gliding surface. The tail, flattened during the glide, provides additional gliding surface and can be utilized to brake just before landing. Flying squirrels, observed infrequently at bird feeders during the winter months, are without question the most "under-counted" mammals of Itasca State Park.

Order: Rodentia

Family: Geomyidae - Pocket Gopher

Plains Pocket Gopher - Geomys bursarius

The early settlement and land clearing of the conifer forest of the Itasca State Park area provided the habitat for this native of the prairie. The plains pocket gopher is found throughout Minnesota except in the rocky northeastern counties. Where grassy or open clearings are made available due to human activity, the pocket gopher will soon follow. A smaller but closely related species, the northern pocket gopher, is found only in the Red River Valley of northwestern Minnesota.

The pocket gopher is primarily a herbivore, feeding on the roots and seeds which may be stored in their burrows. The feeding of pocket gophers on succulent roots of weeds of an overgrazed pasture can be a real benefit to the cattle rancher, providing that overgrazing stops. As the weeds are eliminated by pocket gophers, the valuable grasses—needed by cattle but low on the preferred food of the pocket gopher—will increase. Since extensive grasslands do not exist in Itasca State Park, the picnic grounds, parking lot edges, campgrounds, roadway edges or any small open area will be used. The pocket gopher seems to follow the motto, "You clear it and we will live there." Even the open areas among the Norway pine of Preachers Grove (picnic grounds 1910-1935) have been considered gopher habitat in recent years as indicated by the sudden appearance of gopher mounds there. "In Itasca State Park the number fairly stable. Outside the Park (farmland) the pocket gopher has become a real pest and is hard to control" (AK).

With most of its life spent underground, the pocket gopher is seldom observed unless in the process of pushing dirt above ground from its tunnel. The pocket gopher's constant digging results in the "gopher mounds" on the soil surface, usually just above a tunnel. A typical burrow might consist of 15 interconnected tunnels, totaling 200 feet in length, with a number of nests and food chambers. One biologist conducting research on pocket gopher activity documented that a single gopher can move up to 25 cubic feet of dirt to the surface every year. Pocket gophers—along with various worms, ants, beetles, badgers, ground squirrels, mice and countless other animals that live underground—are constantly reworking the upper few feet of soil. Pocket gophers are a staple in the diet of many predators, and populations will usually be controlled by natural enemies if they have not been eliminated.

Order: Rodentia

Family: Castoridae - Beaver

Beaver - Castor canadensis

Trappers removed nearly all of the beaver in the park by the late 1800s. This trapping was stopped when the park was established in 1891. However, many citizens of the area believed that beaver were no longer in the area, and by 1901 they were considered extirpated. Many individuals have pointed out that "actually beaver were present at that time, but there were not enough of them to be noticed" (JD). Perhaps lack of trapping success, along with the high prices paid for beaver pelts, was a factor as well. Regardless of the actual situation, Minnesota's governor, John Lind, arranged for a gift of live beaver from Algonquin Park, Canada, to repopulate Itasca State Park. Four beaver were sent by boat to Duluth, by rail to Park Rapids, and then to Itasca State Park via stagecoach. Three survived and were released on Schoolcraft Island on August 24, 1901.

The population grew rapidly, reaching about 1,000 in 1921. This large population consumed nearly all the aspen and other small trees near their lodges. The reduced food supply and the drought of the 1930s reduced the population to a few hundred



animals. Recent winter-time census of the beaver population (by lodge counts in selected areas) gave an estimate of close to 2,000. However, the population usually fluctuates in the range of 600 to 1,200, depending on the weather and food supply.

Beaver, the largest members of the rodent group, are common in the park's lakes and streams. You may see them in the evening swimming in Lake Itasca and eating water lilies and other aquatic plants. If you approach too closely, the beaver will slap the water with its tail to scare you and to warn other beaver of possible danger. Lodges made of sticks packed with mud are located in lakes, ponds, and streams. Beaver build dams of sticks and mud to create deep water that will not freeze to the bottom in winter. The lodge has several underwater entrances and a living chamber above the water level. A beaver family may use several lodges, one in winter and another in summer. This interesting behavior was discovered by students at the University of Minnesota Forestry and Biological Station in 1989 when they attached radio transmitters to several adult beaver to study their daily activity and movements on Lake Itasca.

Beaver are active throughout the winter, retrieving food from caches stored in the pond near the lodge. Aspen and willow are favored foods, but they will eat many species of trees and shrubs. Just under the bark of a woody plant is the phloem layer which contains the energy compounds that the beaver can use. Only this phloem layer provides the necessary beaver "food." This is the same layer which people can "tap" for collecting maple sap for the preparation of maple syrup or sugar. You can find "sticks" on lodges and dams with all the bark and phloem peeled off and with beaver tooth marks readily visible.

Mating occurs in January, and three to nine young are born in May or June. The kits weigh less than one pound at birth, but they can follow their mother underwater before they are a day old. A typical lodge in winter may contain two adults, the kits born in the spring, and yearlings. The young stay with the adults for two years before leaving to find mates and create new lodges.

Beaver populations in Itasca State Park have been very high in recent years, with evidence of beaver activity throughout the area. This is especially true at the outlet of Lake Itasca and for many miles downstream along the banks of the Mississippi River. The recently installed concrete culvert, where the road to the Headwaters crosses the Mississippi River, was only a minor problem for at least one beaver. On May 24, 2002, a beaver was observed swimming upstream toward the new culvert; without hesitation it climbed the steep bank next to the culvert, crossed the blacktop, then continued down to the river and on upstream, avoiding the fast moving water through the culvert (BT).

Order: Rodentia

Family: Dipodidae - Jumping Mice

Meadow Jumping Mouse - Zapus hudsonius

Woodland Jumping Mouse - Napaeozapus insignis

Jumping mice are fascinating mammals, with their modified hind limbs that look far too large for their bodies. These kangaroo-style hind legs enable them to cover ground in enormous leaps when necessary to escape predators. Jumping mice are true hibernators. They go into winter torpor in fall and do not reappear above ground until April or May. Like many hibernators, they depend on energy reserves to last through the winter. However, mortality may be high in these mice because of inadequate fat reserves after long and cold winters.

Both meadow and woodland jumping mice are readily distinguished from other mice by the very long, thin tail that tapers to a finely-drawn tip. The tail is much longer than their head and body. Jumping mice are somewhat omnivorous; feeding primarily on seeds and fruits, but also taking insects and fungi. They may actually prefer these latter foods at certain times, such as during reproduction or when preparing for hibernation.

The meadow jumping mouse is 190-240 mm in total length, with its tail ranging from 110-150 mm. They average about 19 grams during mid-summer, but may weigh 35 grams or more by the time they enter hibernation. The fur of meadow jumping mice is coarse, with a broad, dark brown band on the back, yellowish-brown sides and white undersides. The tail is distinctly bicolored: dark above and light underneath. Meadow jumping mice typically rear two litters of four to six young each summer. Young are born after a short gestation period of only 18 to 19 days.

Meadow jumping mice prefer moist to wet sedge and grassy areas; hence they are most commonly found along slow streams or seeps and adjacent to lakes. The grassy habitat need not be extensive, as these mice are quite happy with the relatively small but wet grassy or weedy patches in the midst of what one would otherwise consider solid forest. Students at the Biological Station frequently trap this species in the habitat provided by roadside ditches along Wilderness Drive.

As one would suspect, these mice are preyed upon by a variety of hawks and owls as well as all mammalian carnivores. One road killed bobcat that was examined by students at the University of Minnesota Biological Station in the summer of 1998 was found to have dined almost exclusively upon meadow jumping mice prior to being struck and killed. They even have been found in the stomachs of large trout (DC).

Although meadow jumping mice are common within the park, to observe them one will want rubber boots and a flashlight to get into the appropriate habitat, preferably at

dusk. Otherwise, like most of the other smaller species of nocturnal mammals, the only specimens seen by park visitors are those unfortunate few found dead on roads.

The woodland jumping mouse is similar in appearance and size to the meadow jumping mouse, though a bit brighter and more orange in color with a white-tipped tail. The woodland jumping mouse was first documented in the park in 1957. Since that time, several specimens have been captured at Bear Paw Point and in mature aspen stands with thick hazel understory along Highway 200. However, this species remains one of the rarest within the park, and further documentation of its occurrence would be valuable. Park visitors observing what they believe to be a woodland jumping mouse, as distinguished by the white-tipped tail, should inform a park naturalist or biologists at the U. of M. Biological Station.

Order: Rodentia

Family: Muridae - Mice

Deer Mouse - *Peromyscus maiculatus*

White-footed Mouse - *Peromyscus leucopus*

Southern Red-backed Vole - *Clethrionomys gapperi*

Meadow Vole - *Microtus pennsylvanicus*

Southern Bog Lemming - *Synaptomys cooperi*

All species of mice and rats in the park, other than the jumping mice, are grouped together in the family Muridae. This is the largest family of mammals worldwide and includes some 1,300 species. As would be expected within so large a group, there is tremendous diversity in form and function. Itasca State Park hosts five native and several introduced species.

As the base of the animal food chain, mouse densities typically are high; but populations of all of these species fluctuate rapidly, depending upon local conditions and resource availability. When resources are abundant, populations may climb rapidly, which in turn provides a bonanza for their predators. As one would expect at the base of the animal food pyramid, mice are eaten by virtually all carnivores. They are the preferred prey of many hawks and owls, weasels, and most smaller mammal carnivores. They also may be preyed upon by bobcats, coyotes and wolves—even though these predators typically prefer larger prey.

Native mice may be separated conveniently into two groups—the long-tailed mice and short-tailed mice, called voles. Ecologically, the long-tailed mice differ from voles primarily in being adapted to somewhat broader food habits. Long-tailed mice feed on seeds, insects, fruit, and fungi whereas voles focus more upon leafy vegetation. These are generalizations, however, and considerable overlap exists in the diet of red-backed voles in particular. Aside from the obvious external character of short (l

than the length of head and body) versus long (nearly as long or longer than head and body) tails, the groups may also be distinguished by the fact that the long-tailed mice have much larger eyes and ears than voles.

Although none of these species hibernates, all are primarily nocturnal. What daytime activity does occur is likely to involve nursing mothers, foraging to meet the energetic demands of lactation. Collectively, mice are without a doubt the most common mammals within the park, but visitors will seldom be aware of their presence.

Deer Mouse and White-footed Mouse

The deer mouse and the closely related and similar white-footed mouse are nearly indistinguishable by all except experts, and even they are sometimes fooled! These two species differ morphologically, primarily in the length of their ear. With a lot of experience, one can actually classify most live adult animals of these two species by seeing how they hold their ears.

Both species are 160-200 mm in length and weigh 17-30 grams. They are rich brown on their backs with white underparts. The tails of both are dark above and lighter colored below. Both may be found in deciduous, coniferous, or mixed forest and are often taken in adjacent traps in the same trapline by students working at the Biological Station. There are slight differences in how the two species use the habitat. The white-footed mouse is more likely to use trees, although both species have home ranges that are three-dimensional. Their use of habitat was demonstrated by research by mammalogy and vertebrate ecology classes at the Biological Station. Students investigate habitat utilization by powdering freshly captured live mice with non-toxic fluorescent powder. Some time after the mice are released, their trails may be followed by students armed with black lights. Participants are consistently surprised to find the tracks leading six feet or more up trees, across branches, and up and down vines. The use of trees by these mice drives home the point that they are not solely ground-dwelling animals.

Southern Red-backed Vole

The red-backed vole is a forest dwelling, short-tailed mouse. They have a broad, brownish-red band down the back with grayish sides fading to a lighter gray underneath. Their back coloration readily distinguishes them from all other mice. These voles are 120-150 mm in length and weigh 15-35 grams. They require considerable water, but this requirement is met throughout the park. They have more varied food habits than the other species of voles and eat nuts, seeds, fruits, invertebrates, and fungi in addition to green foliage.

They do not hibernate, but they cache food to survive during winter. Red-backed voles make tunnels through and under rotting logs and moss and will use runways of other small mammals as well. They are not nearly as arboreal as the long-tailed mice, but they may climb to avoid predators.

Red-backed voles are prolific breeders. They have litters of two to ten (usually four to six) young after 17-19 days of gestation. These voles are commonly taken in the same traplines as long-tailed mice by students at the Biological Station.

Meadow Vole

The meadow vole is the largest of the short-tailed mice found within the park. They are the most broadly distributed of any New World vole and are found from Alaska, through most of Canada, and south to New Mexico and Georgia. Their dorsal fur is rich, dark brown changing to gray or silvery gray underneath. Meadow voles are 150-185 mm in length and weigh 35-60 grams. Unlike the red-backed vole, meadow voles are much more restricted in habitat. They prefer open areas of wet grasses or sedges. Their diet is primarily grasses, sedges, and leaves and seeds of these same plants. Although the voles are seldom seen by park visitors due to their nocturnal habits, their presence is easily detected by the numerous runways and grass clippings.

Like red-backed voles, meadow voles are prolific breeders. Pregnancy usually lasts 21 days and litters range up to 11. Pair bonds are not formed and these voles are promiscuous breeders. Life expectancy in the wild is less than two months, but in captivity meadow voles have lived for nearly three years.

Southern Bog Lemming

This is one of the rarest small mammals within the park, as this location is on the very edge the species' range. Southern bog lemmings have dark brownish to chestnut backs with a pale buffy underside. Total length is 115-140 mm with tails that are quite short (18-25 mm). Weight is 20-45 grams. Preferred habitat is similar to the meadow vole, with which they are easily confused. They build and use runways like the meadow vole and will use the runways of other animals as well. Southern bog lemmings are difficult to distinguish from meadow voles, and experts will invariably resort to examining the teeth for diagnostic characteristics.

The gestation period of bog lemmings is 21-23 days, and they have smaller litters than other species of short-tailed mice in the park (two to three young per litter). This species has probably never been very abundant in the park and is relatively scarce throughout its range. Specimens taken within the park have almost invariably been captured in cedar bogs, around sedge margins of lakes, and in wet, moss covered litter in deciduous forests along streams. All of this would indicate that the name, bog lemming, is indeed appropriate.

Order: Rodentia

Family: Muridae - Muskrats

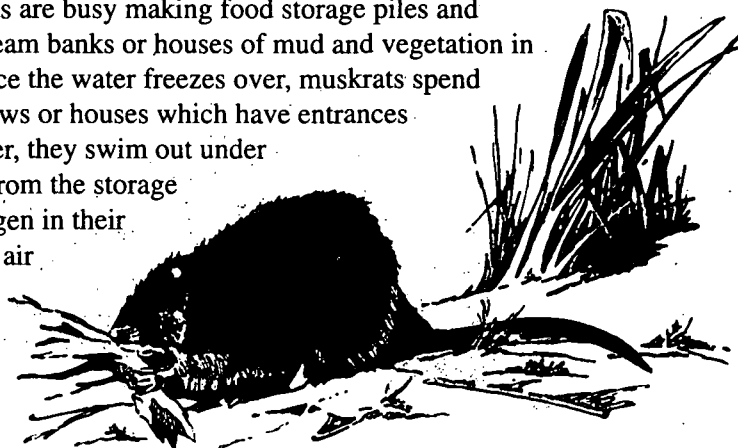
Muskrat - Ondatra zibethicus

Musk rats are common in Itasca's lakes, ponds and streams. Their partially webbed hind feet have stiff bristles which enable them to swim rapidly. They eat primarily aquatic vegetation such as cattails, wild rice, and arrowhead tubers.

During fall, muskrats are busy making food storage piles and building burrows in stream banks or houses of mud and vegetation in lakes and marshes. Once the water freezes over, muskrats spend their time in their burrows or houses which have entrances underwater. Like beaver, they swim out under the ice to collect food from the storage piles. They obtain oxygen in their den or house, and from air pockets trapped under the ice.

Musk rats have several litters each year. They are prime prey for many carnivores, especially mink.

Mink often prey on muskrats, catching them in the water or by entering their houses. Their bank burrows or houses of mud and vegetation provide little protection against a hungry mink population. They may create problems by digging holes in dikes and dams to make bank dens, as these structures are ideal habitat for such activities



Muskrat

Order: Rodentia

Family Muridae - House Mice

House Mouse - Mus musculus

House mice have been introduced unintentionally throughout North America. They most likely arrived as stowaways on the earliest sailing vessels, perhaps with Columbus or the early Spanish explorers, but certainly by the time of the American Revolution. Native species will often occupy outbuildings and may be found in cabins or houses, particularly as the weather turns colder. House mice specialize in inhabiting dwellings and outbuildings and feeding on stored grains, foodstuffs, and animal forage.

House mice are slightly smaller and more lightly built than our native mice. They have long tails like the deer mouse and white-footed mouse, but they are easily distinguished from all but juvenile native species of long-tailed mice by the fact that their fur is gray to grayish brown both dorsally and ventrally. Their tails are naked rather than well-furred like native mice (except jumping mice), and they lack the bicolored of our native long-tailed species. Their ears also appear naked rather than furred.

Neither the Norway nor the black (also called roof) rat has been documented within Itasca State Park. Feral populations of either species are rare; and, like the house mouse, they require the protection that human dwellings provide during the winter months. Due to this preference for human type habitat, none of these species is likely to pose a threat to native rodents in terms of competition.

Order: Rodentia

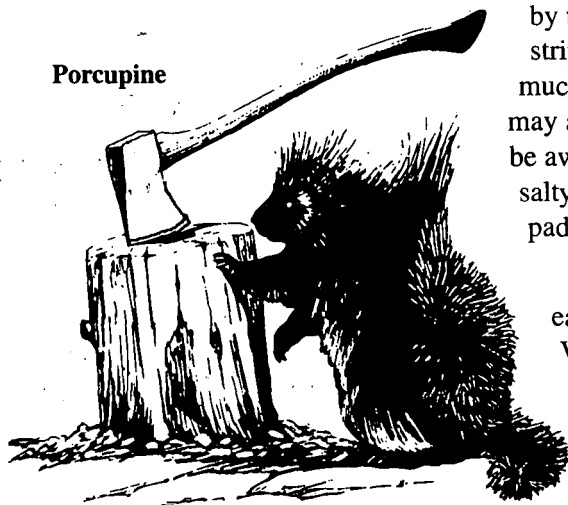
Family: Erethizontidae - Porcupines

Porcupine - *Erethizon dorsatum*

Porcupines are common in the park and are often seen walking along roads at night. Their quills, which are modified hairs, give them protection from most predators, and they do not appear to be frightened when approached. Despite many stories to the contrary, they are not able to throw their quills.

They live in dens in hollow logs, under rocks, windfalls or roots, and sometimes under buildings. In winter, many individuals may use the same den site.

They feed primarily on bark, leaves, and needles, and seem to prefer white pine. Often they can be observed resting high in a white pine. Their presence is given away by the shiny branches which have been stripped bare by the porcupine. If too much of the bark is stripped, porcupines may actually kill the tree. Campers should be aware that porcupines also like to eat salty items, such as axe handles and canoe paddles.



For some reason, porcupines began eating the bark of red pines in the Wilderness Area in the late 1960s. Park personnel were concerned that many red pines would be killed. Attempts were made to reduce this porcupine

damage by having marksmen shoot the porcupines, especially in the red pine areas which were being damaged. This control program was soon canceled as finding and shooting porcupines on cold and windy winter days was extremely hard, not to mention the cost of such an operation (BT). As a result, fishers, which are effective predators of porcupines, were introduced specifically to reduce damage to the red pines. This was an appropriate introduction because fishers were once resident in the park (JT).

Order: Carnivora

Family: Canidae - Dogs

Red Fox - *Vulpes vulpes*

Gray Fox - *Urocyon cinereoargenteus*

Coyote - *Canis latrans*

Gray Wolf - *Canis lupus*

Four species of canids—the red fox, gray fox, coyote (brush wolf) and the gray wolf (timber wolf)—inhabit the area. The canids, particularly wolves, are known to be great travelers, covering large distances in their activities. They are all carnivorous and prey on a variety of animal life in their continual search for food. The two fox species have been tolerated without concern since the park was established in 1891. The early citizens of the area as well as those responsible for the management of Itasca State Park had a totally different approach to the coyote and timber wolf with considerable time and money expended in an effort to eliminate them.

The red fox is common throughout much of Minnesota and is frequently seen in Itasca State Park. They will often expand an old woodchuck or badger hole, but can also develop a totally new den system. Their dens are usually little more than a



Red Fox

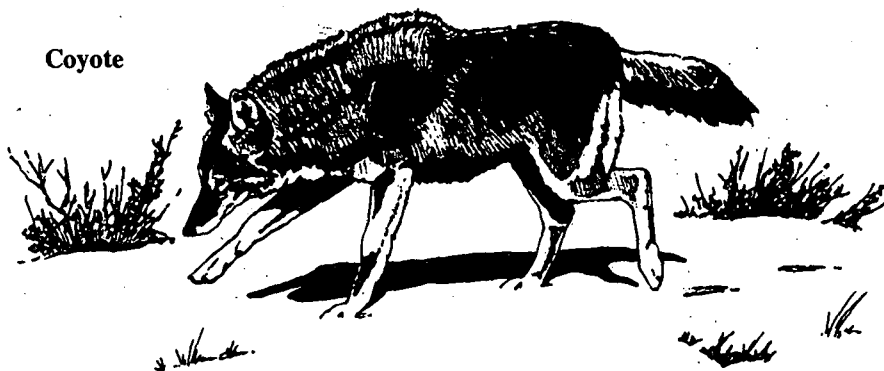
nursery because the red fox prefers to sleep in the open, even during winter. Although active at any hour of the day or night, they are usually observed in the late evening or early morning hours. The red fox is an opportunist in its diet as well: mice, rabbits, ground squirrels, birds, snakes, frogs, fish, insects, berries, nuts and seeds.

The gray fox, occurring throughout the state, is rather scarce in Itasca State Park. Smaller than the red fox, the gray fox is more abundant in the area to the south of Itasca. Sight records of this species are usually made during the winter months every five to ten years. The most recent Itasca State Park visual record for the gray fox was made in 1964 (AK). The gray fox probably remains in the park area but will always be considered rare.

The coyote or brush wolf has been in Itasca State Park for a long time, probably increasing in numbers with the clearing and settlement of the region. The gray wolf was here long before European exploration and settlement occurred. During the 1920s and early 1930s, both the coyote and gray wolf were considered undesirable species to be eliminated. Indeed, men were hired primarily for their wolf trapping abilities, and predator control was the management tool of the day. Records relating to the predator control activities in Itasca State Park in those years document some very poor wildlife and ecological policies prevalent at the time (BT). The establishment of a Civilian Conservation Corps camp in Itasca State Park, along with a new attitude regarding wildlife management, provided the leadership and support which resulted in the elimination of many predator control programs. In spite of hunting and trapping, coyotes are also doing well outside the park. It is one species that is extremely flexible, and perhaps human attempts to eliminate it will actually cause the population to remain high.

The gray wolf is considered common at the present time, a remarkable change from the 1959 report which stated, "The gray wolf, once a common species, is no longer present in Itasca State Park." Many local residents believe that "since the timber wolf has become common, the brush wolf is no longer as numerous; apparently the two do not mix" (AK). With intelligent management, they could both remain common species in Itasca State Park for future generations to study and observe.

Coyote

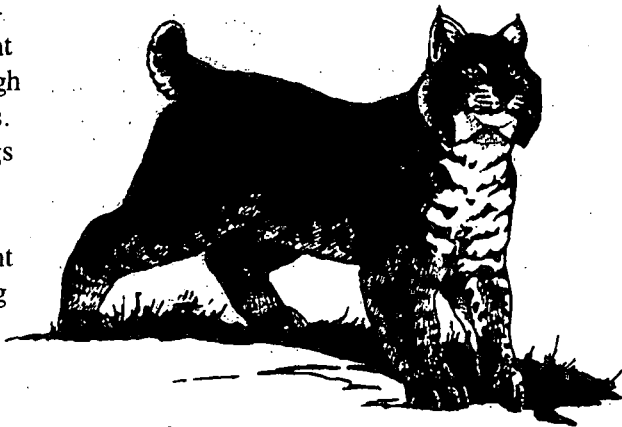


Order: Carnivora
Family: Felidae - Cats

Bobcat - *Lynx rufus*
Mountain Lion - *Puma concolor*

At the time of the previous publication regarding the mammals of Itasca State Park (1959), only the bobcat was reported as being a resident. Although there are no specimens of any member of the family Felidae from Itasca State Park, a considerable number of reliable observations have been reported during the past forty years.

At the present time, both the bobcat and the cougar (mountain lion) have been observed frequently. The mammalogy professor at the Itasca Biology Station for many seasons recorded in detail the sighting of a bobcat in Itasca State Park in 1994. He also noted, "I don't know how many records there are for the park—certainly a first for me" (DC). While probably not permanent residents of the park, both bobcat and cougar could pass through during their extensive travels. A number of cougar sightings were reported during the summer of 1978 and 1979 (BT). One long-time resident of the area recalls that during the past twenty years reports of sightings increased. The most recent sighting was during the summer of 1997 near a beaver pond along Highway 200, well within Itasca State Park (AK).



Bobcat

The lynx (Canada lynx) likewise is periodically observed in the region, although authentic sight records for Itasca State Park are not available. The extremely low population of snowshoe hares during the winter of 1972-73 caused a number of northern lynx to migrate far south of their usual range. Lynx specimens were taken in Morrison, Ottertail, Hennepin and Ramsey Counties that winter. None of the native cats are able to survive in heavily settled areas; thus the future for these large carnivores in Itasca State Park appears questionable.

Order: Carnivora

Mustelidae: Weasels and Mink

Long-tailed Weasel - *Mustela frenata*

Ermine - *Mustela erminea*

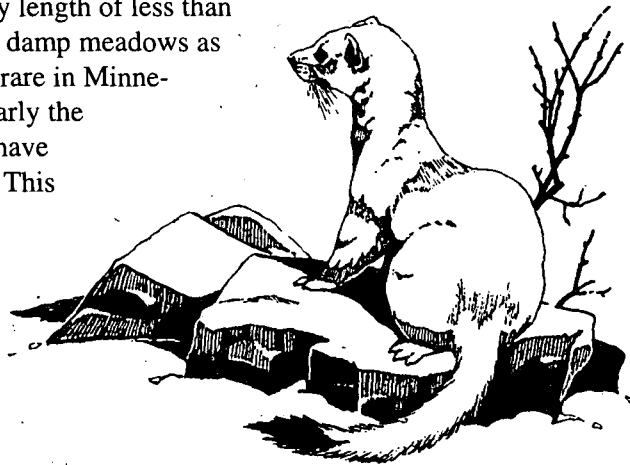
Least Weasel - *Mustela vivalis*

Mink - *Mustela vison*

Although seldom observed, three species of weasels are found in the Itasca State Park area—the long-tailed weasel, the ermine and the least weasel. Their summer brown fur develops into a white coat during the winter months except for a variable amount of black fur on the tip of the tail. Although the black hair at the tip on the tail is usually listed as one of the characteristics of all three species, it should be noted that the least weasel has at most only a few black hairs on the tip of the tail, and many specimens lack even that. All three have long, slender bodies with long necks and small heads. The carnivorous weasels have a diet of chipmunks, mice, voles, insects and other small invertebrates. Our largest species, the long-tailed weasel, has been recorded utilizing animals as large as a cottontail rabbit. Active during the coldest winter months, they are known to travel under the snow, sometimes for long distances, in pursuit of mice and voles. They travel by silent, gliding leaps, the hind feet falling exactly in the tracks of the front ones. They make their homes in hollow roots of a tree, under stumps, or in a burrow abandoned by a woodchuck.

The most common species in the park is the ermine, also called the short-tailed weasel. This species has a tail less than one-third of its body length. The long-tailed weasel, with a tail greater than one-third of its body length, is uncommon throughout the park region. The least weasel, considered to be the world's smallest carnivore (body length of less than six inches), selects marshes and damp meadows as its preferred habitat and is very rare in Minnesota. All three species, particularly the long-tailed weasel and ermine, have significant sexual dimorphism. This makes distinguishing between them difficult.

The mink has been described as a large, heavy-set, bushy tailed weasel that retains its dark brown color throughout the year. Mink do have a variable bit of white on the chin, throat and belly,



Long-tailed Weasel

which appears to be somewhat different on each pelt. Mink are found throughout Minnesota and are usually associated with water—feeding on muskrats, frogs, mice, grubs and earthworms. They can swim and dive with ease, can remain underwater for many minutes, and are capable of catching fish as swift and elusive as trout. However, like all carnivores, they are not trophy hunters and take whatever meat is available.

Mink nest in hollow logs or stumps near water, or in bank dens dug by muskrats. Litters, averaging five or six young, are usually born in late spring, six weeks after mating. Mink weigh about one-fifth of an ounce at birth; by maturity they are one to four pounds.

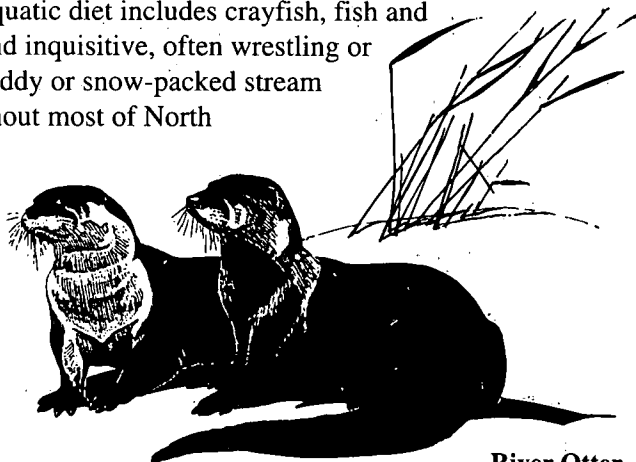
For many years the minnow holding tanks at the Lake Itasca boat landing were a source of a dozen or so dead minnows every morning. They were tossed into the nearby brush; and a pair of mink would be there shortly to clean-up, an event which went on daily during the fishing season. Although the fur market is “down” at the present time, just a few years back, some 50,000 pelts were taken annually in Minnesota for an average of \$600,000 per year. Mink are most often observed in Itasca State Park as they cross roads and other open areas. The mink population appears to have remained stable during the past forty years (AK).

Order: Carnivora

Family: Mustelidae - River Otters

River Otter - Lontra canadensis

The river otter has been observed in various aquatic habitats throughout Itasca State Park, and “they have been increasing in numbers during the past ten years” (AK). The average 15-19 pound otter is long and sleek, with short legs, webbed feet and a long, tapered tail. It may measure five and one-half feet in length and can weigh up to 30-pounds. Their aquatic diet includes crayfish, fish and amphibians. They are playful and inquisitive, often wrestling or spending hours sliding down muddy or snow-packed stream banks. Originally found throughout most of North America, stable populations of river otter are now found where changing land-use patterns have left suitable habitat. They are common in forested regions throughout much of the U.S. and Canada, often as a result of river otter reintroduction



River Otter

programs. During the past forty years, river otters have been observed from time to time in Lake Itasca, Elk Lake, Mary Lake, Lyendecker Lake, Twin Lakes (both east and west), Ozawindib Lake, Nicollet Lake and along the Mississippi River and Nicollet Creek. Winter slides and lakeshore trails used by the river otters have likewise been reported by many park visitors.

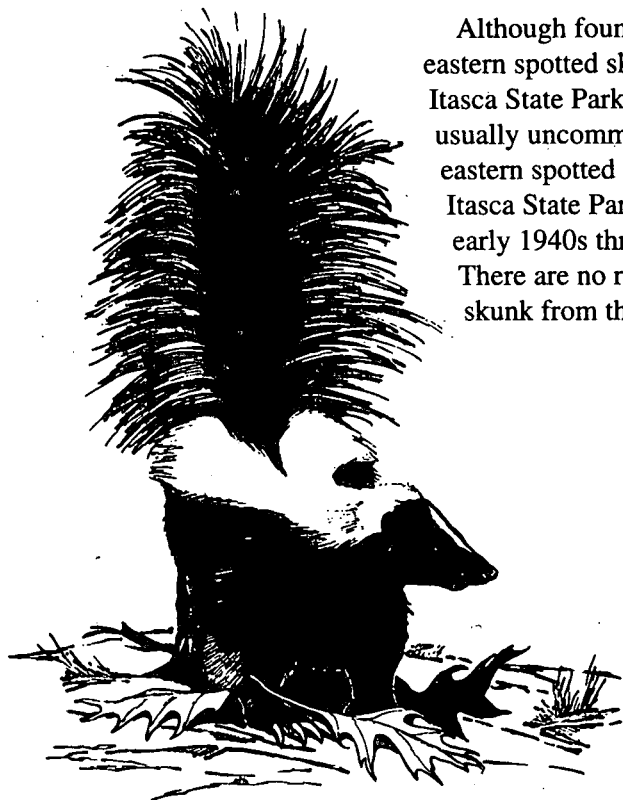
Order: Carnivora

Family: Mephitidae - Striped Skunks

Striped Skunk - *Mephitis mephitis*

The striped skunk has been a common resident of Itasca State Park. It represents a species that most park visitors would rather not encounter, even at a distance. Only the great horned owl is willing to deal with the striped skunk (a unique diet item for their young), and often the odor of "skunk" at a great horned owl nest is overwhelming to say the least. Skunks are intelligent and usually good natured, but they can be deadly because they can sometimes carry rabies. In fact rabies is more common in striped skunks than in any other Minnesota mammal—a potential problem when skunks, dogs and campers get together.

Although found in this area of Minnesota, the eastern spotted skunk probably does not occur in Itasca State Park at the present time. Though usually uncommon throughout its range, "the eastern spotted skunk was frequently observed in Itasca State Park and surrounding area from the early 1940s through the late 1950s" (AK). There are no records of the eastern spotted skunk from the early 1960s to the present time.



Striped Skunk

Order: Carnivora

Family: Mustelidea - Fisher

Fisher - *Martes pennanti*

At the time of settlement, fishers occurred throughout Minnesota's forests. Loss of habitat and over-trapping led to their decline. By 1880, they were found only in the extreme north. The trapping season was closed from 1929 to 1976. By 1976, aspen and balsam fir had reforested much of their former range, and the population had recovered.

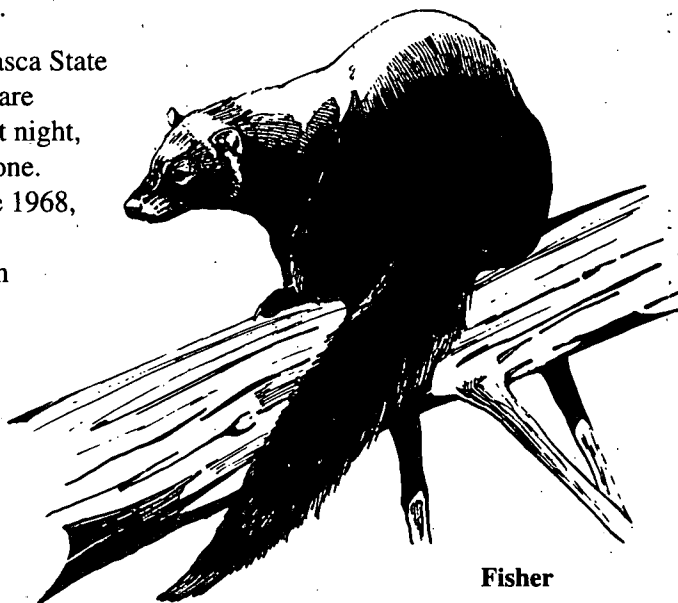
Fishers are common in Itasca State Park; however, because they are secretive and active mainly at night, you will be lucky if you see one.

They have been present since 1968, when 15 were captured and transported from northeastern Minnesota to the park and released. Old-growth red pines were being girdled by porcupines from the base of the tree for a vertical distance of 1 to 2 feet. While such activity is normal bark-feeding

behavior on the part of the porcupine, it usually occurs

only high on the trunk of the tree. Complete girdling at the base of such trees had not been observed before, and it would eventually result in death of the tree. Park personnel were concerned that many red pines would be killed. Fishers are effective predators of porcupines. The fifteen fishers were introduced specifically to reduce porcupine damage to red pines. The year following the reintroduction of the fishers, the basal damage to the red pine was greatly reduced; and in a few years, fresh damage was no longer observed. This reintroduction may not have been necessary since the fisher has expanded its range from extreme northeastern Minnesota west and south to North Dakota and the northern half of Minnesota (WB).

Fishers are members of the weasel and mink family Mustelidae, one of the groups in the order Carnivora. Males average about 11 pounds and females about 6 pounds. Female fur is dark brown to black. Males are dark brown with a grizzled appearance. Carnivores are meat eaters, and the fisher feeds primarily on snowshoe hares, red squirrels, mice, porcupines, birds, and probably deer fawns. Like their close relative,



Fisher

the pine marten, they are good climbers and can capture prey in the trees. Pine marten have not been recorded in the park, but they are expanding their range and may enter the park soon.

In recent years, fishers have been frequently observed near Twin Lakes along the Lakes Drive, along the Dr. Roberts Trail near Douglas Lodge and also along the cabin line, on the Wilderness Drive at DeSoto Trail, as well as many single observations throughout Itasca State Park (BM, PC). A lactating fisher was trapped and fitted with a radio collar by the mammalogy students at the Biological Station in 1999. This female was raising young near the Deer Park Trail. A fisher with at least one young was observed frequently during May and June 2001 just north of the Bear Paw Campgrounds road only a few hundred feet from the Main Park Drive. Apparently it was hunting around and under logs, brush and low vegetation, showing no concern for passing or stopped vehicles but moving fast out of the area for any one getting out of a stopped vehicle (SL, BT, LC).

Order: Carnivora

Family: Mustelidae - Badger

Badger - Taxidea taxus

The badger was probably a recent migrant to this area from the prairie lands to the west of Itasca State Park. Like many animals of the plains, it found that human activity produces suitable habitat. The badger was not recorded in the 1943 mammal list for Itasca State Park, and only a single record of the badger was documented in the 1959 report. Since the 1970s, however, they have been frequently observed within the park boundaries. Their habitat within the park is usually along disturbed road ditches, and on many occasions they with have been observed with young (HM, BT). One long-time local resident (AK) pointed out that "they probably came (local agricultural land) sometime in the 1950s and have increased since with the usual ups and downs in number."

The badger is found throughout Minnesota at the present time except for the heavily forested northeast. They probably will remain in Itasca State Park as small local populations with plenty of reserves in the agricultural land surrounding the park. The badger feeds primarily on mice, ground squirrels and gophers. In fact, it is the only predator that can dig out the deep-burrowing pocket gopher via the use of its two-inch long front claws. One unique use of badger fur is to make shaving brushes—a practice which we are told continues to this day, but without doubt on a limited scale.

Order: Carnivora

Family: Procyonidae - Raccoons

Raccoon - *Procyon lotor*

Raccoons are usually extremely common in the park and seem to be well adapted to living with humans. They have become highly adept at raiding trash cans, gleaning scraps of food from picnic areas, and relieving campers of unguarded food supplies. They are a bane to biologists studying small mammals in the park because of their ability to locate live traps and rob them of bait, such as peanut butter. Raccoons (as well as striped skunks) are also highly efficient predators of turtle eggs, which are laid in holes in the ground. Raccoons often remove the eggs within a few hours of the time they are laid. They almost certainly have a major impact on populations of turtles in some areas (DC). Fruits, berries, nuts, frogs, fish, and crayfish are staple foods of raccoons in the park. In recent years, 2002 for example, the raccoon population was very low, for no known reason.

In the 1970s, populations were so high, especially in the campgrounds, that control was necessary. Each fall, dozens of raccoons were live-trapped, caged, loaded on trucks, and transported considerable distances for release. The extremely large raccoon populations in both Pine Ridge and Bear Paw Campgrounds were attracted by the readily available food supply. The replacement of garbage cans in both campgrounds with large-volume dumpsters has eliminated the number one source of "raccoon food," and thus the super-abundance of our campground raccoons (BT).



Raccoon

Raccoons are easy to identify with their black face mask and ringed, bushy tail. They live in dens in hollow trees, in roots, and under windfalls. During winter, they remain in their den for many weeks at a time, but move about on warm days. They are not true hibernators. Young are born in May or June, and they begin to move about with their mother when they are about four weeks old. Only one litter is produced per year.

Order: Carnivora

Family: Ursidae - Black Bears

Black Bear - Ursus americanus

The status of the black bear in Itasca State Park has changed dramatically during the past forty years. The 1959 report listed only two sightings within Itasca State Park that year, with the notation that "due to its low numbers they are seldom seen by the park visitor." Although found throughout the area long before European settlers arrived, they were never abundant once land development for farms and villages occurred. Prior to 1971, bears were unprotected and could be killed for the \$50 bounty (paid by the county) at any time outside the boundary of Itasca State Park. When a bear was sighted in northwestern Minnesota prior to 1971, people would gather for an unscheduled bear hunt, try to surround the bear and kill it.

I know of several of these types of hunts back in the 1960s (JM). Back in the early 1960s, returning from a trip to Bemidji with a forester from the Itasca District Forestry Station, I observed some twenty or so men armed with rifles alongside the road. I expressed surprise as hunting season was yet many weeks away. "Oh, its nothing," my forestry friend said. "Someone saw a bear; and if they can kill it, they will use the bounty to have a party this evening" (BT). It was classified as a "varmint" in the Itasca State Park area until its legal status was changed, at the stroke of midnight, on the last day of June 1971. At that time it became a "big game species" in Minnesota, fully protected under the game laws at that time.

Once the legislature gave full big-game status to the black bear, its numbers increased throughout the area. Although black bear cannot be hunted in Itasca State



Park, the entire area outside of the park is now open to hunting with regulated hunting zones, seasons and bag limits. The bear population can thus be legally regulated. At the present time (2002), the black bear population has been increasing at about 6 percent per year. To obtain accurate information regarding the status of the black bear, the DNR's Division of Wildlife conducts periodic bear population estimates. These counts make use of tetracycline treated bait stations which leave a fluorescent marker in the teeth or bones of the animal that consumes the tetracycline laced bait. By examination of the tissue samples collected from successful bear hunters, calculations can be made to provide a statewide population estimate.

The number of licenses is limited to what wildlife managers believe to be the "harvestable surplus." A few years ago, only one out of five applicants for a bear license was selected to take part in the hunt. Due to the recent increase in the black bear population, most (94 percent) of the license applicants are drawn for a license and can take part in the hunt. The annual bear harvest (hunter success) is to a large part dependent on the availability of natural foods. Unfortunately, it is still a no-win management situation as there are some who feel that all bears should be eliminated, whereas others feel that no bear hunting should be allowed, with countless other opinions in between.

The bear population in Itasca State Park is estimated at somewhere between 15 and 25, about one per 2-3 square miles (RN, ML, DG). At one time, garbage disposal was via landfills within the park, which provided considerable food for the black bears. The landfills have been closed for many years, but a few park visitors insist on feeding the bears that may wander through the campgrounds. This is an instant formula to develop genuine "garbage bears" which, after repeated attempts to move them, usually must be destroyed. Once black bears become addicted to human scented garbage, they have no fear of humans, which can result in major problems when people believe that such friendly bears are indeed tame. During the summer of 2000, after three attempts to relocate one "garbage bear" (ear tag red-11), which returned some 35 miles in less than three days, it had to be destroyed (JL). This is a major problem in the bear range of Minnesota. Never feed any wild mammal. No species of wildlife is tame. If everyone would acknowledge these two facts, the problem bear would be extremely rare. As Pogo once said, "We have met the enemy, and it is us." Recently the Nuisance Black Bear Policy has changed, and nuisance bears must now be destroyed. Trapping and relocating are now the last resort for safety reasons (RN).

Order: Artiodactyla

Family: Cervida - Deer and Moose

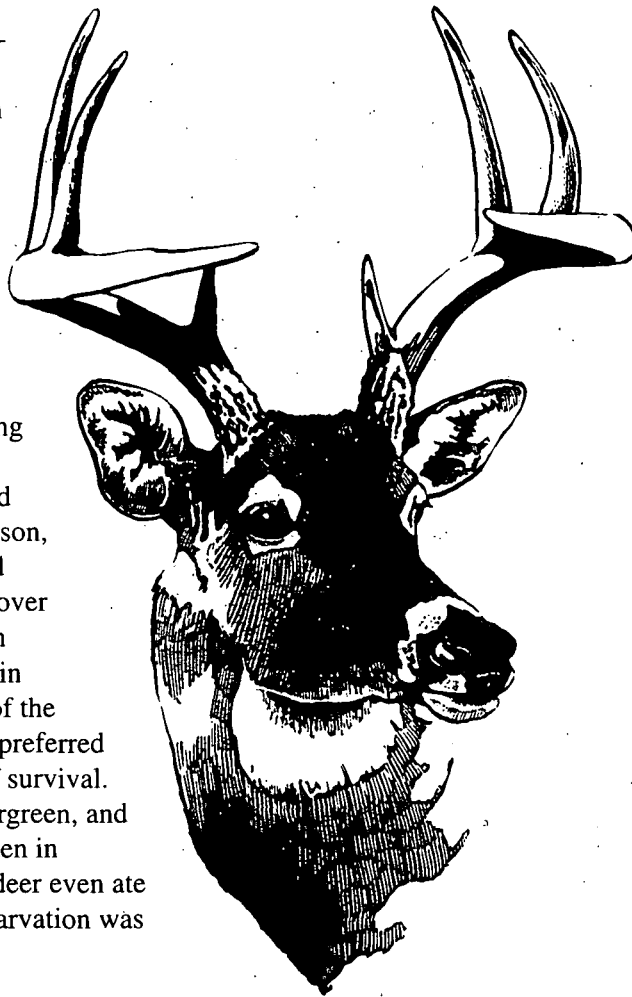
White-tailed Deer - Odocoileus virginianus

Moose - Alces alces

American Elk - Cervus elaphus

White-tailed deer are common to Itasca's forests and wooded wetlands. This deer is perhaps best known for its large white tail, which it raises in alarm as a "flag" as it bounds across a road and into the forest. Deer are tan or rusty brown in summer and grizzled, with gray and white underparts in winter. Fawns are reddish brown with white spots until their fur is replaced in late fall.

The Itasca deer herd was given complete protection after the park was established in 1891. This protection, plus the development of young forest communities which provided ideal cover and food, soon resulted in high numbers of deer in the park. Records from the Civilian Conservation Corps camps, which operated during the late 1930s, provide a wealth of detail regarding the deer population in Itasca State Park. By utilizing over 100 young men, they would surround an entire section (1 square mile) and walk within sight of the next person, counting all of the deer observed passing through the line. Often over 75 deer were counted per section (maximum of 89), a number far in excess of the carrying capacity of the habitat. Young pine seedlings, a preferred food of deer, had little chance of survival. Nearly all the blueberries, wintergreen, and red-osier dogwood were also eaten in summer, and in winter starving deer even ate cattails from muskrat houses. Starvation was



common, and in 1943 winter starvation losses were estimated to be 40 deer per square mile in the northern half of the park.

In 1945, the deer hunting season was opened for the first time in 50 years. The deer population was quickly reduced to a manageable level. Today, hunting is allowed in most of the park, and the harvest ranges from 5 to 11 deer per square mile. Winter browsing of the pine is still a significant problem in many park areas, and bud-capping has been attempted to reduce the damage to the young pine regeneration. Bud caps, made from small pieces of stiff paper, are folded and stapled over the tips of young white pine to protect buds from browsing during the winter months.

The moose, one of the monarchs of the northern wilderness, is the largest wild mammal in Minnesota. They are probably not resident in the park, but single moose are seen occasionally. Since 1979, sightings have been made frequently in Itasca State Park, with the numbers apparently increasing during the past two decades (BT). Many recent sightings have occurred: an adult moose swimming across Lake Itasca in the fall of 1999, moose tracks at the Bear Paw Campgrounds boat landing during late winter of 1999, tracks of an adult and calf at Chambers Creek in April 2000 (BM, PC), with many sightings near the north entrance and along LaSalle Creek (AK).

The American elk was common throughout Minnesota in the early 1800s, but by 1850 it was considered uncommon, being exterminated early with the westward push of the pioneers. By 1900, due to habitat change and poaching, elk were no longer found anywhere in Minnesota. In 1913, the Minnesota legislature appropriated \$5,000 for "securing, transporting, and maintaining a herd of elk in Itasca State Park." The same year, an area of about 700 acres between the east and west arm of Lake Itasca was enclosed with a strong eight-foot woven wire fence. In 1914 and 1915 a total of 56 elk were shipped by rail from the Jackson Hole and Yellowstone area to Itasca State Park. From an old logging railroad which terminated at the east entrance to the park, they were herded to the newly constructed elk enclosure. After an early decline in numbers, they began to increase annually at the rate of 3 to 12 elk per year. As the herd grew, some were transferred to other locations, but it soon became necessary to provide them with hay during the winter months. Transporting hay to the enclosure during the winter months soon became too expensive; so the enclosure was moved in 1928 to the north end of the park, adjacent to the park headquarters and available hay supply. In 1935, 27 of the captive herd were shipped to the Beltrami Island Resettlement Project, a federal project located in northwestern Beltrami County.

An interesting aspect of this project was the loading and transporting of large bull elk with enormous antlers in November with some assurance that they would not wound or kill others during transit. After using a lariat to secure each bull elk, they removed the antlers with a hacksaw. It was recorded at the time: "The change in psychology of the bull elk when they lost their antlers was amusing. They were

instantly transformed from dangerous, pugnacious beasts, ready to fight at the drop of a hat, to meek and tractable animals, easily loaded and shipped." Thus ended the reintroduction elk project in Itasca State Park. For the complete elk reintroduction to Minnesota story, consult the publications by B. Fashingbauer and G. Swanson listed in the Itasca State Park Publications section which concludes this booklet.

This reintroduction of elk was a limited success. Between 1946 and 1964 winter aerial census determined the population to be between 14 and 68 animals. In 1985, the herd numbered some 40 animals living in the Grygla area. The local farm community, unhappy about the crop damaged by the elk herd, put pressure on the legislature to do something. The politicians responded by ordering the DNR to move them out by the first of September and ordered \$20,000 from the non-game fund to pay for it. Thus began the last and very sad chapter of the elk reintroduction program in Minnesota, a well documented situation which was covered by TV and the newspapers from September 1985 to December 1986 and beyond. It should have proven once and for all that politics and wildlife management do not mix.

The following Minnesota mammals have never been observed in Itasca State Park: opossum, smoky shrew, Hayden's shrew, least shrew, eastern mole, eastern pipistrelle bat, white-tailed jack rabbit, Richardson's ground squirrel, western harvest mouse, heather vole, yellownosed (rock) vole, prairie vole, woodland vole, northern grasshopper mouse, northern bog lemming, Norway rat, marten, wolverine, eastern spotted skunk, lynx, mule deer, caribou, and pronghorn. American elk occurred in the park, but are no longer present.

State Status: The timber wolf is the only species listed as Threatened. Northern myotis and mountain lion are listed as Special Concern. State status data from Coffin, B. A. and L. A. Pfannmuller, 1988, *Minnesota's Endangered Flora and Fauna*.

Preferred habitat data from Hazard, E. B., 1982, *The Mammals of Minnesota* and Jones, J. K., Jr., and E. C. Birney, 1988, *Handbook of Mammals of the North-Central States*.

Common and scientific names from Tester, J. R., 1995, *Minnesota's Natural Heritage*.

Statewide Publications:

Ames, A. E. 1873. Mammals of Minnesota. Minnesota Academy of Science, Bulletin 1:68-71.

Buckman, Carol (compiler). Minnesota Mammals - eighty different kinds. Informational Bulletin, Minnesota Department of Conservation, St. Paul. (undated, not numbered, ca. 1970s.)

Gunderson, H. L., and J. R. Beer. 1953. The mammals of Minnesota. Minnesota Museum of Natural History, Occasional Paper, 6:1-190.

Hazard, E. B. 1982. The Mammals of Minnesota. Univ. Minnesota Press, 1-280.

Herrick, C. L. 1892. The Mammals of Minnesota. Bulletin Geological and Natural History Survey of Minnesota, 7:1-299.

Johnson, C. E. 1916. A brief descriptive list of Minnesota mammals. Fins, Feathers and Fur, 8:1-8.

Johnson, M. S. 1930. Common injurious mammals of Minnesota. Univ. Minnesota Agricultural Experimental Station, Bulletin 259.

Jones, J. K., Jr., and E. C. Birney. 1988. Handbook of mammals of the North Central States. Univ. Minnesota Press, 1-346.

Longley, W. H., and C. Wechsler. 1977. Minnesota mammals. Minnesota Department of Natural Resources, 1-28.

Surber, T. 1932. The mammals of Minnesota. Minnesota Department of Conservation, St. Paul, 1-84.

Swanson, G. A., T. Surber and T. S. Roberts. 1945. The mammals of Minnesota. Minnesota Department of Conservation, St. Paul, Technical Bulletin, 2:-108.

Except for Hazard (1982) and Jones and Birney (1988), all of the above have been out of print for many years. Most major libraries would have the out-of-print items or would be able to obtain them through inter-library loan. Some may be available via the used book market or as reprint editions.

Itasca State Park Publications:

Dobie, J. 1959. Checklist of the Mammals of Itasca State Park. The Itasca Story. Ross and Haines, 1-202.

Fashingbauer, B. A. 1965. The Elk in Minnesota. Big Game in Minnesota, Minnesota Department of Conservation, Section of Game and Fish, 99-132.

Feeney, W. 1936. Minnesota State Park Mammals. C.C.C. Technical Report, National Park Service, Typed, 1-36.

Sargent, A. B. and W. H. Marshall. 1959. Mammals of Itasca State Park. The Flicker, 31:116-128.

Swanson, G. A. The American Elk in Minnesota. The Conservation Volunteer, Vol. 1, No. 2, Nov. 19, 1940.

Swanson, G. A. 1943. Wildlife of Itasca State Park. The Flicker, 15:41-49.

All of the above publications are out-of-print, but most libraries could secure copies via inter-library loan.

An extensive collection of faculty and student research papers is on file at the University of Minnesota's Lake Itasca Forestry and Biological Station. These reports date back some 90 years and contain a wealth of information regarding the history and natural history of many of the Itasca State Park mammals. These reports can be made available for pertinent research purposes via Dr. Jon Ross, Resident Biologist, Lake Itasca Forestry and Biological Station.

Acknowledgements

During production of this booklet, many individuals have provided comments and suggestions. We feel that their work has greatly enhanced the value of this booklet for the intended reader—the Itasca State Park visitor. Our sincere appreciation to Vern Thompson, former English instructor at Ridgewater College, Willmar, Minnesota, for his proofreading and overall manuscript corrections. Our thanks to Connie Cox, Itasca Park Naturalist and Bryce Anderson, Regional Park Naturalist for their work regarding the publication of this booklet. Special thanks to Laurie Schummer for final layout review. Finally, to all who spent time with the various phases of the manuscript, we know that your work resulted in a better publication.

Review and comments were provided by the following: (Their initials are sometimes used as a reference in the text.)

AK - Alvin Katzenmeyer	BH - Bonnie Hohn
BM - Becky Marty	BT - Ben Thoma
CH - Clara Herhusky	DC - Don Christian
DG - Dave Garshelis	DH - Donald M. Hatfield
HM - Hank Morgenstern	JD - John Dobie
JL - John Ludwig	JM - Jerry Maertens
JT - John Tester	KT - Ken Thole
LC - Lance Crandall	MC - Marjorie Collins
ML - Mark Lenarz	PC - Paul Conklin
RN - Rob Naplin	RS - Robert Sikes
SL - Sandra Lichter	WB - William Berg

The net proceeds from the sale of this booklet will be deposited directly into the visitor services account and will be utilized on projects of benefit to the park visitors to increase their understanding of the park's history and natural history.

The previous publications on the mammals of Itasca State Park as well as other published material were very valuable in the preparation of this booklet. Many of these publications are listed in the final pages. Any questions or suggestions regarding this publication should be directed to: Office of the Park Naturalist, J.V. Brower Visitor Center, Itasca State Park, 36750 Main Park Drive, Park Rapids, MN 56470.

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2M-3/03