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Varying Hare (*Lepus americanus*)

Description

The most distinguishing characteristic of the varying hare (also called snowshoe or white rabbit) is its seasonal variation in coat color. Unlike the cottontail rabbit and European hare, this hare grows a white winter coat (pelage) in November and then sheds it in late March. Through the summer its coat is a reddish-brown on the side and back, with white on the underside. The tips of the ears are black and some individuals retain patches of brown on their feet, legs or bodies through the winter.

The varying hare is intermediate in size between the relatively small cottontail rabbit and the large European hare (Table 1). Females tend to be a bit larger than males. As its common name of snowshoe hare implies, its rear feet are long, wide, and densely furred giving the hare excellent buoyancy in fluffy snow.

Even though hares and rabbits have large, elongated incisor teeth that are adapted for gnawing, these animals are not classified as rodents. They are instead classified as lagomorphs because of a second pair of smaller incisors located just behind the upper, larger pair. Rabbits differ from hares in that their young are born naked, blind, and helpless, whereas hares are born fully furred, able to see and capable of running in just a few hours. Wildlife species with such characteristics are termed altricial (very immature and helpless) and precocial (early mature and independent), respectively.

Snowshoe or Varying Hare

Table 1. Some physical dimensions of wild rabbits and hares in N.Y. State, 1979^a

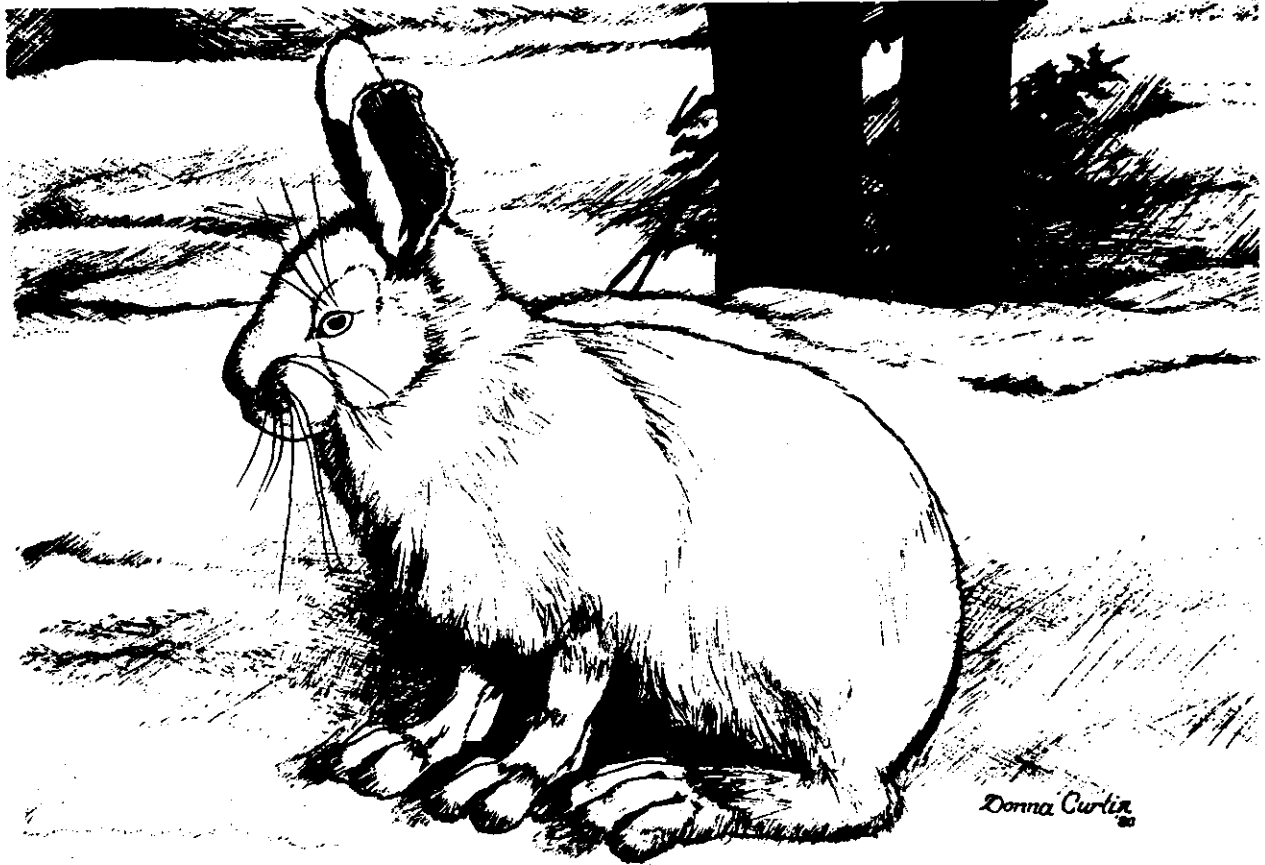
Common Name	Length from nose to tip of tail		Tail length		Hind foot length		Weight	
	cm	(in)	cm	(in)	cm	(in)	kg	(lbs)
Eastern Cottontail	38.0-46.1 (14.8-18.0)		3.0-7.0 (1.2-2.7)		7.7-10.6 (3.0-4.1)		0.8-1.4 (1.8-3.0)	
New England Cottontail	36.3-48.3 (14.2-18.8)		3.1-4.9 (1.2-1.9)		9.0-10.2 (3.5-4.0)		0.8-1.3 (1.6-3.0)	
Snowshoe Hare	47.0-52.0 (18.3-20.3)		3.6-5.0 (1.4-2.0)		13.5-14.7 (5.3-5.7)		1.4-2.0 (3.1-4.4)	
European Hare	64.0-70.0 (25.0-27.3)		7.0-10.0 (2.7-3.9)		16.0-17.0 (6.2-6.6)		3.3-4.5 (7.3-10.0)	

a. Average range of adult dimensions as presented in Godin, 1977.

Distribution and Abundance

The varying hare is found throughout the New England States (with the exception of Massachusetts and Rhode Island), New York and along the Appalachians as far south as northern Tennessee. Michigan and Wisconsin are the only other eastern States that have substantial hare populations. Four subspecies are recognized in the east, with only L.a. virginianas occurring in New York.

In New York State, the snowshoe hare can only be considered abundant in the Adirondack region, although scattered populations do occur in many Southern Tier and Catskill counties. As with most wildlife species, the key to viable populations of snowshoe hares is suitable habitat. The snowshoe once inhabited nearly all of the State. The logging of coniferous forests, along with increased farming (except in the Adirondack and Catskill Mountains) during the late 1800's, eliminated snowshoe hare habitat throughout most of the State. Without dense, coniferous cover, the snowshoe hare could not exist. The cottontail, which flourished in the resulting open grass and brushland, replaced the hare as the most abundant and widely distributed lagomorph of the State. Even though the Adirondacks and Catskills were extensively logged through the 1800's, hare populations were not affected in inaccessible stands of conifers commonly located in swamps or at higher altitudes. The abandonment of marginal farms from the 1930's through the 1950's and the establishment of conifer plantations on these former



farms has resulted in the creation of some fairly good snowshoe habitat in several areas of the State. Through the efforts of the New York State Department of Environmental Conservation and sportsmen groups, hares have been re-introduced into favorable habitat during the past few years. As a result, new varying hare populations are now firmly established and are now expanding in several Southern Tier and Catskill counties.

Life History

Breeding activity starts in early March and continues until early August. The males (bucks) are promiscuous; that is, they breed freely with any receptive female (doe). Gestation lasts 37 days. The last litter is usually born in late August or early September. Average litter sizes are 3 to 4, with 2 or 3 litters produced per season. The female makes no attempt to construct a nest. Because hares are precocious there is little need for such a protective nest. The doe merely finds a convenient, somewhat sheltered location at the time of birth. The young (called leverets until they are a year old) are born fully furred, weigh 67-75 grams (2.3-2.6 ounces) and have their eyes open. They are able to hop about in just a few hours and eat vegetation in about 8 days. The

leverets usually stay with does and continue nursing until they are about 3 to 4 weeks of age. The young are fully grown at 5 months, but unlike the cottontail rabbit, they do not breed until the following spring.

Hare populations tend to be cyclic throughout most of the hare's range in North America. A population of snowshoe hares studied in Alberta Province Canada, displayed approximately a 10-year cycle. Peak years were followed by a die-off of up to 95 percent of the population over a 2- to 3-year period. During one peak year, there were approximately 15 hares per hectare (6/ac.) on the highest density study area. Winter food shortages promoted the population decline in the Alberta study which resulted in reduced juvenile and adult winter survival rates and reduced reproductive rates.

In New York State, as in most of the snowshoe hare's southern range, populations do not rise and fall with cyclic regularity, nor is there such a drastic change in population densities. Sporadic fluctuations do occur, however, with populations changing perhaps four-fold from high to low years. Good habitat in New York typically supports winter populations of 2.5 hares per hectare (1/ac.) during peak years.

Varying hares are more social than cottontail rabbits. Several hares frequently share the same home range without any apparent conflict or display of territorial rights except immediately preceding or during the breeding season. In relatively good habitat, males may have a home range



of 7.2 hectares (18 ac.) while females utilize just 2.8 hectares (7 ac.). Hares commonly only cover about 1.6 hectares (4 ac.) in a day's activity.

When available, snowshoe hares, like cottontails, prefer to eat green, leafy vegetation rather than bark or twigs. Summer foods consist of clover, grasses, dandelions, strawberries, ferns, vetches, jewelweed, horsetails and a few shoots from aspen, willows and birches. With the arrival of winter, the hares are forced to switch over to the bark, twigs or needles of cedar, balsam fir, spruce, tamarack, pines, hemlock, maples, willows, birches and apple. With the exception of white cedar, the other coniferous browse is of little nutritional value to the hares. Food items that only serve to fill the stomachs of animals are called "starvation foods". Snowshoes frequently engage in coprophagy; that is, the ingestion of their own feces. This practice allows them to recycle their wastes and utilize nutrients missed in tough, fibrous bark, and to obtain vitamins formed by their digestive micro-organisms. Unlike most herbivores (animals whose diet consists chiefly of vegetation), snowshoes benefit from unusually deep snow accumulations because they can stay on top of the snow and feed at previously unreachable levels on trees and shrubs.

The snowshoe hare is a fine example of the result of evolutionary pressure. As an important food for many predators, only those hares capable of escaping predation, at least until they have bred, have the opportunity to pass on their genetic characteristics. Consequently, the hare has evolved several intrinsic features that enhance its survival. Its eyes are positioned laterally on its head to permit a wide visual field; its ears are long, slightly cupped and pivotable, enabling it to hear faint sounds; its variable coat color provides ideal camouflage during both summer and winter; its long legs, large feet, and agile body allow it to make evasive dashes up to 40 kph (25 mph) over snow; it is mainly nocturnal (active at night); and its shy and retiring nature draws little attention from the sharp eyes of its predators.

Even with these adaptations, the snowshoe hare is one of the most important links in the food chain between plants and carnivorous (meat-eating) animals. Nearly every predator of the northern woods has evolved at least one characteristic which has allowed it to use the snowshoe as a major prey species. Barred and great horned owls rely on excellent night vision and keen hearing as they hunt through the night. Bobcats are noted for their stealthy stalk and lightning-like rush. Foxes and coyotes primarily use their acute sense of smell to locate prey, then they either stalk or chase the prey. The tenacious fishers, martens, and weasels use their speed and agility to take hares.

In spite of losses to predators, the reproductive rate of hares in quality habitat is sufficient to allow populations to grow until diseases, parasites, or starvation become severe enough to stop population growth. At high densities frequent contact between individuals enhances the spread of external parasites such as fleas, ticks, and mites; internal parasites such as tapeworms, roundworms, and flukes; and disease pathogens such as Salmonella, Pneumococcus, ringworm, and Pasteurella tularensis. Survival rates vary depending upon whether the population is growing or declining. Only a small percentage of hares ever reach the relatively old age of 3 or 4 years.

During winter, tracks of snowshoe hares are particularly conspicuous in snow. At any gait other than a slow, shuffling walk, the large, oblong hind feet are placed ahead of the smaller, round front feet. To someone unfamiliar with these hares, it is easy to confuse which direction their tracks lead. The indisputable clue is the position of the widely-spaced toes on the hind feet. Where abundant, hares establish a maze of well-defined, packed trails through evergreen thickets. Though very difficult to distinguish from cottontail browsing, hares will clip off many of the available twigs and shoots along these trails up to a height of about 46 cm (18 in.) from the ground or snow surface. Vegetation browsed by hares or rabbits will be cleanly cut compared to the jagged edge left behind by deer. A large portion of the winter diet of snowshoes is bark, so teeth marks that are 2.0 millimeters wide (0.08 in.) at the base of trees or shrubs are evidence of rabbits or hares. Besides seeing a snowshoe hare, probably the best evidence of their presence during the summer is their large number of fecal droppings which are green or brown and slightly smaller than a marble. Except for the piercing, high-pitched, wavering scream they make upon being injured, hares usually make only a few occasional grunts. Hares have the habit of thumping the ground with their hind feet producing an audible sound. Biologists believe that this behavior serves to warn other hares of danger.

Habitat

Snowshoe hare populations are directly dependent upon the availability of food and shelter. Shelter invariably consists of conifer stands that are in a sapling to small pole stage. The low, overhanging branches provide the security and protection hares seek during daylight hours. Unless the coniferous stand is white cedar, snowshoes must be able to find nearby hardwood browse

during the winter. The hare will not travel more than a few meters from cover to feed. A large block of conifer cover surrounded by hardwood browse will not support as many hares as would the same area with the cover and browse interspersed. The quantity of this interspersed interfacing "edge" partially determines the number of hares a unit of habitat can hold.

Landowners who wish to manage their land for snowshoe hares can do several things to improve existing habitat. Conifer cover that is in the pole or saw-log stage should be thinned to allow new growth of hardwood and evergreen seedlings which will provide both food and shelter at the sapling stage. Small clearings (8 m diameter) or lanes (3 m wide) should be cleared to allow new growth. These openings also improve human access and the opportunity to see hares. If blocks or "islands" of potentially valuable habitat exist outside of an established base habitat, vegetative travel lanes should be created to provide cover so hares can utilize the new habitat. Forests that are heavily browsed by domestic livestock or deer cannot support good populations of snowshoe hares.

Throughout the Adirondack and Tug Hill regions of the State, snowshoe hares are associated with dense conifer stands that occur along watercourses, in swamps, and on the northern slopes of higher elevations. Where humans are not an influence, high quality hare habitat can only be created or maintained by natural forest disturbances such as fire and windstorms. Local populations have flourished in abandoned farmland along the St. Lawrence River and Lake Champlain Valleys. As mentioned earlier, the establishment of conifer plantations in southern portions of the State have also produced adequate hare habitat in several areas.

Ecological Role

The Adirondack region of New York is considered by many to be the last remaining wilderness in the eastern United States. An integral part of this wilderness is its predator community. The continued existence of viable populations of marten, fisher, red and grey fox, bobcat, coyote, barred owl and great horned owl that currently inhabit the area, depend directly on the snowshoe hare as a prey species. The great grey and snowy owls that occasionally drift south of Canada in search of food could not survive in the Adirondacks if hares were not present.

Hares are taken in all seasons by various predators, but it is during the winter that the snowshoe is used most heavily. From December to March three

major mammalian prey species remain active above the snow: white-tailed deer, red squirrel, and the snowshoe hare. Of these three, the snowshoe is most readily taken by the majority of predators.

Outside the Adirondacks, snowshoe abundance is inadequate to constitute a major or reliable prey base for predators, except in very localized areas. The establishment of hare populations in regions such as the Catskills might bolster current predator populations and help insure the future of recently reintroduced fishers.

Economic and Social Values

The snowshoe hare is a fairly shy and elusive animal which spends much of its day resting in a "form" (any slightly protected spot). Consequently, it is seldom seen by the casual observer, compared to cottontails which routinely spend several minutes at dawn and dusk each day feeding in the open. Snowshoe hares only venture out of their preferred cover of evergreen thickets at night to feed on shrubs or grasses in forest openings. Nature watchers must pick moonlit nights or take a chance on an early morning vigil if they wish to observe snowshoe hares.

Small game hunters consider the snowshoe to be a top-rate game animal. Even when pursued by beagles or the longer-legged hounds that hunters prefer to use in the Adirondacks, the hare will not hole up. The hare's built-in snowshoes allow them to stay atop any snow condition and therefore easily stay ahead of the dogs. The hare's one downfall is their habit of circling around their home territory; using the same trails again and again. To be successful, hunters must figure out a hare's pattern and then wait for the pursued hare to pass by. The snowshoe's winter diet of bark and needles from cedar, spruce or balsam fir makes its meat less desirable tablefare than that of the cottontail; nevertheless, it is delicious in stews or "spiced-up" dishes. Unlike the cottontail rabbit, snowshoe hares are seldom infected by tularemia. Thorough cooking eliminates any possibility of contracting contagious diseases from contaminated meat.

As discussed in the Ecological Role section, snowshoe hares are a primary prey base of nearly all predators inhabiting the Adirondack region. Predators such as the fisher, bobcat, coyote and red fox are extremely valuable furbearers that are taken in substantial numbers in the Adirondacks. In an indirect manner, the snowshoe hare supports a large portion of the annual multi-thousand dollar fur industry of the State.

Little crop or orchard damage can be attributed to the snowshoe because it

is not abundant in the State's prime agricultural areas. Rural homeowners occasionally experience some damage to ornamental shrubs or vegetable gardens.

Control Methods¹

For gardeners, fencing probably is the single best method of control. The fence should be made of 2.5 to 3.8 cm (1 to 1.5 in.) wire mesh and stand 60 cm (2 ft.) high with 15 cm (6 in.) buried beneath the ground. Fencing should be attached to posts by means of twists of pliable wire so that it can be rolled up and stored at the end of the gardening season. If gardens are in poor hare habitat and there are just a few culprits, it may be possible to live trap them through the use of box traps placed at key entrance lanes to the garden.² Traps baited with corn or sliced apples and a few hare droppings are usually effective. Box traps may also be the solution for homeowners who experience damage to yard shrubbery. Captured hares should be released in good hare habitat at least 5 km (3 mi.) away to prevent them from returning to their former home territory. When just a few shrubs are involved, tree guards constructed of 1.3 cm (0.5 in.) hardware cloth which encircle the trunk may be most efficient and economical. Guards must extend at least 60 cm above anticipated snow level.

Where feasible, habitat management can be an efficient control method. As discussed in previous sections, hares will not travel more than a few meters beyond dense cover to feed. Buffer zones of as little as 25 m wide that are devoid of cover will usually act as barriers to the hares. Also, the potential over-wintering hare population can be substantially reduced by a few successful hunts early in the small game hunting season.

¹ For a more in-depth discussion of control methods, see Caslick and Decker (1978)

² The snowshoe hare is a protected game animal in New York State; therefore, it is necessary to contact your local Environmental Conservation Officer before trapping.

Selected References

- Banfield, A.W. 1974. The mammals of Canada. Univ. of Toronto Press, Toronto, Canada. 438 pp.
- Caslick, J.W. and D.J. Decker. 1978. Control of wildlife damage in orchards and vineyards. Info. Bull. 146. Dept. of Natural Resources, N.Y.S. College of Agric. & Life Sciences, Cornell Univ., Ithaca, NY. 18 pp.
- Dodds, D.E. 1960. The economics, biology and management of the snowshoe hare in Newfoundland. Ph.D. Thesis. Cornell Univ., Ithaca, NY. 320 pp.
- Godin, A.J. 1977. Wild mammals of New England. Johns Hopkins University Press, Baltimore, MD. 304 pp.
- Gutierrez, R.J., D.J. Decker, R.A. Howard, Jr., and J.P. Lassoie. 1979. Managing small woodlands for wildlife. Info. Bull. 157. Dept. of Natural Resources, N.Y.S. College of Agric. & Life Sciences, Cornell Univ., Ithaca, NY. 32 pp.
- Jackson, H.H. 1961. Mammals of Wisconsin. Univ. of Wisconsin Press, Madison, WI. 504 pp.
- Keith, L.B. and L.A. Windberg. 1978. A demographic analysis of the snowshoe hare cycle. Wildlife Mono. Vol. 58. 70 pp.

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