Cornell University
Cooperative Extension

New York's Wildlife Resources

An Extension Publication of the Department of Natural Resources, New York State College of Agriculture and Life Science,
a Statutory College of the State University at Cornell University, Ithaca, New York

Gray Squirrel
(Sciurus carolinensis)

Written by Kristi L. Sullivan and Megan Hilbert. 2015.*

Description

This bushy-tailed rodent is a common resident in New York State. Although the usual color phase is gray, melanistic (black) squirrels are found in some localities. True albinos (white fur, pink eyes) occur rarely. Color variations of the basically gray phase are observed also, with the hair of some individuals being heavily tinged with red or brown. Individuals of various color phases can be found mixed in the same litter. Close examination of the summer pelage (fur) of the gray squirrel will reveal that the gray hairs along the back and on the shoulders are brown, with black bars and gray or silver tips. The face, flanks, feet, and rear legs tend to be rusty-brown. The longer, denser winter coat is much grayer. The ears are a light buff color and the soles of the feet are well furred during winter.

There are four other species of arboreal (tree climbing) squirrels in New York: fox squirrel (*Sciurus niger*), red squirrel (*Tamiasciurus hudsonicus*), southern flying squirrel (*Glaucomys volans*) and northern flying squirrel (*G. sabrinus*). Some physical dimensions of each are presented in Table 1. Note that gray squirrels are slightly smaller than fox squirrels. Considerable overlap exists in color phases of the two species, but the fox squirrel typically has a tawny underside compared to the usual white underside of the gray, and the gray phase of the fox squirrel lacks the brown tones of the gray squirrel. The gray squirrel has a more rounded forehead and longer, more pointed ears than the fox squirrel. The red squirrel is markedly smaller than the gray squirrel or fox squirrel and is typically rufous (rusty-red) with a white underside. The most distinguishable characteristic of a flying squirrel is the presence of a loose membrane of furred skin, which extends from the outside of the wrist on the front leg to the ankle of the rear leg.

Gray squirrel

Distribution and Abundance

Extensive stands of mature hardwoods, including oak, hickory, walnut, butternut, beech, and American chestnut provided excellent habitat for gray squirrels in colonial New York. Forest clearing and the proliferation of small farms throughout the state greatly reduced squirrel habitat by the late 1800's. At the turn of the century, the gray squirrel population was at its low point. Favorable habitat has since regenerated across the state, following the abandonment of marginal farms during the first half of this century. Now, gray squirrels are more abundant near homes than in

Table 1. Physical dimensions of 5 squirrel species native to New York State.[a]

Common Name	Length from nose to tail – cm (in)	Length of tail – cm (in)	Length of hind foot – cm (in)	Weight – g (oz)
Gray Squirrel[b]	46.0-53.0 (17.9-20.7)	16.5 – 25.0 (6.4-9.8)	6.0-7.5 (2.3-2.9)	340-680 (11.9-23.8)
Fox Squirrel[c]	50.0-56.5 (20.0-22.6)	21.7-26.5 (8.7-10.6)	6.2-8.0 (2.5-3.2)	790 (27.6)
Red Squirrel[b]	28.0-35.0 (10.9-13.7)	11.4-15.2 (4.4-5.9)	4.6-5.2 (1.8-2.0)	165-240 (5.8-8.4)
Northern Flying Squirrel[b]	25.0-29.5 (9.8-11.5)	11.5-13.5 (4.5-5.3)	3.5-4.0 (1.4-1.6)	57-125 (2.0-4.4)
Southern Flying Squirrel[b]	21.0-25.5 (8.2-10.0)	8.0-11.0 (3.1-4.3)	2.5-3.5 (1.0-1.4)	50-70 (1.8-2.5)

[a]Average adult sizes.
[b]Reference – Godin 1977.
[c]Reference – Banfield 1974.

woodlands. Gray squirrels are currently widespread across the state and their range extends into southern Canada.

Life History

Reproduction

The first breeding activity begins in late January. Adult females in good condition often have a second breeding period in June. Gestation requires about 44 days, so the first and second litters are born in March and August, respectively. Approximately 10 percent of the females-of-the-year breed during years of ample food supplies. Females of a spring litter commonly produce young the following spring but seldom have a second litter that season. Females of late summer litters generally have their first litter one year later.

Spring litters usually are born in tree dens. These offer more protection from the elements and predators than do leaf nests. Dens are cavities within tree trunks that have been created by decay, lightning, or woodpeckers. Leaf nests are ragged spheres measuring about 45 cm (18 in) in diameter and made of woven leaves and twigs. They are constructed in tree trunk forks or major limb forks of trees at least 9 m (30 ft) in height. These nest sites are often used more than one season. Pregnant females line den nests with bits of shredded bark, moss, or grass.

Food availability greatly influences litter size, which can range from 1 to 9 young. The first litters of the year generally have fewer young than those of late summer, averaging 2.5 and 3.2 young per litter, respectively. Newborn gray squirrels are completely naked, blind, and toothless. They weigh 15-18 grams (0.5 to 0.6 oz) and are 11 to 12 cm (4.4 to 4.8 in) long. Young squirrels do not leave the nest for the first time until they are 6 to 7 weeks old. At 8 to 10 weeks they are weaned and capable of foraging with adults. The spring litter generally stays with the female until she has her second litter, which in turn usually overwinters with her. Second litters frequently are born in leaf nests, allowing females to escape the fleas and mites of tree dens and relocate closer to seasonal food supplies. Upon leaving the family group, young squirrels often construct their own leaf nests, but these nests often do not hold together well, probably due to the builders' inexperience. Squirrels seldom use leaf nests in winter.

Gray squirrels generally are gregarious (readily associate with each other); however, when rearing young, females defend their den or nest tree from intruders.

Local populations have a well-defined social structure in which females and juveniles are subordinate to adult males. Disputes over territories, social hierarchy, or limited food supplies, are usually settled by bluff displays. Where food is plentiful, several adults may feed peacefully side-by-side and adults may even share winter dens.

Flying squirrel

Food

Home ranges average 0.5 ha (1.3 acres) with males ranging a bit farther than females. Dense populations of 7.5 squirrels per ha (3 per acre) may occur in excellent habitat during peak years, but populations in good

habitat average about 2.5 per ha (1 per acre). Local populations will readily shift their foraging a few hundred yards in the fall to adjust to food availability.

Melanistic (black) gray squirrel

The diet of the gray squirrel changes with the seasons. In spring, preferred foods are the nutritious buds and catkins (flowers) of elms, maples and oaks, plus the inner bark and sap of maples. During early summer, maple and elm seeds are foods of major importance. Later, various seeds and fruits such as wild grapes, blueberries, wild cherry, and mushrooms, are popular food sources. Gray squirrels also will eat bird eggs and fledglings, insect, caterpillars, and will gnaw on bones or antlers as part of their varied diet. An ample fall nut crop ensures squirrels of a nutritious food supply through winter. Squirrels eat a variety of mast: acorns, beechnuts, butternuts, walnuts, and hickory nuts. Corn and apples also are popular fall foods.

Squirrels cache (hide) nuts by burying them a few centimeters beneath the leaf litter on the forest floor or in crotches of trees throughout the squirrel's home range. Gray squirrels do not hibernate, but they will remain in their dens for several days during periods of severe winter weather. During winter, squirrels randomly search for their stored nuts, locating caches by smell. Consequently, neighboring squirrels often benefit from another's industriousness. The gray squirrel's acute sense of smell allows it to detect whether or not nuts are sound, even if the nuts are buried. If all mast production in an area fails, the squirrels can make it through the winter on bark and twigs from elm, maple, and sumac, or pine seeds, but these foods are less nutritious, and spring reproduction among squirrels forced to use these foods will be reduced as a result.

Habitat

Stable, viable gray squirrel populations are dependent upon woodlands containing a variety of tree and shrub species with an adequate number of den trees; a water supply in the form of a stream or spring also greatly enhances squirrel habitat. As indicated earlier, gray squirrels rely on different food items at various times of the year. Habitat with good plant species diversity can provide a variety of food throughout the seasons. As an example, white oak acorns are an excellent squirrel food, but because this oak only sporadically produces mast, woodlots devoid of other mast species may be relatively poor squirrel habitat. Part of the diversity should include ample old trees with cavities for tree dens. Gray squirrels need tree dens for protection in winter and for rearing the first litter of the year.

Woodland management practices that encourage the production of gray squirrels consist of maintaining or establishing tree species diversity, encouraging mast-producing trees, and preserving den trees. Logging or thinning operations should spare existing den trees. Ideal den sites are mature (not decaying) hardwood nut trees having an entrance not larger than 10 cm (4 in) wide at least 6 m (20 ft) from the ground. A density of 10 to 12 active den trees per ha (4 to 5 acre) is sufficient. Mast or den trees located along hedgerows or the forest edge must be associated with travel lanes of good cover if squirrels are to make use of such trees. Gray squirrels will readily use artificial nest boxes if natural den sites are not available.

Survival

Due to the gray squirrel's wariness and arboreal habits, mortality rates caused by predation are low compared to most rodents. Gray squirrels can scamper along the ground at about 24 kph (15 mph). Once in the trees, squirrels are extremely elusive, able to climb up or down trees with equal speed and capable of leaping 2.5 meters (8 ft) or more from limb to limb.

Still, nearly every predator associated with gray squirrel habitat includes a few squirrels in its diet. Raccoons, opossums, and weasels may raid nests successfully, but usually the protective females drive off such intruders. Occasionally a squirrel, late in getting to its den or nest in the evening, will be caught by a barred or great horned owl, but because these squirrels are diurnal (move about during the day), such events are rare. Foxes, bobcat, domestic cats, mink, and large snakes will sometimes catch an unwary squirrel. Probably the most successful predators of squirrels are the forest-dwelling hawks, such as the red-shouldered

hawk, goshawk, broad-winged hawk, and Cooper's hawk.

When established in good habitat, adult gray squirrels have fairly low mortality rates and may live 8 to 10 years. The average life expectancy, however, is about 2 to 3 years.

Sign

Gray squirrels seldom go unnoticed in an area. In urban environments, squirrels usually lose much of their natural wariness and can be seen throughout the day on lawns or in parks, searching for bits of food. In rural settings, squirrels usually limit their activity to early morning and late afternoon. People interested in observing squirrels will find the best opportunities to do so come in the fall and early winter. Areas with a constant supply of seeds, nuts, apples, or corn will be visited regularly by foraging squirrels.

One does not have to see gray squirrels to know that they are present. They have several calls, but two

are the most distinctive. During the breeding season, females emit an accented "bark" or chatter followed by a trill. When annoyed or aware of danger, squirrels make an alarm call consisting of a series of short barks or chattering, also heavily accented but without the trill.

Squirrels leave other evidence of their presence. Through the fall and winter, foraging gray squirrels will make small pits in the forest floor, 5 to 7 cm (1.3 to 1.8 in) in diameter and about as deep, where they have dug for stored nuts. They seldom eat their finds where they uncover them; instead, they retreat to a favorite branch or stump to dine in a little more security. "Midden piles" (shells, bits of nut meats) accumulate at these feeding locations. Tracks of foraging squirrels are especially conspicuous in snow. The shape of the track varies with the speed of the squirrel: walk, a single line of superimposed tracks; short-hops, smaller front feet come down in front of rear feet with all 4 prints present; run, larger hind feet come down in front of front feet, with prints 0.5 to 1.5 meter (1.7 to 5.0 ft) apart. Sometimes a gray squirrel's running track is difficult to distinguish from that of a cottontail rabbit, but usually the prints of a squirrel's front feet are side-by-side rather than one behind the other. Another clue is that squirrel tracks tend to lead to and from trees, unlike the rabbit's. Red squirrels also make diggings, midden piles, and gray squirrel-like tracks, but the red's tracks are only about two-thirds the size of the gray's.

Ecological Roles

While gray squirrels are not the primary prey of any predator species, they are so widely distributed that they are important as prey to many of New York's predators. The feeding habits of gray squirrels are beneficial to both plant and animal communities in their range. Since squirrels do not find all of their nut caches, the remaining nuts distributed throughout the forest are the seed source for future forests. Other rodents, such as mice and chipmunks, feed on the gray squirrel's caches and the bits of nut meats present in their midden piles.

Economic and Social Values

The gray squirrel is a mammal people enjoy watching around their homes. In urban situations, gray squirrels are easily approached and make interesting wildlife to observe as they forage for food and interact with each other. Gray squirrels are also a popular game species among hunters and can be challenging quarry. They possess both keen hearing and sharp eyesight along with more than enough patience to sit quietly in hiding and let hunters pass.

They can however, become a nuisance. Damage frequently occurs when squirrels feed on cherry blossoms and ripe pears or chew the bark of fruit trees. In

gardens, squirrels may eat planted seeds, mature fruit such as tomatoes, or grains such as corn. Hungry squirrels also frequently raid bird feeders and may chew holes through the tubing used in maple syrup production.

In residential areas, squirrels sometimes travel on power lines and may short out transformers. They may become a problem when they gnaw on wires or enter buildings and cause damage.

Control Methods

When gray squirrels have invaded an attic, garage, or wall partition, control may be as simple as waiting until the offenders are outside and then covering the entry hole with planking, heavy screening, or sheet metal. The best method to use with squirrel pests in vegetable or flower gardens will vary depending upon the particular case. To keep squirrels from climbing fruit trees, metal bands (stove pipe works well) at least 60 cm (24 in) wide and 1.5 m (5 ft) or more high above the ground. Squirrels are notorious leapers, however, and will gain access to trees via low hanging branches or adjacent trees when possible. On bird feeders, metal cone "baffles" can be installed to prevent access. Several repellents are also available to deter squirrels from eating bird seed or feeding on garden crops.

Selected References

Banfield, A.W. 1974. The mammals of Canada. Univ. of Toronto Press. Toronto, Canada. 438 pp.

Barkalow, F.S., Jr. and M. Shorten. 1973. The world of the gray squirrel. J. B. Lippincott Co., Philadelphia, PA and New York, NY. 160 pp.

Batcheller, G., and J. Gawalt. 2002. Squirrels of New York. NYS DEC.

Caslick, J.W. and D.J. Decker. 1981. Control of wildlife in homes and gardens. IB176 N.Y.S. Col. of Agric. And Life Sci., Cornel Univ., Ithaca. 28 pp.

Godin, A.J. 1977. Wild mammals of New England. Johns Hopkins Univ. Press. Baltimore, MD. 304 pp.

Hamilton, W. J. Jr. 1957. The squirrels of New York. The Conservationist. 11(4): 23-27 (Feb-Mar).

Sullivan, K. L. and P.D. Curtis. 2001. Tree Squirrels. Wildlife Damage Management Fact Sheet Series. Cornell Cooperative Extension, Ithaca, NY.

*Revised extensively from Goff, G.R., Decker, D.J., Kelley, J.W., and Howard, R.J., Jr. 1981. New York's Wildlife

---

Funds for publication revisions provided by Smith Lever Funds and The Renewable Resources Extension Program in partnership with USDA NIFA.

USDA United States Department of Agriculture National Institute of Food and Agriculture

Funding for revisions specifically attributed to the following grant: Shooting Sports as Civic Ecology Recreation: An Exploration and Expansion of Extension Activities that Promote Natural Resource Recreation for Resilient People, Communities, and Ecosystems.