



Wildlife Damage Management Fact Sheet Series

Tree Squirrels

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Four species of squirrels—the gray squirrel, fox squirrel, red squirrel, and northern flying squirrel—reside in New York State. The fox squirrel is limited to the southern portions of Chautauqua, Cattaraugus, and Allegany Counties as well as the Lake Erie plains; New York State constitutes the extreme northeastern edge of its range. Each of these species inhabits wooded areas in both rural and suburban landscapes and plays an important role in forest ecosystems.

General Biology

Gray squirrels (*Sciurus carolinensis*) typically are gray on the top of the body and have a white underside. The gray squirrel measures 18 to 20 inches long, its broad bushy tail accounting for about half its length, and weighs 1 to 1.5 pounds. Most adult gray squirrels first breed in mid-December or early January, and 5 to 10 percent of older females may breed again in June. The gestation period is 42 to 45 days, after which gray squirrels typically give birth to three young. The young are born hairless and blind and spend their first 10 to 12 weeks in the nest before beginning to explore the outside world. Gray squirrels typically live about two to three years. Hawks, owls, and foxes occasionally prey on young squirrels, but adults are not frequently taken. Predation does not greatly affect squirrel populations in areas that have good food and cover. Fox squirrels (*Sciurus niger*) are gray to reddish-gray above and buff to pale orange-brown on the underside.

The fox squirrel is so named because its color often resembles the brownish red-orange of the red fox. Larger than gray squirrels, fox squirrels are about 21 inches long and weigh nearly 2 pounds. Fox squirrels mate in January and give birth to two to four young in late February or early March. Unlike gray squirrels, fox squirrels have only one litter per year.

Red squirrels (*Tamiasciurus hudsonicus*), also known as barking squirrels, boomers, chickarees, and chatterboxes, are alert, noisy, and energetic. They spend most of their time in trees and are extremely agile, sometimes leaping 10 feet between branches or 30 feet to the ground. Red squirrels are known to fall considerable distances with little or no apparent injury. When this happens, the squirrel extends its legs and flattens its body and tail, thereby reducing the speed of the fall. About half the size of the gray squirrel, the red squirrel measures about 12 inches from its nose to the tip of its tail and weighs about 5.5 ounces. In the summer, its fur is a rich, rusty brown color, turning grayer in winter when the squirrel also develops prominent ear tufts. The undersides are off-white. Breeding season for red squirrels begins in late winter; three to six young are born in April, May, or June after a 40-day gestation period. Red squirrels are strongly territorial and will defend their food sources and den trees against intruders.

The northern flying squirrel (*Glaucmys sabrinus*) is New York's only nocturnal squirrel. The flying squirrel is about 8.5 inches long, including a 3.5-inch tail. Its large, round eyes are adapted for night vision. The fur of the flying squirrel is soft grayish-brown above and white on the underside. The flying membrane is a loose flap of skin between the front and hind legs on either side of the body. The membrane is stretched tight when the legs are extended, allowing the squirrel to soar or glide but not to fly in the true sense of the word. The broad, flat tail is used as a rudder to guide the animal while it is soaring. Flying squirrels can sail up to 40 yards in a downward direction, often soaring from tree to tree. Two to six young are born in April or May following a 40-day gestation period.

Helping You Put Knowledge to Work

Habitat and Food Habits

Tree squirrels inhabit woodland areas. Fox squirrels prefer the forest edge, where trees border crop fields or other open areas. Red squirrels favor coniferous or mixed deciduous and coniferous forest but will inhabit mature deciduous forests where coniferous habitat is unavailable. Although the gray squirrel is the most common and adaptable species, all three species regularly live in cities and suburbs as well as forests.

Good squirrel habitat contains many mature fruit- and nut-producing trees and a mixture of other tree and shrub species to provide a variety of food throughout the year. Natural dens and tree cavities are used for escape and breeding cover. In addition, gray and fox squirrels build and use leaf nests in trees during summer and fall. Leaf nests are typically 12 x 16 inches and are built of twigs, leaves, grass, bark, and other plant materials. Red and flying squirrels prefer to nest in hollow tree limbs and woodpecker cavities.

Fox and gray squirrels share similar food preferences. They typically feed on mast (fruits and nuts) in fall and early winter. They favor acorns, hickory nuts, and walnuts and often store them for use in the winter. In late winter and early spring they prefer tree buds and in the summer they eat fruits, berries, and succulent plant materials. Fungi, corn, and cultivated fruits are taken when available. When populations peak, these squirrels may chew bark from a variety of trees. They will also feed on insects and other animal matter such as bird eggs. Red squirrels prefer pine seeds and buds but will also eat a variety of other foods common to the gray and fox squirrels. Flying squirrels feed on items similar to other squirrels, but they are the most carnivorous of all tree squirrels, feeding on bird eggs and nestlings, insects, and other animal matter when available. All tree squirrels cache, or hide, food to be eaten during the winter. Red squirrels cache large amounts of food at a single location such as a hollow log. Gray and fox squirrels, however, bury nuts singly at numerous locations.

Description of Damage

Squirrels can become a nuisance when their feeding and nesting habits conflict with human interests. Damage frequently occurs when squirrels feed on cherry blossoms and ripe pears or chew the bark of fruit trees. In addition, squirrels may carry off mature nuts. In gardens, squirrels may eat planted seeds, flower bulbs, mature fruits 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. Tree squirrels can become a problem when they gnaw on wires, enter buildings, and build nests in attics. Squirrels may damage siding, insulation, or household contents when they take up residence in homes or other buildings.

Laws and Regulations

Gray and fox squirrels are considered small game species in New York State and can be taken during the established hunting season for these species. Red and flying squirrels are considered unprotected species and can be taken at any time with a valid hunting license. New York State Environmental Conservation Law (section 11-0523) specifies that whenever gray, fox, red, or flying squirrels are injuring property on occupied farms or lands or dwellings, they may be taken at any time in any manner by the owners or occupants thereof or by a person authorized in writing by such owner or occupant. By law, any animal taken outside the regular hunting season by the landowner must be killed or released on site. Nuisance wildlife control operators licensed by the New York State Department of Environmental Conservation are authorized to trap and transport animals off-site and will do so for a fee.

Preventing Damage

Population Reduction

Gray, fox, and red squirrel numbers can be reduced by shooting, but the results are often short-lived. Squirrels also can be trapped using snap-back rat traps, box traps, or cage traps. Cage traps should have a 6-x-6-inch opening and be 24 inches long. Effective baits include apple slices, walnuts removed from the shell, peanut butter, corn, or sunflower seeds. When using box or cage traps, tie the trap doors open for two to three days to allow squirrels to become accustomed to feeding there. Then set the traps and check them twice a day.

Repellents

Capsaicin (the active ingredient in hot peppers) has been found to have repellent properties. In a recent Cornell University study, use of capsaicin-treated sunflower seeds reduced consumption by squirrels by about 80 percent. Squirrels also spent considerably less time at feeders stocked with capsaicin-treated seeds, and birds and chipmunks spent more time at those feeders. Chipmunks, however, were not deterred from carrying away the capsaicin-treated seeds because their fur-lined cheek pouches seemed to prevent them from experiencing the full effects of the capsaicin. Although capsaicin-treated birdseed did significantly reduce the amount of sunflower seeds taken by squirrels, it did not completely prevent them from eating the seed. In addition, certain individual squirrels appeared to be more tolerant to the effects of capsaicin than others.

Several birdseed products treated with capsaicin are available to reduce consumption by squirrels. These products include Suet with Pepper Treat, Seed Saver, and Pepper Treat Wild Bird Seed and another product called Squirrel Saver. Get Away Squirrel and Raccoon

Repellent is registered for lawns and gardens to prevent squirrels from digging in landscaped areas. The level of capsaicin in this product appears to be sufficient to repel squirrels.

Miller Hot Sauce Animal Repellent is registered in New York State for use on maple sap collection equipment, including plastic tubing, lines, and fittings. This repellent can be used to prevent squirrel damage to maple sap collection equipment. Follow label instructions for applying this product to sap collection lines.

Fencing and Other Barriers

Squirrels can be excluded from buildings by securely fastening hardware cloth over attic vents, which are a common entry point into buildings. Also seal openings at joints of siding and overhanging eaves. In addition, seal openings where utility cables or pipes enter buildings. Install chimney caps on all chimneys and check for gaps in the flashing at the chimney base. Be sure not to trap squirrels inside. A squirrel excluder can be constructed by mounting an 18-inch section of 4-inch-diameter plastic pipe over the building opening used by squirrels. The pipe should point down at a 45-degree angle to allow squirrels to exit but prevent them from reentering. Alternatively, if squirrels are located inside an attic, traps may be set to ensure that any squirrels left inside are removed.

To prevent squirrels from climbing up trees to gain access to buildings, taking fruit or nuts, or stripping bark from a tree, fasten a 2-foot band of sheet metal around the trunk 6 to 8 feet above ground. Sheet metal can be fastened by wrapping wires around the trunk and attaching them together with springs. This method allows the sheet metal to spread as the tree grows. All trees that need protection, plus all trees within jumping distance (branches within 6 to 8 feet), should be protected with a sheet metal band. Tree limbs also should be trimmed to 6 to 8 feet from buildings to prevent squirrels from leaping onto buildings.

Squirrels can be prevented from raiding bird feeders by placing feeders on top of poles and mounting a baffle around the support structure at a height of 6 feet or greater. Another option is to suspend a feeder from a cable or rope running over pulleys between two buildings or between a building and a pole. Placing a baffle on top of the feeder will prevent persistent squirrels from accessing the feeder from the suspended line.

You can protect garden crops by building a fence of 1-inch-mesh galvanized wire. The fence should be at least 30 inches high and extend 6 inches below ground, with an additional 6 inches bent outward at a 90-degree angle to discourage burrowing. Set at least two electrified strands, one 2 to 6 inches above ground and the other at fence height, off the fence about 3 inches.

Newly planted bulbs can be protected with 1-inch-mesh poultry wire. Dig a trench slightly deeper than the desired depth of planting and fit the poultry wire in the bottom. Add dirt and plant the bulbs. Place another strip of poultry wire over the plantings so that the bulbs are completely encased, and finish covering with dirt.

References

- Barkalow, F. S. Jr., and M. Shorten. 1973. *The World of the Gray Squirrel*. Philadelphia: J. B. Lippincott.
- Fitzgerald, C. S., P. D. Curtis, M. E. Richmond, and J. A. Dunn. 1995. "Effectiveness of Capsaicin as a Repellent to Birdseed Consumption by Gray Squirrels." Pages 169–183 in *Repellents in Wildlife Management: Proceedings of a Symposium*. J. R. Mason, ed., National Wildlife Research Center, Fort Collins, Colo.
- Goff, G. R., D. J. Decker, J. W. Kelley, and R. A. Howard, Jr. 1982. "Gray and Fox Squirrels." *New York's Wildlife Resources Series 9*. Ithaca, N. Y.: Cornell University Department of Natural Resources, NYS College of Agriculture and Life Sciences.
- Jackson, J. 1994. "Tree Squirrels." In *Prevention and Control of Wildlife Damage*. S. Hygnstrom, R. Timm, and G. Larson, eds. Lincoln: University of Nebraska Cooperative Extension.
- Loconti, K. M., and D. J. Decker. 1987. "Red Squirrel." *New York's Wildlife Resources Series 31*. Ithaca, N. Y.: Cornell University Department of Natural Resources, NYS College of Agriculture and Life Sciences.
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READ THE LABEL BEFORE APPLYING ANY PESTICIDE.

Updated 2008

Source: [http://www.nysipm.cornell.edu/publications/beasts/default.asp?metatags_Action=Find\('PID','11'\)](http://www.nysipm.cornell.edu/publications/beasts/default.asp?metatags_Action=Find('PID','11'))

Red Squirrel source <http://www.nysipm.cornell.edu/publications/beasts/>

Small (less than 1 lb.), reddish brown above and white below. Often a black stripe separates the two colors. Diurnal (active during day). Frequent invader of attics, wall voids, and miscellaneous crawl spaces. Also can become trapped in chimneys.

Access Routes

Trees and branches within 10 feet of the roof; electrical utility lines; fire escapes; certain types of siding; brick chimneys; downspouts (occasionally).

Entry Sites

Usually high on the building; holes in fascia boards of eaves, dormer tie-ins, architectural returns, and similar sites along the roof line; vents (roof, soffit, gable, fan); uncovered chimneys; deteriorated roofs, eaves, and walls. Will also enter holes near the foundation and crawl spaces and wall voids via attached garages. Entry holes can be smaller and more difficult to find than those of the gray squirrel.



Image source:
[http://upload.wikimedia.org/wikipedia/commons/thumb/1/13/Red_squirrel_\(Sciurus_vulgaris\).jpg/775px-Red_squirrel_\(Sciurus_vulgaris\).jpg](http://upload.wikimedia.org/wikipedia/commons/thumb/1/13/Red_squirrel_(Sciurus_vulgaris).jpg/775px-Red_squirrel_(Sciurus_vulgaris).jpg)

Sounds

Very vocal; distinctive calls; diverse repertoire includes chatters and clucking sounds and pitch is higher than that of gray squirrel. Scampering; gnawing.

Gnaw Marks and Food Remains

Gnaw marks on wood, plastic, etc. Chewed-open nut shells. Food caches (cones, seeds, nuts).



Fecal Droppings:

Usually 1/4 to 3/4 inch long and elongated. Tend to be smaller in diameter, but often longer, than gray squirrel's. Generally scattered rather than accumulated in "toilets."



Hair

Except tail, approximately 1/2 inch long. Back and sides of animal: tipped with reddish-yellow. Belly: white. Tail: approximately 3/4 inch long; each hair partitioned into red, black, yellow (tip) segments.



Other Signs

Body rub marks at entry sites. Runways in attic insulation.

Gray Squirrel

source <http://www.nysipm.cornell.edu/publications/beasts/>

Slender, weighing 1 to 2 lb., with a long bushy tail. Typically grayish with a reddish cast, white belly, and white-tipped hairs on border of tail. Black and lighter-than-typical coats can occur. Diurnal (active during day). Frequent invader of attics, wall voids, and miscellaneous crawl spaces. Often becomes trapped in chimneys and enters human living spaces, especially basements, via chimneys.



Image from <http://statelibrary.dcr.state.nc.us/NC/SYMBOLS/images/squirrel.jpg>

Access Routes

Trees and branches within ten feet of the roof; electrical utility lines; fire escapes; certain types of siding; brick chimneys; downspouts (occasionally).

Entry Sites

Usually high on the building; holes in fascia boards of eaves, dormer tie-ins, architectural returns, and similar sites along the roof line; vents (roof, soffit, gable, fan); uncovered chimneys; deteriorated roofs, eaves, and walls.

Sounds

Chattering; short "barks." Scampering; gnawing.

Gnaw Marks and Food Remains

Gnaw marks on wood, plastic, etc. Chewed-open nut shells.



Fecal Droppings:

Usually 1/4 to 1/2 inch long, granular, and oval. Vantassel describes as "black piece of rice" or "enlarged brown BB pellet." Generally scattered rather than accumulated in "toilets."

Hair

Except tail, 1/2 to 1 inch long. Back and sides of animal: gray may be tipped with reddish-brown. Belly: white. Tail: 2 to 3 inches; each hair partitioned into reddish-brown, black, white (tip) segments.



Other Signs

Body rub marks at entry sites. Runways in attic insulation. Aluminum surfaces (e.g., gutters) may have claw marks.

Tracks

Front: 1 in. Hind: 2 1/4 in.



Flying Squirrel

source <http://www.nysipm.cornell.edu/publications/beasts/>

Small (less than 7 oz.) tree squirrel. Olive-brown above, white below. Distinctive gliding skin flap stretching from front leg to rear leg. Flattened tail. Nocturnal. Invader of attics, wall voids, and crawl spaces. Frequency varies regionally. Also can become trapped in chimneys.

Access Routes

Tall trees within gliding distance of roof.

Entry Sites

Usually high on the building; holes in fascia boards of the eaves, dormer tie-ins, architectural returns, and similar sites along the roof line; vents (roof, soffit, gable, fan); uncovered chimneys; deteriorated roofs, eaves, and walls. Holes are often smaller than those of the gray squirrel.

Sounds

High pitched twitters. "Landing" noises at night. Scampering; gnawing.

Gnaw Marks and Food Remains

Gnaw marks on wood, plastic, nutshells, etc. Caches some food (such as seeds and nuts) in nests and tree crotches.

Fecal Droppings:

Variable, but tend to be elongated and 1/4 to 1/2 inch long. Similar to red squirrel except smaller. Brownish stains often associated with feces and urine accumulations.



Hair

Except tail, 1/4 to 1/2 inch long. Back and sides of animal: black-tipped with light brown. Belly: white or black with white tip; may have reddish cast. Tail: 1/2 to 3/4 inch long. Back of tail: light brown. Bottom of tail: light reddish.

Other Signs

Body rub marks around entry holes. Runways in attic insulation.

Tracks: Landing marks.



Image from:
<http://extension.unh.edu/fhgec/graphics/NFSquir.jpg>

Sciurus niger

Eastern Fox Squirrel

Geographic Range

Fox squirrels are found throughout the eastern and central United States, south into northern Mexico, and north into Canada. They have been introduced into urban areas in western North America as well.

Biogeographic Regions:

nearctic (native).

Habitat

Fox squirrels, like other tree squirrels, use trees for escaping from predators. They are fast and agile in the trees.

They can readily escape predators on the ground and large birds of prey if they can seek refuge in the trees. Fox squirrels are found in a diverse array of deciduous and mixed forest. Areas with a good variety of tree species are preferred due to variability in mast production.

These animals are found in the following types of habitat:

temperate ; terrestrial .

Terrestrial Biomes:

forest .

Physican Description

Fox squirrels are a medium-sized tree squirrel with no sexual dimorphism. The dorsal pelage is buff to orange and the venter is rufous. Some varieties in the southeastern United States are black. These squirrels have 8 mammae. Tail is well furred. Ear tufts often develop in winter.

Adaptations for climbing include sharp recurved claws, well developed extensors of digits and flexors of forearms, and abdominal musculature.

Some key physical features:

endothermic ; bilateral symmetry .

Sexual dimorphism: sexes alike.

Females can mate with several males, but the males will compete with each other to determine who gets to mate first.

Mating systems:

polygynandrous (promiscuous) .

Reproduction

Fox squirrels can mate any time of year; this behavior peaks in December and June. Males follow females prior to estrus, smelling the perineal region. Males aggregate in the home range of a female when she begins estrus. Dominance hierarchies form among the males to determine mating privilege. Copulation lasts less than thirty seconds, and females can mate with several males. A copulatory plug forms after mating. Gestation lasts 44-45 days. Average litter size is 2-3, but litters range between 1 and 7. Young are born naked,



Image from

<http://sporkinthedrawer.typepad.com/photos/uncategorized/2007/11/16/foxsquirrel1a.jpg>

Female fox squirrels care for their young in the nest for 6 weeks. When the mother leaves her young in the nest she covers them with nesting material. Young fox squirrels disperse away from their mothers range in the fall of their first year. Male fox squirrels disperse farther and may die more as a result.

Lifespan/Longevity

Fox squirrels have been known to live to 18 years old in captivity. Under natural conditions the average lifespan is 8 to 18 years old, though most squirrels die before they reach adulthood.

Behavior

Primarily arboreal and diurnal. Generally, fox squirrels are not gregarious, although they come together during the breeding season when females are in estrus. Males have larger home ranges than females. Squirrels threaten one another by an upright stance with their tail over their back, followed by a quick flick of the tail. Scent-marking is another form of intra-specific communication used by fox squirrels. Vocalizations in the form of barks and chatters, distress screams, and high-pitched whines during mating are common. Fox squirrels are serially polygynous. Mating chases involve one female and a number of males, with the successful male guarding the female to prevent others from mating with her; males do not help in the raising of young.

Communication and Perception

Fox squirrels have excellent vision, even in dim light. They have well-developed senses of hearing and smell. Scent marking is used to communicate among fox squirrels. They use a variety of sounds to communicate, including barks, chatters, distress screams, and high-pitched whines during mating. Fox squirrels will threaten one another by standing upright with their tail over their back and flicking it. Fox squirrels also have several sets of vibrissae, thick hairs or whiskers that are used as touch receptors to sense the environment. These are found above and below their eyes, on their chin and nose, and on each forearm.

Food Habits

A wide variety of foods are taken, ranging from vegetative matter to gall insects, moths, beetles, bird, eggs, and dead fish. Acorn, hickory, walnut, mulberry, and hawthorne seeds are preferred. Food can often become limiting in the winter, so squirrels commonly cache seeds in a scattered fashion for the colder months. Nuts are opened by a levering technique of the lowering incisors, a skill at which squirrels become proficient quickly.

Predation

Fox squirrels are preyed on mainly by large hawks and owls. Young squirrels may also be taken by snakes. Fox squirrels take advantage of their agility and maneuverability in the trees to escape most predators. They emit alarm calls that alert other squirrels when they see a predator.

Ecosystem Roles

Because squirrels prey so heavily on the seeds of trees they play a significant role in shaping the composition of forests. They may eat (along with other seed-eating animals) almost all of the tree seeds that trees produce in some years. When squirrels bury seeds and forget them, these seeds are likely to sprout where they were placed. Squirrels, therefore, act to promote the growth of certain kinds of trees. Fox squirrels are also important prey items for small predators because of their abundance in the environment.

Economic Importance for Humans: Negative

Squirrels are often considered a nuisance species due to their raiding of bird feeders and gardens. They are also responsible for some damage to corn crops. They often use electrical lines as routes of travel, and this can cause power outages.

Economic Importance for Humans: Positive

Squirrels are be hunted as a food source and for their fur, although the fur is not very valuable. In addition, fox squirrels are important agents of seed dispersal and can aid in succession by burying forest nuts. May play some role in the dispersal of mycorrhizal fungi.

Conservation Status

Many subspecies of fox squirrels are endangered due to overhunting and destruction of mature forests.

Contributors

Bridget Fahey (author), University of Michigan.

References

Koprowski, J. L. *Sciurus niger*. Mammalian species No. 479: 1-9.

Nowak, R.M. Walker's Mammals of the World, 5th Edition. Johns Hopkins University Press.

Fox Squirrel source http://animaldiversity.ummz.umich.edu/site/accounts/information/Sciurus_niger.html