Gray Squirrel Biology & Management

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Fact Sheet 13 Forestry and Natural Resources **Revised May 2009**

The gray squirrel *(Sciurus carolinensis)* has been a part of South Carolina forests for thousands of years. Native Indians and early settlers used the squirrel for food and its fur. In turn, the squirrel raided cornfields and other farm crops during periods of extremely high squirrel populations when thousands of squirrels would leave their normal range and emigrate many miles in search of a new home. The mechanism controlling mass movements of squirrels is still not well understood.

History records that in 1934, two 50-man teams participated in a hunt to reduce the impact of a squirrel population eruption. The two top hunters shot 783 and 900 squirrels, respectively. The days of such hunts are gone forever, but so are the vast forests that could support such high populations, though squirrel populations still periodically erupt and many emigrate from overpopulated areas. Today, increases in road-killed squirrels during late summer and early fall may be a good signal of a peak.

South Carolina has both gray and fox squirrels, but the gray is the only species numerous enough to manage for hunting purposes. Gray squirrel management practices should also benefit fox squirrels.

Life History

Female squirrels, called sows, may produce 2 litters of young per year if food is plentiful and other factors are not too adverse. Litter size can vary from 1 to 6 young, but is usually between 2 and 4. The two major breeding periods are December through January and May through June, with some minor amount of breeding occurring through the year. Though some juveniles produced from the winter breeding season may produce a litter their first summers, usually only yearlings and adults breed.

Male squirrels, known as boars, carry their testicles inside their bodies during the non-breeding periods. This accounts for the notion that some hunters have about some young boars being clipped by other dominant squirrels to prevent over-population. When the breeding season approaches, the boar's testicles enlarge and become exposed. Several males usually locate a sow just prior to her entering breeding condition, when she emits a scent that attracts males. Males may chase a sow for several days before she is ready to be bred. The dominant male of the area will usually exert himself over the other males, and gradually the less dominant boars will leave in search of other prospects. Both the sow and her chosen mate will go through a brief courtship until she enters estrus.

Pregnancy lasts about 44 days. First litters are born in February of the winter period, and June of the summer breeding period. As stated previously, the number of young per litter depends on numerous factors, but the average litter is about 3.

The hairless babies weigh about ½ an ounce, roughly the weight of a 50-cent piece. At birth, the squirrel's eyes and ears are closed and no teeth have erupted through the gums. After 3 weeks, the ears of the young squirrel open, followed by the eyes at 5 weeks. From the fifth though the ninth or tenth week, the young squirrel grows about an inch a week. Weaning of the young usually begins in the seventh week. Tooth development, which began in the third week, has progressed and by the seventh week some buds and leaves near the nest can be eaten. However, the bulk of the diet is still milk.

During the eighth week, the young become more active outside the nest and begin to eat more and more solid foods. The first few trips into the outside world provide the young kittens opportunity to chew on various solid matter and learn what is edible. They also begin to become skilled at following mother through the treetops that will someday serve them as protection from predators.

Squirrels use both tree cavities and leaf nests. Young squirrels of both sexes practice building lodging facilities, with varying results in quality

of workmanship. Nests often become infested with a high number of fleas, mites, ticks and other insects. However, other insects, including several kinds of beetles, help rid the nests of these biting pests.

Females mated during the summer may return to the den tree cavity where they reared their winter litters, but they often seek new quarters in order to get away from the previous litter. While most litters are reared in tree cavities, some summer litters are reared in leaf nests. Leaf nests are safer during the summer period than during winter because the surrounding foliage protects the nest from view.

Summer-born litters become active outside their nests by September or October. Because the autumn season provides a longer break between breeding periods, the family group will likely stay together somewhat longer before the adult female leaves or drives her young away. Whereas May-bred sows may leave their February-born litters at 8 to 14 weeks after birth, the July-born young will probably stay with the sow into December. The average litter size is about 3 young in the summer and 2.5 young for winter litters.

Factors that Limit Squirrel Populations

Like some wildlife species, squirrels have a high mortality rate during their first year, but the potential life span is about 6 years in the wild. In captivity, squirrels can live up to 15 years.

With the continually changing habitat conditions and other factors that help regulate reproductive rates, squirrel populations are very cyclic. When a population eruption results in mass emigrations, nearly all the squirrels leave the area. They have been seen swimming lakes and rivers, and such emigrations may be experienced over several states, involving millions of animals, many of which die during the movement.

A population eruption is a rather unique kind of limiting factor because the end result probably helps improve the overall gene pool of the gray squirrel over a broad area. Also, because the remaining squirrels are greatly reduced in number, their living conditions are greatly improved until a new population build-up results. Populations building back from a mass movement will usually take about 5 years to peak again.

Natural predators of the gray squirrel include rat snakes; red-tailed hawks; red-shouldered, marsh and Cooper's hawks; great horned owls and barred owls; red and gray foxes; bobcats, weasels, raccoons, house cats and dogs. However, considering that population build-up to the point of migration is fairly common, these natural predators are not really limiting to overall population growth.

Scabies or mange, caused by the scabies mite, can be fatal to squirrels. If squirrels scratch themselves until their bodies are bloody and hairless, they become weakened and susceptible to predation, secondary infections and the effects of weather extremes.

The warble or bot fly ranks as the squirrel's most serious pest. This fly lays its eggs on tree bark and, when the eggs hatch, the larvae transfer to the first passing squirrel. The larva burrows under the skin around the shoulders and legs and becomes a large grub, which keeps a hole in the skin in order to breathe. Although this parasite does not bother the meat of the squirrel, hunters frequently leave squirrels with bot fly larvae (often called "wolves") lying where they shoot them. Early fall is the period when squirrels are bothered with these wolves. Ticks, fleas and lice are minor nuisances.

Weather factors may be the most limiting conditions imposed on squirrel populations aside from man-caused habitat destruction. Rainfall, or the lack of it at critical times, may severely reduce the production of needed food sources. Heavy rains during periods when litters are very young may result in the drowning of young squirrels. Cold weather during early spring may nip fragile buds that would have produced the fall mast crop.

Food Habits

Squirrel reproduction and survival fluctuate with the changing availability of heavy-seeded mast (fruit from trees or shrubs), particularly acorns. When heavy mast is not available, squirrels feed on other fruits and berries, floral parts, buds, bark, roots, mushrooms and some animal matter. About 1½ pounds of mast per week is required for one squirrel from September through March.

The order of preferences for hard-mast varieties is hickory nuts, beechnuts, white oak acorns and black oak acorns. This preference order varies from place to place because of differing habitat availability. When heavy-seeded mast crops fail, competition for food becomes intense. Well-established adults force younger members of the population out of the home range. Mortality of sub-adults increases and production may cease. Mast failure during a population peak is the prime cause of the emigrations described earlier.

Cover Requirements

Hollow den trees are essential to squirrels for winter shelter and rearing of young. Research has shown that survival of litters is usually about 2.5 times as high in den trees as in leaf nests. Adult females with young will not tolerate other squirrels in the same den tree. Considering that only about 50 percent of the hollow trees identified from the ground up as suitable den trees, plenty of hollow trees are needed to satisfy the squirrel population. Known den trees should be marked and protected from cutting. Adult squirrels usually frequent at least two den trees located in their home range. Home range size varies from about 1.5 to 8 acres for individual squirrels, with many ranges overlapping.

Leaf nests are only temporary shelters. As indicated above, they are inferior to den trees, but necessity often requires squirrels to use them as winter shelters and for rearing litters.

Gray squirrels seem to prefer timber stands with a moderately dense understory, because it provides more concealment of movement and many more escape routes to taller timber. Anyone who has observed squirrels knows how frequently they climb vines and sapling-size trees.

Water Requirements

Gray squirrels use all available water sources, including streams and pools, dew on plants and succulent plant materials. Enough moisture can usually be taken in from succulent plants to satisfy water requirements.

Habitat

Mast Management

The gray squirrel's food habits have been discussed above. Managing squirrels means providing several year-round food sources. Managing timber for pine pulp production (even-age pine management) is not always compatible with good squirrel management.

To ensure that ample food sources are maintained, timber stands should be composed of a mixture of hardwood or pine-hardwood species. Hardwood or mixed pine-hardwood sites should remain as such and not be converted to pine stands. A timber stand should be managed on at least a 60-to a 100-year rotation before trees are harvested. This will ensure that a stand provides many years of optimum mast-producing potential. Timber stand improvement practices throughout the forest stand rotation should be aimed at improving crown development of preferred mast producers.

Cattle should be excluded from woods intended for squirrel management, as their presence reduces plant reproduction in the understory and adds yet another competitor to the list of species that use many of the foods squirrels need for survival. Prescribed burning also reduces understory growth and is not a good tool for squirrel management.

Clearcutting of large acreages and harvest cuts that remove mast-producing trees, den trees, and stimulate the growth of dense ground-level brush are detrimental to squirrels. Such areas are lost for squirrels for at least 25 years. All harvest cuts should be held to a minimum size, not exceeding about 50 acres in a block. Areas of hardwood containing good mast producers and den trees should be spared for harvest, yet not left as small islands of timber surrounded by cleared land. Particular care should be taken to protect stream bottoms with fairly mature timber of mixed age and species composition. Such sites should only be selectively cut for over-mature or inferior mast producers not more than every 5 years.

Hunting Requirements

Hunting pressure should be considered in relation to the availability of food and squirrels. On small acreages, and especially in woodlots, it is possible to get a good idea of the abundance of both squirrels and mast. By cruising through these small wooded areas in September, one can study the various mast-producing species to determine how heavy the mast crop will be. Also, squirrels or their signs (nest, cuttings, etc.) should be apparent during these wood cruises. It is easy to find squirrels around hickories during September if mast is available.

Evidence of a high squirrel population and low mast production indicates that the squirrels should be heavily hunted. This will greatly reduce their numbers in a short period of time, before the meager food supply is exhausted. If the squirrels go relatively unhunted, competition for the already low food sources becomes intense and an emigration may result. Hunting early in the season is best to protect the population during short mast years.

When both squirrels and food are plentiful, the hunting pressure should be heavy. Squirrel reproduction during heavy mast years is usually very good, but mast production during the following year may be poor. If squirrels are not heavily cropped when they are plentiful, the result is usually detrimental to good squirrel management practices.

Squirrels in Urban Areas

In some cases, squirrels in urban areas may become so abundant and overpopulated that they begin to cause damage to trees, shrubs, ornamental plantings, gardens, and structures. Approaches to deal with squirrel problems can be found on the website Internet Center for Wildlife Damage Management (www.icwdm.org).