

SQUIRRELS IN BRITAIN

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Great Britain

THE HISTORY OF SQUIRRELS IN BRITAIN

Sciurus vulgaris leucourus Kerr, the British or light-tailed squirrel, is the only known native squirrel of Britain. It forms one of forty-two named subspecies of *S. vulgaris* Linnaeus, the red squirrels which range from Ireland in the west to Japan in the east, and from the limits of tree growth in the north to the shores of the Mediterranean. It is distinguished from other forms by being monomorphic; by the annual whitening of the hairs of the winter coat, ear tufts and tail; and by the small size of the adults (head and body 211-238 mm. tail vertebrae 159-190 mm., condylobasal length of skull rarely exceeding 48 mm.)

This race is believed to have developed since Britain became an island. During the eighteenth century the squirrel appears to have been absent from Ireland and to have reached the verge of extinction in Scotland. Re-introductions made between 1772 and 1876 were successful, and by the end of the nineteenth century red squirrels were abundant throughout Britain. An outbreak of disease then caused a sharp decline in numbers, from which the population has never recovered. At the same time, the introduced American gray squirrel had begun to spread in Britain, and gradually to replace the remnants of the red stock.

TABLE I

Gray Squirrels in District	REPLACEMENT OF RED SQUIRRELS BY GRAY SQUIRRELS, FOREST YEAR 1956			
	Forest with Red Squirrels	Forest without Red Squirrels	Total	% Forests with Red Squirrels
By 1935	3	70	73	5
By 1945	21	43	64	33
By 1955	58	19	77	75
None	66	28	94	70

The gray squirrels introduced into Britain appear to have been intermediate between, or a mixture of, *S. carolinensis carolinensis* and *S. carolinensis leucotis*. The earliest description of an animal resembling a gray squirrel in Britain appeared in 1830; but all major introductions took place between 1876 and 1929. The most important center was that at Woburn Abbey in Bedfordshire. At least thirty releases took place, and all but a few were successful in starting thriving colonies. Few places in England and Wales are now without gray squirrels, and they are also spreading in Ireland and Scotland.

Glis, glis, the Continental or Edible Dormouse, was also introduced into Britain at the beginning of this century. Large, gray in colour, and with a bushy tail, this animal might be confused with a young gray squirrel. It is, however, nocturnal. *Glis* hibernates in cold weather.

HABITS OF THE RED SQUIRREL

The densest population of red squirrels in England today is to be found at Thetford Chase, a 36,986-acre Forestry Commission forest predominantly planted with pine and larch. Even here, foresters estimate that the overall density is not higher than one per five acres.

Dreys built in the coniferous trees, and the litter of chewed cones on the forest floor, betray the squirrel's presence. Seeds from pines, larches, and spruce are the typical diet; but red squirrels also eat acorns, beechmast, and sweet chestnuts; they will take fungi, fruit, pollen-bearing catkins, and eggs, young birds, and insects. Fire-tanks scattered through the forest provide drinking water for squirrels during the dry spells; a well-used runway leading from the foot of a tree to the corner of a tank marks the route that the squirrels take across the open ground.

The season when such runways are in greatest use is the very time that bark is stripped from *Pinus sylvestris* by the squirrels, which attack the cambium layer to get at the sweet sap. At Thetford such damage is found between late April and late July. The top ten feet of the main stem of trees between 10 to 40 years' age are most frequently damaged. Weakened tops may then be blown out, and the growth of the tree is distorted. Damage to the bark leaves a permanent scar which does not heal, though it may be masked by later growth. A fault is left, which appears when planks are cut at the sawmill.

European larch, Norway spruce and lodgepole pine (*Larix decidua*, *Picea abies*, *Pinus contorta*) are sometimes damaged by red squirrels, but *Pinus sylvestris* is most often attacked. Hardwood trees are not usually affected. In the days of its abundance the red squirrel caused concern because of this damage, and bounties were offered to encourage its destruction. Today it is relatively scarce in Britain, and is not considered to be a pest. In 1956 only thirteen out of 270 forests containing red squirrels sent in reports of damage caused by these animals.

HABITS OF THE GRAY SQUIRREL

Little work has been done in Britain with free-living marked gray squirrels; their status as a pest of forest and farm has discouraged most attempts. Gray squirrels are being marked and released within an area of twelve square miles in southern England in an attempt to study movements and to follow the history of individual animals through successive seasons.

Some types of problem facing those who are concerned with squirrel control may be answered by this kind of research. The Pest Officer needs to have advice on the following questions:

If a crop of young trees, cereals, or fruit is to be protected against damage by squirrels during the few months of the year when serious attacks are made, at what season and over how large a surrounding area can control be most economically applied to ensure protection? If a farmer whose wheatfield adjoins squirrel-infested woodland destroys all dreys and kills squirrels during the winter months, will his crop be damaged the following summer? Is there one period of the year particularly devoted to travel by squirrels? If so, it would be wasteful to let this period intervene between control measures and the season when damage is anticipated.

Until experimental work began, we had little idea whether squirrels in a woodland or parish remained within the same area all their lives, came and went seasonally, or stayed for a short while only before being replaced by other transients. We had no idea how far an individual might travel, what routes it would be likely to follow, what times of year it would choose to move, or what factors influenced movements. The work is still in progress, and it is too early to draw conclusions; but some interesting facts have emerged.

Marked animals have been shown to travel three or four miles in a month; June is the month when most movements are recorded, and is also the month when cage-trapping is most successful. Within a sixteen-acre wood, cage-traps were set at six-weekly intervals for several years. Some squirrels mainly females which had reared young, were trapped regularly there. Others, usually males, were only taken during one or two trapping periods each year. Young born on the area during the spring were often not taken in traps after the following summer, or not for several years. Although subject to normal control methods everywhere outside the experimental area, marked squirrels survived for up to five years in spite of the bounty offered for their tails.

Individuals are marked by removal of toes, using a system which gives almost 2,000 variations. Black dye is also applied to the tails, males and females being marked differently.

The gray squirrel has shown itself to be hardy and adaptable. It will colonize many different types of habitat, but prefers mixed woodland with a predominance of oak.

Two types of leaf nest are built, the solid domed winter breeding drey and the open leafy summer drey. Winter dreys may be used for a number of years,

but summer dreys soon fall into disuse. Dens in hollow trees are used less regularly, and young are rarely found in them.

The most serious type of damage inflicted by gray squirrels is that caused by removal of bark and damage to cambium on young hardwood trees between April and late July. Sycamore* and beech† are most often attacked, but a variety of tree species, including conifers, may suffer. The growth of sycamore as a crop may be virtually impossible in an area where there are many gray squirrels.

TABLE II

DAMAGE BY GRAY SQUIRRELS IN FORESTRY COMMISSION AREAS, 1954-55

Year	Number Forests Surveyed	Forests with Gray Squirrels	Forests with Damage	Among Forests with Damage			
				Forests with Beech Grown	Forests with Damaged Grown	Forests with Sycamore Grown	Forests with Damaged Grown
1954	469	213	87	96	44	72	50
1955	538	217	68	96	41	72	37

A pilot survey of farms growing susceptible crops near woods where gray squirrels were present provided the following information:

TABLE III

DAMAGE BY GRAY SQUIRRELS TO FARM CROPS, 1956-57

Crop	No. of Farms with Crop	
	Grown	Damaged
Wheat	48	26
Oats	35	12
Barley	38	12
Walnuts	1	1
Cobnuts	10	8
Cherries	4	3
Apples	18	9
Pears	6	3
Plums	6	3
Strawberries	8	3
Peas	4	1
Potatoes	6	1
Beans	5	0
Roots	9	1

SQUIRREL CONTROL

From 1945 to 1955 inclusive, hunters were provided with free cartridges for use against gray squirrels. From 1953 until 1955 a bounty of one shilling was offered for the tail of every gray squirrel killed; hunters could choose between cash and cartridges. From 1956 until 1958 the reward was doubled, and then the bounty was withdrawn. Although the publicity associated with the bounty scheme undoubtedly sharpened awareness of the squirrel as a pest, and helped to advertise methods of hunting and trapping, it did not provide an incentive strong enough to raise the control exerted by man to a level which balanced the increase in numbers due to breeding within a year.

When leaves are off the trees, woods can be cleared of dreys. A party of three men, together with a trained dog, can clear about 50 acres in a day, shooting every squirrel disturbed. A set of aluminium alloy tubes, each 5 foot 6 inches long, giving a total extension of sixty feet, and with the last section shaped like a V, is used to dismantle the nests. Every squirrel that leaves is shot, and any young found are humanely destroyed. Dens thought to harbour squirrels are smoked out, and then plugged.

* *Acer pseudoplatanus*.

† *Fagus sylvatica*.

Spring traps, set in tunnels along likely routes, may catch squirrels traveling on the ground. Bait greatly improves the success of this method, but the choice of sites for the traps is also important.

Cage traps are most effective in late spring and early summer, when food supplies are running short. Acorns and whole maize are used as bait, and traps are prebaited for four or five days before setting. Using this method, a trapper can produce a score of squirrels from a wood apparently uninhabited by them. It is a more efficient method of control than shooting.

In England and Wales it is illegal to use poison against squirrels. There is evidence that they are susceptible to the effects of warfarin, the anti-coagulant widely used against rats.

The introduction of the gray squirrel into Britain has faced us with problems which are not felt in America. In Britain the squirrel causes appreciable damage, is not regarded as a prized game animal, and is not often eaten. It is, in fact, an unpopular animal.

DAMAGE CAUSED BY THE GRAY SQUIRREL IN BRITAIN

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INTRODUCTION

The American gray squirrel (*S. carolinensis* Gmelin) has for many years been recognized as a destructive animal in the broadleaved woodlands of Britain. Growing concern has been caused as the range of the species has increased, and at the same time the expanding acreage of young broadleaved crops at the vulnerable pole stage has afforded greater risk of serious damage.

Although primarily pest in woodland plantations, the gray squirrel also attacks cereal crops and orchard fruit in Britain. It is reputed to take eggs of game birds and poultry, although the evidence on this charge is rather conflicting.

In order to gather information on the distribution, type and severity of damage caused by gray squirrels to forest trees, a questionnaire has been circulated annually since 1954 to every forest area supervised by the Forestry Commission. Damage by squirrels to farm crops has not been surveyed on a wide scale; except in years when squirrels are very abundant such damage tends to be overshadowed by the damage caused by rabbits, woodpigeons, and other species. A pilot survey has been used to show the order of frequency in which farm crops are attacked by squirrels. Damage to eggs and young birds by *S. carolinensis* has not yet been critically surveyed; there is a little information in connection with the woodpigeon and the common partridge.

Results of the annual survey of damage to forest trees will be considered in this paper.

DISTRIBUTION OF DAMAGE

Gray squirrels were reported to be absent from more than 50% of Forestry Commission areas in each year. Where they were present, light damage was reported from 19 to 30% of the areas, and severe damage from 0.4 to 11% of them. The total number of forests in which some degree of damage by gray squirrels occurred was 87/469 in 1954, 68/538 in 1955 and 45/551 in 1956. In each of these years there was a bounty scheme in operation, whereby one shilling was paid for the tail of each squirrel killed.

Damage was most commonly reported from forests in southern Wales and southern England, and in west Scotland.

To justify classification as "severe," damage must be such that it affects the final value of a crop to an appreciable extent. Scrub, amenity trees, trees marked for thinning, or isolated trees of small importance may themselves be severely damaged without warranting the classification "severe" to describe damage on the area.