

## BIOLOGY, LEGAL STATUS, CONTROL MATERIALS, AND DIRECTIONS FOR USE

### Tree Squirrels

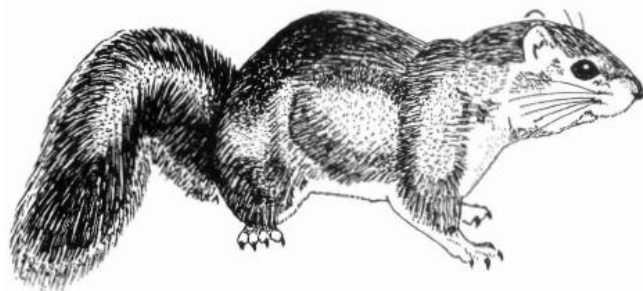
*Sciurus griseus*, Western Gray Squirrel

*Sciurus niger*, Eastern Fox Squirrel

*Tamiasciurus douglasii*, Douglas Squirrel or Chickaree

*Sciurus carolinensis*, Eastern Gray Squirrel

Family: Sciuridae



**Introduction:** There are four species of tree squirrels in California, excluding the small nocturnal flying squirrel, which is not considered a pest. Of the four, two species are native and two are introduced from the eastern part of the United States. In their natural habitats they eat a variety of foods including fungi, insects, bird eggs and young birds, pine nuts, and acorns, plus a wide range of other seeds. Squirrels sometimes cause damage around homes and gardens, where they feed on immature and mature almonds, English and black walnuts, oranges, avocados, apples, apricots, and a variety of other plants. During ground foraging they may feed on strawberries, tomatoes, corn, and other crops. They also have a habit, principally in the fall, of digging holes in garden soil or in turf, where they bury nuts, acorns, or other seeds. This ‘caching’ of food, which they may or may not ever retrieve, raises havoc in the garden and tears up a well-groomed lawn. They sometimes gnaw on telephone cables and may chew their way into wooden buildings or invade attics through gaps or broken vent screens. Tree squirrels carry certain diseases such as tularemia and ringworm that are transmissible to people. They are frequently infested with fleas, mites, and other ectoparasites.



**Identification:** Tree squirrels are active during the day and are frequently seen in trees, running on utility lines, and foraging on the ground. Tree squirrels are easily distinguished from ground squirrels and chipmunks by their long bushy tails and lack of fleck like spots or stripes, and the fact that they escape by climbing trees and other structures. All are chiefly arboreal, although the fox and western grey squirrels spend considerable time foraging on the ground. Tree squirrels do not hibernate and are active year-round. They are most active in early morning and late afternoon.

Of the four tree squirrels, the eastern fox squirrel, sometimes called the red fox squirrel, is by far the most

serious pest to homes and gardens in urban and suburban situations, and is becoming an agricultural pest in some areas. This squirrel can be differentiated from the others by its brownish red-orange fur. Tree squirrels naturally nest in tree cavities, enlarged woodpecker holes, or high in a tree in a spherical nest they construct of twigs, leaves, and shredded bark.

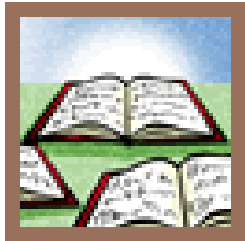
Eastern fox squirrels (*Sciurus niger*) were introduced from the eastern part of the United States and are well established in most major cities of California. In some cities eastern fox squirrels have moved outward into agricultural land, especially in the southern part of the state, where they have become a pest of commercial

crops. Eastern grey squirrels (*S. carolinensis*) were originally introduced from the eastern United States into Golden Gate Park in San Francisco, California. They are also established in areas of Calaveras and San Joaquin counties in California and may be expanding their range.



Native western grey squirrels (*Sciurus griseus*) are found throughout much of California, primarily in oak woodlands of the foothills and valleys and in pine/oak forests, where they feed on a variety of seeds, fungi, and other plant materials. They also have a

tendency to strip bark in order to access and feed on the cambium layer, causing injury to trees. Native Douglas squirrel (*Tamiasciurus douglasii*), sometimes called chickarees, is found in mostly conifer-forested regions of the north coastal area and along the Sierra Nevada Mountain region. Because of the habitat in which they thrive, these two native tree squirrels are not usually pests, except for the damage they can do in forest regeneration projects. They may, however, become garden or home pests in some of the more remote rural areas.



**Legal Status:** Tree squirrels, *Sciurus* spp. and *Tamiasciurus* spp. are classified as game mammals by the Fish and Game Code and can be taken only as provided by the hunting regulations. Except, (1) red fox squirrels, which are found to be injuring growing crops or other property, may be taken at any time or in any manner by the owner or tenant of the premises. They may also be taken by officers or employees of the Department of Food and Agriculture or by federal or county officers or employees when acting in their official capacities pursuant to the provisions of the

Food and Agricultural Code pertaining to pests, and (2) any owner or tenant of land or property that is being damaged or destroyed or is in danger of being damaged or destroyed by gray squirrels may apply to the Department of Fish and Game for a permit to kill such mammals. The Department, upon satisfactory evidence of such damage or destruction, actual or immediately threatened, shall issue a revocable permit for the taking and disposition of such mammals under regulations promulgated by the Fish and Game Commission. Mammals so taken shall not be sold, nor shipped from the premises on which they are taken, except under instructions from the Department. No poison of any type may be used to take any gray squirrel. The Department shall designate the type of trap to be used to insure the most humane method is used to trap gray squirrels. The Department may require trapped squirrels to be released in parks or other nonagricultural areas.



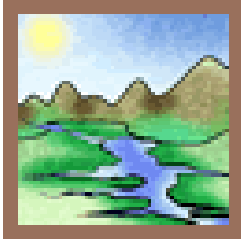
**Damage:** Green and ripe walnuts, almonds, oranges, avocados, apples, strawberries, tomatoes, and grain. Tree squirrels sometimes gnaw on lead covered telephone cables and they may gnaw into wooden buildings or invade attics through knotholes, etc. The Douglas squirrel's pine cone diet limits his potential for agricultural depredations. Squirrels may

carry rabies, toxoplasmosis, sylvatic plague, western encephalitis, encephalomyocarditis, murine typhus fever, tularemia, endemic relapsing fever, and ringworm, all of which are transmissible to man.



**Range:** *Sciurus griseus* is a native tree squirrel found from the Mexican border north through the coast ranges to the Oregon border, and from the Tehachapi mountains north along the western slope of the Sierra Nevada. Eastern fox, *Sciurus niger* is an introduced species established in city parks and adjacent areas in Fresno, San Diego, San Mateo, Santa Cruz, San Fernando, Sacramento, San Francisco, and the South Bay area and in agricultural land east of Ventura and Oxnard in Los Angeles County. *Tamiasciurus douglasii* is a native of the north coastal area and the Sierra Nevada.

*Sciurus carolinensis* (Eastern grey) has been introduced from the east into Golden Gate Park in San Francisco and is established in a small portion of Calaveras and San Joaquin Counties.

[Douglas Squirrel](#)[Eastern Fox Squirrel](#)[Eastern Gray Squirrel](#)[Western Gray Squirrel](#)

**Habitat:** Western gray squirrels live in oak woodland areas in the foothills and valleys and in pine-oak forests in the mountains. The native habitat of the Eastern fox squirrel is open hardwood forests in the northern states and pine forests of the south. Douglas squirrel inhabits coniferous forests of the upper pine belt and fir, spruce and hemlock forests. Eastern gray squirrels live in hardwood forests with nut trees and in river bottoms in its native region.



**Biology:** All tree squirrels are diurnal, except for the flying squirrel which is not an economic pest. Tree squirrels are easily distinguished from ground squirrels and chipmunks by their long bushy tails, the lack of dorsal spots or stripes, and the absence of internal cheek pouches. Although they are chiefly arboreal, some tree squirrels spend considerable time foraging on the ground, particularly the fox squirrel and the western gray squirrel.

Tree squirrels do not hibernate; they are active year-round except in inclement or very cold weather. They are most active in early morning and late afternoon.

**Food:** The western gray squirrel is primarily an acorn eater, supplementing this diet with conifer seeds, nuts, mushrooms, tender twigs and shoots, and grain if it is available. He spends much time in autumn burying fallen acorns singly in holes three to four inches deep; mushrooms and nuts are also stored for winter use. The eastern gray squirrel feeds on a variety of nuts, seeds, mushrooms, fruits, and the cambium layer beneath the bark of trees. Like his western cousin, they bury nuts and acorns in the ground, many of which are never recovered; some of these sprout into trees. Buried acorns are retrieved by the sense of smell.



The eastern fox squirrel's diet includes bird eggs and insects as well as various nuts, acorns, seeds, fungi, bulbs, and roots and cambium tissue. Sometimes, nuts are buried. The Douglas squirrel lives largely on conifer seeds, which are harvested in the cones in early autumn. Each squirrel usually cuts off a number of cones before coming to the ground and gathering them. Ingles (1965) states that most cones are stored in large caches in moist places or in stumps (some Jeffrey pine cones are shucked immediately at the base of the tree, while Orr (1971) maintains that the cones are shucked forming conspicuous piles of cone scales, the seeds then being stored in various places. Douglas squirrels tunnel through the snow to reach their caches in winter.

**Nesting and Territory:** The western gray squirrel usually enlarges an old woodpecker or flicker hole for its

brood den, or it may construct a nest of twigs and shredded bark far out on the branches of a large tree; the nest is usually 20 feet or more above the ground. The home range is 1/2 to 2 acres, and populations do not usually exceed two squirrels per acre. Female display territorial behavior when young are in the nest.

The eastern gray squirrel also nests in holes in trees, or constructs a nest of leaves in an outer tree branch. The nest is usually 25 feet or more from the ground. The home range is two to seven acres, and populations may range from two to 20 squirrels per acre.

The eastern fox squirrel nests in tree cavities or builds a twig and leaf nest in a crotch or branch, usually 30 feet or more from the ground. The home range is 10 to 40 acres. Populations range from 1/2 to 3 squirrels per acre.

The Douglas squirrel nests in a woodpecker hole or other small tree cavity, in a slope of rocks or in a nest of leaves, twigs and shredded bark in a tree branch, usually near the tree trunk. The home range is less than 200 yards across. Populations of two squirrels per three acres are probably average, but it may be as high as 10 per acre. The Douglas squirrel displays territorial behavior by protecting its food supply.



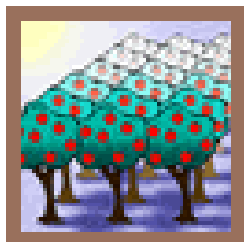
Breeding and Longevity: The western gray squirrel produces one litter of three to five young born between February and June. The gestation period is 44 days and the young remain in the nest at least six weeks before going out on their own. Western gray squirrels have lived 11 years in captivity. Its main enemies are the coyote, fox, owl, and large hawks, who usually catch the squirrel on the ground. It is fairly safe in trees, except when it extends its range into the higher

mountain zones where the marten lives. Deep snow limits the gray squirrel's range because he has difficulty in retrieving his buried single acorns under the snow.

The eastern gray squirrel bears two litters of three to five young annually, in late winter and in late summer. The gestation period is 44 days, and the young are weaned at two months. It has lived 15 years in captivity.

The young of the eastern fox squirrel are born between January and April and between July and September. Yearling females have one litter and older females have two litters per year. The gestation period is 44 days and the young are weaned at two to three months. The eastern fox squirrel may live ten years or more in captivity; six years is the longevity record in the wild.

The Douglas squirrel apparently has two litters per year, as young are born in June and October. The average litter size is five (range four to eight) and the gestation period is about 38 days. They may live ten years. Coyotes, foxes, bobcats, goshawks and horned owls are probably successful predators.



#### **Damage Prevention and Control Methods**

**Exclusion:** Prevent squirrels from climbing isolated trees and power poles by encircling them with a two-foot wide collar of metal six feet off the ground. Attach metal using encircling wires held together with springs to allow for tree growth. Trim trees appropriately to prevent squirrels from jumping onto roofs. Close

openings to buildings with heavy 1/2-inch wire mesh or make other suitable repairs. This method has limited effectiveness because squirrels are such good climbers and they can jump 10 feet or more from one tree to another.

#### **Habitat Modification:**

Trees that overhang roofs or are close to telephone lines should be cut back to slow the movement of squirrels about garden, home areas. However, squirrels can jump quite a distance.

#### **Frightening**

A number of devices are available commercially; however, none have proven to be effective. Tree squirrels quickly become accustomed to both visual and sound devices intended to frighten. Any effect is usually very temporary.

#### **Fumigants:**

None are registered.

#### **Repellents:**

Some chemical repellents are registered for repelling tree squirrels. Their effectiveness is questionable. Similarly repellents are available which may be added to birdseed that prevents the squirrels from feeding on the seeds, these to have shown little effectiveness.

#### **Toxic Bait**

None are registered.

**Trapping:** One means of controlling Eastern fox squirrels is through the use of a modified wood box type gopher trap. These traps are effective and more economical to use than live catch traps. Trapping tree squirrels requires a trapping license issued by the Department of Fish and Game.

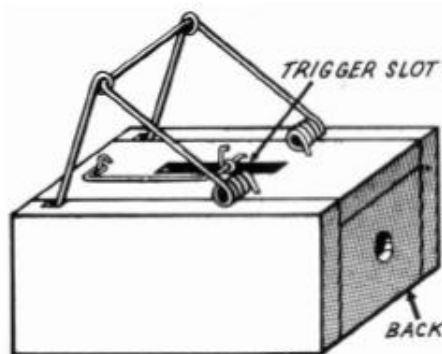


FIGURE 1

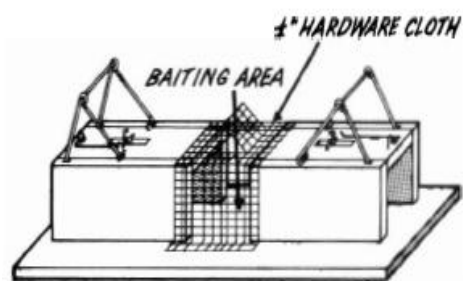


FIGURE 2

**Trap construction:** Remove the back of a gopher trap (Figure 1). Lengthen the trigger slot with a rat tail file or pocket knife to permit unhindered trigger swing. This makes it possible for the animal to pass beneath

the swinging loop of the unset trap.

A single trap is constructed by the use of hardware cloth to extend and close the open end. This provides additional baiting area and allows the bait to be observed from both ends but prevents the animal from entering except from the front. The trap is secured to a board for placement in a tree.

Dual assembly utilized two modified traps (Figure 2) placed back to back and secured to a board (1" x 4" x 18"). A small strip of hardware cloth connects the two and forms a baiting area. Baiting is accomplished by placing a handful of walnut meats through a small door cut in the wire or through the open end of the trap.

Commercially available traps such as the tunnel trap are available and could be used in trees to catch fox squirrels.

**Placement of traps:** Attach the trap assembly with nails driven through the base board into a horizontal limb in a tree where damage is occurring (Figure 3).



**Baiting and setting traps:** A handful of nut meats placed well behind the trigger mechanism will attract the squirrels. A few may be scattered at the trap entrance also. For best results, baited traps are left unset for several days until the squirrels become accustomed to pushing back the swinging trigger loop to reach the bait. After the squirrels have become familiar with the traps, rebait and set all the triggers. A considerable number of fox squirrels can be taken with relatively few traps if they are kept in continuous operation while damage is occurring. Trapping should be commenced as soon as the first damage is observed.

### Other

Shooting where legal can be effective. Shotgun with No.6 shot or .22 caliber rifle is suitable.

## REFERENCES AND ADDITIONAL READING

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