

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

**Golden-mantled Ground Squirrels**

*Spermophilus lateralis*

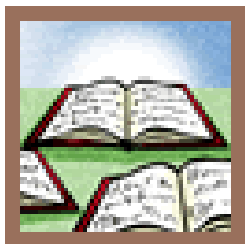
Family: Sciuridae



**Introduction:** Often mistaken for a chipmunk the golden mantle ground squirrel is distinctive, with two black stripes running down the middle of its back. Unlike the chipmunk, it lacks stripes on its face. It is found throughout forest areas in North America, and shares territory with the Chipmunk.



**Identification:** While similar to a chipmunk in appearance. The biggest physical difference between the two is size; the golden mantled ground squirrel is much larger. A chipmunk is about 8 inches long and weighs around 2 ounces, while a golden-mantled ground squirrel is 9 to 12 inches long and weighs between 4 and 14 ounces. The squirrel's name comes from the golden brown or russet mantle over its head and shoulders. Whitish fur rings circle the eyes.



**Legal Status:** Golden-mantled ground squirrels are classified as nongame mammals by the California Fish and Game Code. Nongame mammals 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 officials or employees when acting in their official capacities pursuant to the

provisions of the Food and Agricultural Code pertaining to pests.



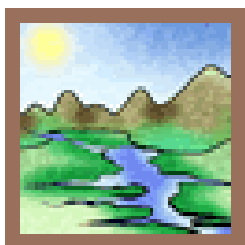
**Damage:** They may cause damage to reforestation attempts that utilize seeds, but because they inhabit high-altitude areas, are of little agricultural importance. If allowed to become too numerous, golden-mantled ground squirrels may become a nuisance to campground visitors by invading food stores and causing damage to facilities by gnawing or burrowing.

Golden-mantled ground squirrels are highly susceptible to sylvatic plague and present potentially major public health problems in campgrounds and other areas within national forests. Because they can become very numerous, very tame, and often in close contact with park or campground visitors, transmission of plague to humans is quite possible whenever an epizootic is occurring. They may also carry other diseases such as Rocky Mountain spotted fever, various tick fevers and others.



**Range:** The golden-mantled ground squirrel is found at higher elevations in the mountains of California, except for the Coast Range south of San Francisco. It inhabits the Sierra Nevada, Trinity and San Bernardino Mountains, including a wide area in the northern part of the state.

[Golden-mantled Ground Squirrel](#)



**Habitat:** *S. lateralis* inhabits mountains and higher northeastern plateaus. Moderately dense to open coniferous forest or forest mixed with brush. They show a decided preference for rocky slopes or forest floor littered with logs; but, at the same time, without heavy undergrowth. Open ground is preferred; keeping out of large grassy meadows except along the margins where they adjoin the woods. In the higher mountains they are often found inhabiting rock slides.



**Biology:** A small ground squirrel which appears like a large chipmunk, but having no stripes on the side of the face. The head and shoulders are golden or coppery, contrasting with the body; one white stripe bordered with two black stripes runs down each side of the body (chipmunks have two white stripes on each side). The hairy tail is fairly short and not bushy.

Rarely do golden-mantled ground squirrels assume the upright picket-pin pose so characteristic of some other of the species. They most often maintain crouching attitudes when at rest. When running, the gait is clumsy, as compared with the chipmunks. The tail is normally longer than other

small size ground squirrels, and is more conspicuously displayed, often up over the back.

Golden-mantled ground squirrels are diurnal. They seek sun and warmth, becoming active around sunrise and disappearing quickly after sunset. They avoid the heat of the day and, in midsummer they may be inactive between 9:00 a.m. and 4:00 p.m. as a result. Golden-mantled squirrels undergo a winter hibernation beginning in late summer or fall. Adults generally enter hibernation one or two months before the juveniles. Some adults may undergo summer estivation in years of plentiful food. Some squirrels arouse periodically from hibernation and appear above ground in winter. Their tracks are frequently seen on top of the snow. They store up large quantities of fat underneath the skin and elsewhere in their bodies and are thus able to survive long periods of deep torpor without eating. It is believed that the burrow food caches are utilized only occasionally during the winter, mainly being used in early spring when hibernation is over. Emergence is in spring (March-May), and appears to be in response to an endogenous (internal) rhythm rather than in response to weather conditions alone.

Known predators of the golden-mantled ground squirrel include the coyote, fox, weasel, bobcat, red-tailed hawk, snake, and sometimes the striped skunk.

Golden-mantled ground squirrel burrows are located close to or beneath rocks, bushes, trees, logs, and stumps, although they may be out in the open as well. Burrow openings are inconspicuous as compared to those of other ground squirrels. Little or no excavated earth is left by the entrances. The openings are two to three inches in diameter, and often there are two or more openings to a burrow. The entire tunnel system may be 17 feet long, running, for the most part, about 8 inches deep. The burrow system may contain side tunnels and a nest chamber lined with shredded grass, bark, leaves, stems, conifer needles, and, perhaps, paper or cloth.

Breeding: Males are fertile on emergence from hibernation. Females come into estrous shortly afterwards. Mating occurs over a four-week period, mainly during the latter part of April and early May. However, there is a great deal of altitudinal and geographic variation in the timing of the breeding season. One litter is produced per year, with an average litter size of 5 (ranging from 2 to 8). The gestation period is 27-28 days. The young are born from mid-May to early June, with the juveniles appearing in the above-ground population about 5 to 6 weeks later. The young begin to eat solid food at 40 days of age, and are fully weaned 6 to 8 weeks after birth. Sexual maturity is attained the following spring.

Reportedly, leaves and hypogeous (i.e. subterranean) fungi constitute 87% of their diet. In some areas leaves of woolly mule ears (*Wyethia mollis*) were eaten more than any other plant. Later in the year, the golden-mantled ground squirrels feed on *Wyethia* flowers. They also favor bulbs of wild onion (*Allium* spp.). Fungi are of major importance in their diet, and the forest floor is often covered with holes where they have dug for these small modules. In September and October, the squirrels switch to feeding on the ripened conifer seed. In addition, golden-mantled ground squirrels will consume many other types of green vegetation, shrub and herb seeds, berries, insects, larvae, young birds and eggs, and when available, meat. Although they will readily feed on dead or trapped chipmunks, they apparently are seldom able to capture them under normal conditions. Golden-mantled ground squirrels gather food in well-developed internal (membranous) cheek pouches and store it in caches. Food may be temporarily stored in shallow pits and covered up with dirt, or it may be cached in more permanent hoards in the burrow system.



## Damage Prevention and Control Methods

**Trapping:** Trapping is a practical means of control for ground squirrels where other methods are unsatisfactory or undesirable. Trapping golden-mantled ground squirrels requires a trapping license issued by the Department of Fish and Game (see California ground squirrel section for details).

### Toxic Bait

CDFA labels    0.005% Chlorophacinone grain bait

0.005% Diphacinone grain bait

**Grains:** Crimped oat groats treated with 0.005% anticoagulant (diphacinone, chlorophacinone) is applied in bait stations.

### Anticoagulant Baits



NOTE: Single feeding anticoagulant bait will not control ground squirrels. Anticoagulant bait must be eaten over a period of several days to give adequate control.

**Bait stations:** Place 1 to 5 pounds of bait in a covered bait box in areas frequented by golden mantled ground squirrels (near runway, burrows, etc.). Inspect bait stations daily and add bait as needed; increase the amount when all bait in containers is eaten overnight. Continue until all feeding ceases which may be one to four weeks. Initial acceptance may not occur until squirrels become accustomed to the bait box, which may be several days. Replace moldy or old bait with fresh bait. Baits should be picked up and disposed of upon completion of rodent control program. Bait stations should have entrance holes large enough to admit squirrels but not larger animals. Secure bait stations so that they cannot be turned over.

### **Exclusion**

Ground squirrels can be excluded from buildings using the same techniques as for other commensal rodents such as mice or rats. However, exclusion using fences is rarely practicable because of the animals climbing and digging ability. Marsh 1994 states that ground squirrels can readily dig beneath fences buried several feet deep in the soil. The use of sheet metal to 'cap' off the top of a fence may help prevent them from climbing over but this method of control is not recommended.

### **Habitat Modification**

Ground squirrels can be limited by frequent tillage; deep discing or plowing should be conducted as close to field borders and fences as ground squirrels like to live at the edge of fields and feed on crops.

Flood irrigation in orchards, alfalfa, and pasture land does discourage ground squirrels but will not eradicate them completely.

Good housekeeping by eliminating debris and removing abandoned irrigation pipes, farm equipment, and piles of rocks from field margins will assist as squirrels like to burrow beneath items.

### **Frightening**

Not a recommended method.

### **Fumigants**

Fumigants can be an effective lethal control for golden-mantled ground squirrels but finding their burrows is difficult and the practice is not recommended.

### **Repellents**

Chemical taste or odor repellents will not prevent damage, or cause squirrels to leave or avoid an area. Seed treatment repellents have offered limited protection to newly planted crops but no repellent is currently registered for this use.

## Toxic Bait

Rodenticide baits are effective and economical, and most often used to control ground squirrels. Ground squirrel baits commonly used in agricultural settings may be labeled for golden-mantled

## Trapping

Live trapping is not recommended because of the problem of disposing of the live ground squirrel. Releasing or relocating trapped animals away from the trap site is illegal in California without a permit from the Fish and Game Department. Doing so risks spreading disease, and may create a pest problem wherever the squirrel is released.

Kill trapping is labor intensive but an effective method for controlling low to moderate squirrel populations over small areas where poisons may not be appropriate. Several types of kill trap are available for control of ground squirrels. Trapping can be conducted anytime squirrels are not hibernating. The most biologically sound time is before young are born from a control point of view.

Most traps work best if placed on the ground a few feet in front of a burrow entrance. One trap for every 4 to 5 burrow entrances is sufficient, and will reduce populations over several weeks. To increase bait trap effectiveness do not set them for several days so that the squirrels become accustomed to them. Bait them while doing this. Once squirrels are readily taking bait from the unset traps, set them. Baits that be used include walnuts, almonds, oats, barley, melon rinds and orange slices.

Certain box type gopher traps can be used as squirrel kill traps. They can be improved by modifications; fasten the trap to a baseboard after removing the back, add a wire bait compartment, alternatively, anchor to modified traps back to back on the same baseboard. If a baseboard is not used then anchor the trap with a wire attached to a stake to prevent the trap and its catch from being carried away by a dog or other predator.

All metal tunnel or tube traps can also be used for ground squirrels. These can be set directly in the squirrels trail and can be baited with grain, oats, or barley. These traps offer protection to other non target animals that cannot access them, and are strong enough to be used in horse pastures or around domestic animals.

The Conibear 110 trap is an effective ground squirrel kill trap (available also under different product names). The trap has a catch opening approximately 4 inches by 4 inches (10cm by 10cm) with a single spring. A more powerful version has two springs. This type of trap can be used baited or without bait, and can be placed over a burrow entrance, without bait. It is best to set the trap over the burrow opening.

All ground squirrel traps have strong springs and are capable of killing animals of an equal size or injuring fingers (children). Do not place traps where they may pose a hazard to children, nontarget wildlife, pets or poultry.

Trapping ground squirrels requires a trapping license issued by the Department of Fish and Game (see ground squirrel section for details).

## Other

Shooting: If local laws allow then shooting using a .22 rifle can provide some control, but is not effective

where ground squirrels are present in large numbers. It is time consuming, squirrels become rapidly 'gun-shy', and upon the first shot, the remaining squirrels will be very hesitant to emerge from their burrows.

Biological Control: Many predators, including hawks, eagles, rattlesnakes, and coyotes, eat ground squirrels. In most circumstances predators alone will not be sufficient to keep ground squirrel populations below the level at which they become pests. Predators may sometimes be useful in keeping ground squirrels away from marginal habitats. Dogs may also keep them from entering small areas.

## REFERENCES AND ADDITIONAL READING

Marsh, Rex E., Salmon, Terrell P., and Howard, Walter E., 1981. Integrated Management of Rodents and other Wildlife in Campgrounds. U.S. Department of Agriculture, Forest Service, Report No. 81-39.

Smith, Charles R., 1992. Rodent Disease Implications Associated with Campground and Public Use Areas in California. Proc. 15th Vertebrate Pest Conf. (J.E. Borrecco & R. E. Marsh, Eds.) Published at Univ. of Calif, Davis. Pp.258-260.

