POCKET GOPHERS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Pocket gophers, often called gophers, *Thomomys* species (Fig. 1), are burrowing rodents that get their name from the fur-lined, external cheek pouches, or pockets, they use for carrying food and nesting materials. Pocket gophers are well equipped for a digging, tunneling lifestyle with their powerfully built forequarters; large-clawed front paws; fine, short fur that doesn't cake in wet soils; small eyes and ears; and highly sensitive facial whiskers that assist with moving about in the dark. A gopher's lips also are unusually adapted for their lifestyle; they can close them behind their four large incisor teeth to keep dirt out of their mouths when using their teeth for digging.

IDENTIFICATION

Five species of pocket gophers are found in California, with Botta's pocket gopher, *T. bottae*, being most widespread. Depending on the species, they are 6 to 10 inches long. For the most part, gophers remain underground in their burrow system, although you'll sometimes see them feeding at the edge of an open burrow, pushing dirt out of a burrow, or moving to a new area.

Mounds of fresh soil are the best sign of a gopher's presence. Gophers form mounds as they dig tunnels and push the loose dirt to the surface. Typically mounds are crescent or horseshoe shaped when viewed from above (Fig. 2). The hole, which is off to one side of the mound, usually is plugged. Mole mounds (Fig. 3) are sometimes mistaken for gopher mounds. Mole mounds, however, are more circular and have a plug in the middle that might not be distinct; in profile they are volcano-shaped. Unlike gophers, moles commonly burrow just beneath the surface, leaving a raised ridge to mark their path.

One gopher can create several mounds in a day. In nonirrigated areas, mound building is most pronounced during spring or fall when the soil is moist and easy to dig. In irrigated areas such as lawns, flower beds, and gardens, digging conditions usually are optimal year round, and mounds can appear at any time. In snowy regions, gophers create burrows in the snow, resulting in long, earthen cores on the surface when the snow melts.

BIOLOGY AND BEHAVIOR

Pocket gophers live in a burrow system that can cover an area that is 200 to 2,000 square feet. The burrows are about 2 1/2 to 3 1/2 inches in diameter. Feeding burrows usually are 6 to 12 inches below ground, and the nest and food storage chamber can be as deep as 6 feet. Gophers seal the openings to the burrow system with earthen plugs. Short, sloping lateral tunnels connect the main burrow system to the surface; gophers create these while pushing dirt to the surface to construct the main tunnel.

Gophers don't hibernate and are active year-round, although you might not see any fresh mounding. They also can be active at all hours of the day.

Gophers usually live alone within their burrow system, except when females are caring for their young or during breeding season. Gopher densities can be as high as 60 or more per acre in irrigated alfalfa fields or in vineyards. Gophers reach sexual maturity about 1 year of age and can live up to 3 years. In nonirrigated areas, breeding usually occurs in late winter and early spring, resulting in 1 litter per year; in irrigated sites, gophers can produce up to 3 litters per year. Litters usually average 5 to 6 young.

Figure 1. Adult pocket gopher, *Thomomys* species.

Figure 2. Top view of a pocket gopher mound.

Figure 3. Top view of a mole mound.

Pocket gophers are herbivorous and feed on a wide variety of vegetation but generally prefer herbaceous plants, shrubs, and trees. Gophers use their sense of smell to locate food. Most commonly they feed on roots and fleshy portions of plants they encounter while digging. However, they sometimes feed aboveground, venturing only a body length or so from their tunnel opening.

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Burrow openings used in this manner are called "feed holes." You can identify them by the absence of a dirt mound and by a circular band of clipped vegetation around the hole. Gophers also will pull entire plants into their tunnel from below. In snow-covered regions, gophers can feed on bark several feet up a tree by burrowing through the snow.

DAMAGE

Pocket gophers often invade yards and gardens, feeding on many garden crops, ornamental plants, vines, shrubs, and trees. A single gopher moving down a garden row can inflict considerable damage in a very short time. Gophers also gnaw and damage plastic water lines and lawn sprinkler systems. Their tunnels can divert and carry off irrigation water, which leads to soil erosion. Mounds on lawns interfere with mowing equipment and ruin the aesthetics of well-kept turfgrass.

LEGAL STATUS

The California Fish and Game Code classifies pocket gophers as nongame mammals. This means if you are the owner or tenant of the premises and you find pocket gophers that are injuring growing crops or other property, including garden and landscape plants, you can control them at any time and in any legal manner.

MANAGEMENT

To successfully control gophers, the sooner you detect their presence and take control measures the better. Most people control gophers in lawns, gardens, or small orchards by trapping and/or by using poison baits.

Probing for Burrows

Successful trapping or baiting depends on accurately locating the gopher's main burrow. To locate the burrow, you need to use a gopher probe (Fig. 4). Probes are commercially available, or you can construct one from a pipe and metal rod. Probes made from dowels or sticks work in soft soil but are difficult to use in hard or dry soils. An enlarged tip that is wider than the shaft of the probe is an important design feature that increases the ease of locating burrows.

To find burrows, first locate areas of recent gopher activity based on fresh mounds of dark, moist soil. Fresh mounds that are visible aboveground are the plugged openings of lateral tunnels. You can find the main burrow by probing about 8 to 12 inches from the plug side of the mound; it usually is located 6 to 12 inches deep. When the probe penetrates the gopher's burrow, there will be a sudden, noticeable drop of about 2 inches. You might have to probe repeatedly to locate the gopher's main burrow, but your skill will improve with experience. Because the gopher might not revisit lateral tunnels, trapping and baiting them is not as successful as in the main burrow.

Trapping

Trapping is a safe and effective method for controlling pocket gophers. Several types and brands of gopher traps are available (Fig. 5). The most common type is a two-pronged, pincher trap such as the Macabee, Cinch, or Gophinator, which the gopher triggers when it pushes against a flat, vertical pan. Another popular type is the choker-style box trap.

To set traps[1], locate the main tunnel with a probe, as described above. Use a shovel or garden trowel to open the tunnel wide enough to set traps in pairs facing opposite directions (Figs. 6 and 7). Placing traps with their openings facing in opposite directions means you will be able to intercept a gopher coming from either end of the burrow. The box trap is easier to use if you've never set gopher traps before, but setting it requires more surface excavation than if you are using the pincer-type traps, an important consideration in lawns and some gardens. However, box traps can be especially useful when the diameter of the gopher's main tunnel is smaller than 3 inches, because in order to use the pincer-type traps, you will need to enlarge small tunnels to accommodate them. This can add time to the trapping process.

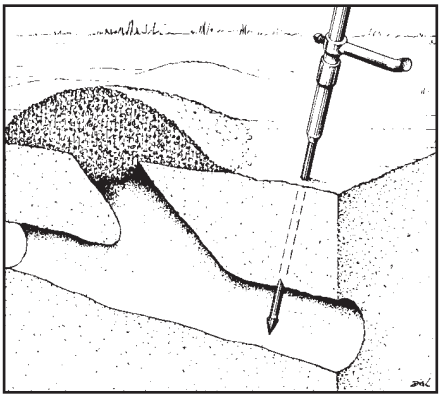

Figure 4. A gopher probe.

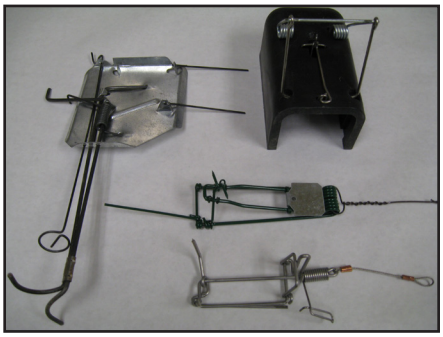

Figure 5. Types and brands of gopher traps include (clockwise from upper right) Victor Black Box, Macabee, Gophinator, and Cinch.

It isn't necessary to bait a gopher trap, although some claim baiting might give better results. You can use lettuce, carrots, apples, alfalfa greens, or peanut butter as bait. Place the bait at the back of a box trap behind the wire trigger or behind the flat pan of a pincer-type trap. Wire your traps to stakes so you can easily retrieve them from the burrow (Figs. 6 and 7).

After setting the traps, you can exclude light from the burrow by covering the opening with dirt clods, sod, canvas or landscape cloth, cardboard, or plywood. You can sift fine soil around the edges of these covers to ensure a light-tight seal. Alternatively, you can leave the trap-sets uncovered, thereby encouraging gophers to visit these trap

[1] See the online version of this Pest Note at www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html to view a video on how to set a Macabee trap.

sites as they seek out these openings to plug; gophers do not like open systems.

The influence on capture success of covering versus uncovering trap-sets is unclear, although current data suggests there might be little difference. Leaving trap-sets uncovered will allow you to set traps more quickly and check them more easily. However, you always should cover sets when using box traps, since gophers likely will plug tunnels before hitting the trigger wire of these traps if you leave them uncovered.

Check traps often and reset when necessary. If you haven't captured a gopher within 2 days, reset the traps in a different location.

Baiting with Toxic Baits

The key to an effective toxic baiting program is bait placement. Always place pocket gopher bait in the main underground tunnel, not the lateral tunnels. After locating the main gopher tunnel with a probe, enlarge the opening by rotating the probe or inserting a larger rod or stick. Following label directions, place the bait carefully in the opening using a spoon or other suitable implement that you use only for that purpose, taking care not to spill any onto the ground. A funnel is useful for preventing spillage.

Often, a back-filled (plugged) tunnel—one a gopher has filled with loose dirt—will feel similar to an active tunnel. Experience is required to tell the difference. New probe users might benefit from digging down to confirm that the tunnel is active or plugged. If it is an active tunnel, you can apply bait to both of the tunnel's sides before closing it up. If it is plugged, don't treat. Once you are comfortable with your ability to accurately determine active tunnels, you can follow the standard baiting protocols described below.

Strychnine-treated grain is the most common type of bait used for pocket gopher control. This bait generally contains 0.5% strychnine and is lethal with a single feeding. Baits containing 2.0% zinc phosphide are also available. As with strychnine, these baits are lethal after a single feeding.

Multiple feeding anticoagulants are available as well. When using anticoagulant baits, you'll need to set out a large amount of bait—about 10 times the amount needed when using strychnine baits—so enough will be available for multiple feedings. Although generally less effective than strychnine baits, anticoagulant baits are less toxic. As such, they are preferred in areas where children and pets might be present. When using either type of bait, be sure to follow all label directions and precautions.

After placing the bait in the main tunnel, close the probe hole with sod, rocks, or some other material that excludes light while preventing dirt from falling on the bait. Several bait placements within a burrow system will increase success. Tamp down or clear existing mounds, so you can distinguish new activity. If new mounds appear more than 2 days after strychnine or zinc phosphide baiting or 7 to 10 days after using anticoagulant baits, you'll need to rebait or try trapping.

If gophers have infested a large area, use a hand-held bait applicator to speed treatment. Bait applicators are a combination probe and bait reservoir. Once you have located a tunnel using the probe, a trigger releases a measured amount of bait into the tunnel. Generally, strychnine bait is used with such an applicator, because it dispenses only a small quantity of bait at a time.

Fumigation

Fumigation with smoke or gas cartridges usually isn't effective, because gophers quickly seal off their burrow when they detect smoke or gas. However, fumigation with aluminum phosphide is effective at controlling gopher populations, although it is a restricted-use material. Applicators must be certified to use this material, which can limit homeowner use. Fortunately, many professional pest control operators have access to aluminum phosphide, so if trapping and baiting aren't effective, consider hiring a professional.

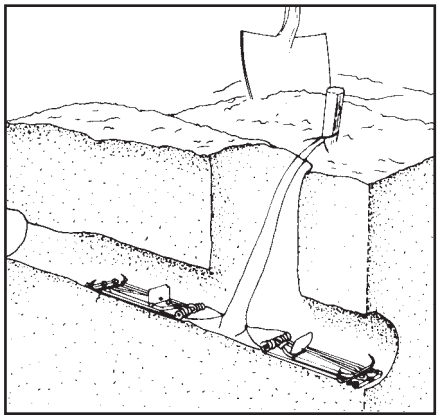

Figure 6. Macabee traps in position.

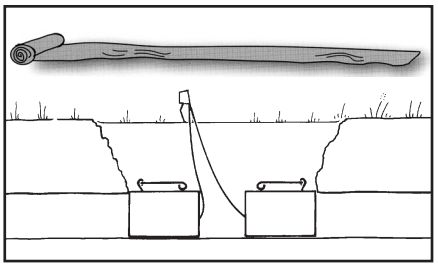

Figure 7. When putting box traps in place, cut the face of the hole smoothly, so you can push the traps tightly against the tunnels. You can cover the hole with landscape fabric, corrugated cardboard, or other material to exclude light.

Exclusion

Underground fencing might be justified for valuable ornamental shrubs or landscape trees. To protect existing plantings, bury hardware cloth or $^{3}/_{4}$-inch mesh poultry wire at least 2 feet deep with an additional 6 inches of mesh or wire bent at a 90-degree angle away from the planting. This will help keep gophers from digging around the fencing boundary. Also extend the fencing at least 1 foot aboveground to deter gophers moving overland. This method is not perfect, however, because persistent gophers can burrow below the wire; also, the wire can restrict and damage root growth of trees.

You can protect small areas such as flower beds by complete underground screening of the bed's sides and bottoms. When constructing raised vegetable or flower beds, underlay the

soil with wire to exclude gophers. To protect individual plants, install wire baskets, which you can make at home or buy commercially, at the same time you are putting the plants into the ground. If you use wire, use one that is light gauge and only for shrubs and trees that will need protection while young. Leave enough room to allow for the roots to grow. Galvanized wire provides the longest-lasting protection.

Six to 8 inches of coarse gravel 1 inch or more in diameter around underground sprinkler lines or utility cables also can deter gophers.

Natural Controls

Because no population will increase indefinitely, one alternative to a gopher problem is to do nothing, letting the population limit itself. Experience has shown, however, that by the time gopher populations level off naturally, they've already caused much damage around homes and gardens.

Predators—including owls, snakes, cats, dogs, and coyotes—eat pocket gophers. Predators rarely remove every prey animal but instead move on to hunt at more profitable locations. In addition, gophers have defenses against predators. For example, they can escape snakes in their burrows by rapidly pushing up an earthen plug to block the snake's advance. Relying solely on natural predators might not control gophers to the desired level.

Some people have tried attracting barn owls to an area by installing nest boxes. Although barn owls prey on gophers, their habit of hunting over large areas, often far from their nest boxes, and their tendency to hunt areas with abundant prey, make them unreliable for gopher control. When a single gopher, which is capable of causing damage rapidly, invades a yard or garden, a gardener can't afford to wait for an owl to arrive. It is better to immediately take effective action, usually through trapping or baiting.

Habitat Modification

Reducing gopher food sources using either chemical or mechanical methods can decrease the attractiveness of lawns and gardens to gophers. If feasible, remove weedy areas adjacent to yards and gardens to create a buffer strip of unsuitable habitat.

Other Control Methods

Pocket gophers easily can withstand normal garden or home landscape irrigation, but you sometimes can use flooding to force them from their burrows, which will enable you to use a shovel or a dog to destroy the rodent.

Gas explosive devices also are available and are somewhat effective at controlling gopher populations. These devices ignite a mixture of propane and oxygen in the burrow system. This concussive force kills the gopher and destroys the burrow system. Be sure to exercise caution when using these devices because of the potential for unintended damage to property, injury to users and bystanders, potential for starting fires in dry environments, and destruction of turf. Additionally, these devices can by quite loud, making them unsuitable in residential areas.

No repellents currently are available for successfully protecting gardens or other plantings from pocket gophers. Plants such as gopher purge *(Euphorbia lathyrus)*, castor bean (*Ricinus communis*), and garlic have been suggested as repellents, but research has not substantiated these claims.

Although many devices designed to frighten pocket gophers are commercially available—including vibrating stakes, ultrasonic devices, and wind-powered pinwheels—these rodents don't frighten easily, probably because of their repeated exposure to noise and vibrations from sprinklers, lawnmowers, vehicles, and people moving about. Another ineffective control method is placing chewing gum or laxatives in burrows in hopes of killing gophers.

Follow-up

Once you have controlled pocket gophers, monitor the area on a regular basis for reinfestation. Level all existing mounds after the control program, and clean away weeds and garden debris, so you easily can see fresh mounds.

It is important to check regularly for reinfestation, because pocket gophers can move in from other areas, and damage can reoccur in a short time. If your property borders wildlands, vacant lots, or other areas that serve as a source of gophers, you can expect gophers to reinvade regularly.

Be prepared to take immediate control action when they do. It is easier, cheaper, and less time consuming to control one or two gophers than to wait until the population builds up to the point where they cause excessive damage.

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