Pest Notes, Publication 7433
Revised July 2019

UC IPM

UC PEER REVIEWED

Pocket Gophers

Integrated Pest Management for Home Gardeners and Landscape Professionals

Pocket gophers, *Thomomys* species (Figure 1), often simply called gophers, 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 are also 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.

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

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 including the short tail. Gophers typically 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 (Figure 2). The hole, which is off to one side of the mound, is usually plugged.

Mole mounds (Figure 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 make feeding burrows just beneath the surface, leaving a raised ridge to mark their path, in addition to building deeper "main" burrows.

Figure 2. Top view of a pocket gopher mound.

One gopher can create several mounds in a day. In nonirrigated areas, mound building is most pronounced during winter or spring when the soil is moist and easy to dig. In irrigated areas such as lawns, flower beds, and gardens, digging conditions are usually 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.

Author:
Roger A. Baldwin, Department of Wildlife, Fish, and Conservation Biology, UC Davis.

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 2½ to 3½ inches in diameter. Feeding burrows are usually 6 to 12 inches below ground, and the nest and food storage chamber can be as deep as 6 feet, depending on soil type. 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, even though you might not see any fresh mounding. They can also be active at all hours of the day and night.

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 at 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.

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. 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 (Figure 4).

Figure 3. Top view of a mole mound.

Figure 4. Top view of pocket gopher feeder hole.

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 by pulling entire plants into their tunnel from below. In snow-covered regions, gophers can feed on bark (called girdling) several feet up a tree by burrowing through the snow, although most girdling damage to trunks and large roots occurs belowground. Gophers also gnaw and damage flexible plastic water lines and irrigation systems, particularly those types used for drip irrigation. 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 Department of Fish and Wildlife's Fish and Game Code classifies pocket gophers as nongame mammals. A trapping license is not required for gopher removal. They can be controlled 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, by using poison baits, or both.

Exclusion

Underground fencing might be justified for valuable ornamental shrubs or landscape trees. To protect existing plantings, bury hardware cloth or ½- to ¾-inch mesh 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. Use galvanized or stainless steel wire to extend the life of the fencing. This method is not perfect, because persistent gophers can burrow below the wire and 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 mesh 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. Use light-gauge, ¾-inch, non-galvanized steel wire for shrubs and trees that will only need protection while young; the wire will rust and disintegrate after several years, preventing growing roots from becoming strangled. Choose baskets large enough to allow for the roots to grow for several years.

Deter gophers by placing 6 to 8 inches of coarse gravel (1 inch or more in

diameter) around underground flexible sprinkler lines or utility cables.

Probing for Burrows

Successful trapping, baiting, and burrow fumigation require accurate location of the gopher's main burrow. To locate the burrow, you need to use a gopher probe (Figure 5). Probes can come in many shapes and sizes, but essentially need to be long and durable enough to allow the user to identify gopher tunnel systems through 4 to 12 inches of hard soil. An enlarged tip that is wider than the shaft of the probe can be a useful design feature that increases the ease of locating burrows. However, many people use long screwdrivers to find tunnel systems.

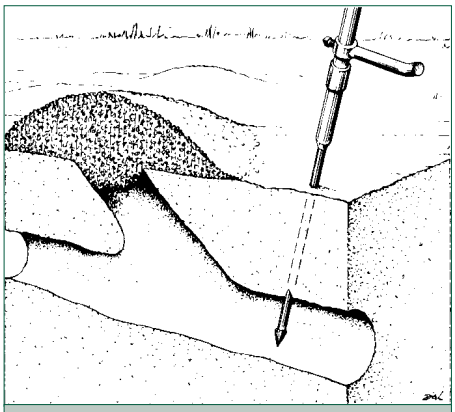

Figure 5. A gopher probe.

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 4 to 12 inches from the plug side of the mound; it is usually located 4 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.

Learn how to locate fresh mounds and gopher burrows in this video called "Finding Gopher Tunnel Systems" at youtube.com/watch?v=aKYh8cenobM.

Trapping

Trapping is a safe and effective method for controlling pocket gophers. Several types and brands of lethal gopher traps are available (Figure 6). Most common are 2-pronged pincer traps, such as the Macabee, Cinch, or Gophinator, which the gopher triggers when it pushes against a flat, vertical pan or metal wire. Another popular type is the choker-style box trap. More recently, the Gopherhawk has been developed which is a choker-style trap that allows for direct insertion into the gopher burrow. At this time, little is known about the efficacy of this trap type.

To set pincer and box traps, locate the main tunnel with a probe, as described above. Use a shovel, garden trowel, or hori hori knife to open the tunnel wide enough to set traps. You will need to set traps in as many tunnels as are present since you will not know which portion of the tunnel the gopher is in (Figures 7 and 8). Some consider box traps to be easier to use than pincer-style traps for inexperienced gopher trappers. However, setting box traps in the main tunnel requires more surface excavation than the pincer-type traps, which is an important consideration in lawns and some gardens. Most experienced trappers find pincer traps easier to use. Of these, the Gophinator trap can be more effective than the Macabee in catching larger, mature gophers.

Although some advocate for the use of bait behind the trap to increase capture success, UC Davis researchers have observed no such benefit. There is also no impact of human scent on trapping success. Once traps are set, be sure to wire your traps to stakes so you can easily retrieve them from the burrow, and to prevent scavengers from carrying them away.

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

There does not appear to be much advantage to covering trap-sets other than to eliminate access to humans and other nontarget animals. Leaving trap-sets uncovered will allow you to set traps more quickly and check them more easily. However, you should always cover trap-sets when trapping in areas frequented by humans and pets. In general, it is recommended that you cover sets when using box traps, since gophers likely will plug tunnels before hitting the trigger wire

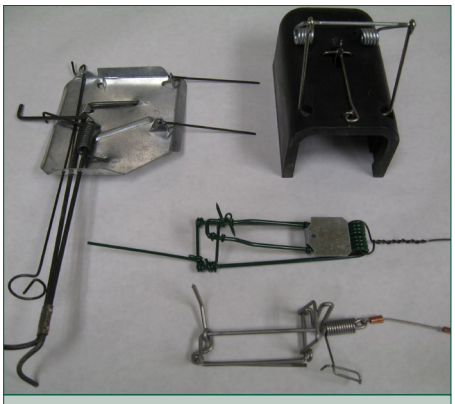

Figure 6. Types and brands of gopher traps include (clockwise from upper right) Victor Black Box, Macabee, Gophinator, and Cinch.

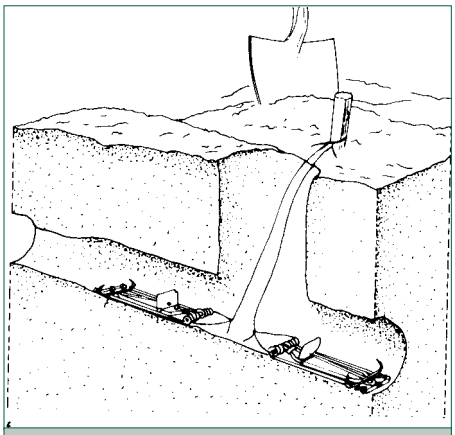

Figure 7. Macabee traps in position.

of these traps if you leave them uncovered. However, some trappers prefer to leave box traps uncovered when setting in lateral tunnels to encourage investigation by the gopher.

Check traps often and reset when necessary. If you haven't captured a gopher within 1 to 2 days, reset the traps in a different location.

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, gardens, parks, or athletic fields.

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 the most abundant prey, make them unreliable for gopher control, particularly over small areas such as a yard. 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 perhaps 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.

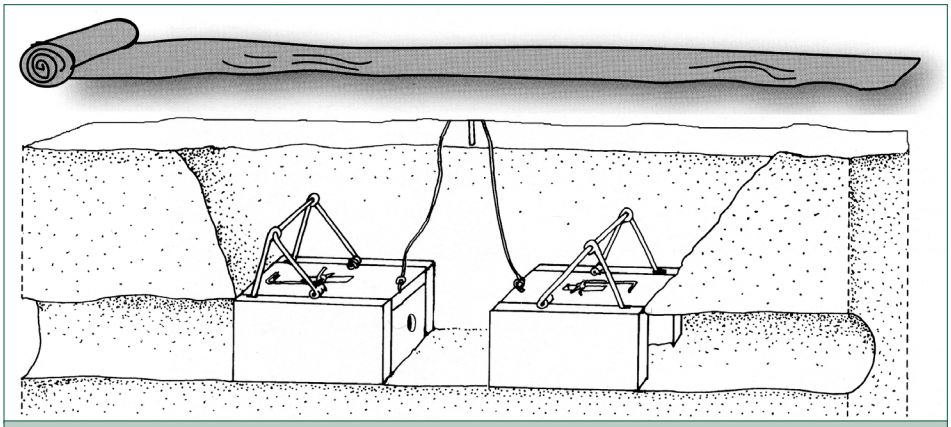

Figure 8. When putting box traps in place, cut the face of the hole smoothly, so you can push the traps tightly against the tunnels. You can cover the hole with landscape fabric, corrugated cardboard, or other material to exclude light.

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 effective 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-feed anticoagulants (chlorophacinone and diphacinone) are available as well. When using anticoagulant baits, you'll need to apply a large amount of bait—about 10 times the amount needed when using strychnine baits, perhaps requiring multiple applications—so enough will be available for multiple feedings. Although generally less effective than strychnine baits, anticoagulant baits are less toxic after ingestion of a single dose, and have an antidote available. 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. Be sure to clean up any bait spilled aboveground, as it could be hazardous to desirable wildlife and pets.

It is important to remember that bait application for gophers is only allowed directly within burrow systems; above ground application is illegal and ineffective and may expose pets and nontarget wildlife to poison bait. Bait application should not be made in gardens with root vegetables as these vegetables could come into direct contact with the bait and expose people to the pesticide.

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. Applicators are often used only with strychnine or zinc phosphide bait, given that the applicators only dispense 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, a restricted-use application requiring a state license, is effective at controlling gopher populations. Licensed pest control operators have access to aluminum phosphide, so if trapping and baiting aren't effective, you may consider hiring a professional.

Be aware that new regulations greatly restrict the use of aluminum phosphide in residential areas. Applications can only be made within burrow systems located more than 100 feet from any building where humans, domestic animals, or both are or may potentially be found. Within residential areas, aluminum phosphide can only be applied in parks and athletic fields. As such, it likely won't be available for use on most residential properties.

In 2012, pressurized exhaust machines were approved for use against burrowing rodents in California. As their name implies, these devices generate exhaust rich in carbon monoxide. This exhaust is injected into the burrow system, asphyxiating the gopher. Several products are available on the market including the Pressurized Exhaust Rodent Controller (PERC), BurrowRx, Cheetah rodent control machine, and the CO-Jack. These machines are relatively effective, with removal rates in excess of 70% observed in some settings for the PERC machine. However, the machines are expensive and are likely only practical for individuals involved in large-scale gopher management.

Other Control Methods

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

Gas explosive devices are also available, but they are only 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. Be aware that these devices are quite loud, making them unsuitable in residential areas. Other approaches tend to be significantly more effective.

No repellents have proven effective at 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 can easily 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.

REFERENCES

Baker RJ, Bradley RD, McAliley LR, Jr. 2003. Pocket gophers. In GA Feldhamer, Thompson BC, and Chapman JA, eds. *Wild Mammals of North America, 2nd ed.* Baltimore: Johns Hopkins Univ. Press.

Baldwin RA. 2014. Determining and demonstrating the importance of training and experience for managing pocket gophers. *Wildlife Society Bulletin* 38:628–633.

Baldwin RA, Chapman A, Kofron CP, Meinerz R, Orloff SB, Quinn N. 2015. Refinement of a trapping method increases utility for pocket gopher management. *Crop Protection* 77:176–180.

Baldwin RA, Kavermann M, Meinerz R, Orloff, SB. 2017. Is pressurized exhaust an effective tool against burrowing rodents? *Wildlife Society Bulletin* 41:780–784.

REFERENCES

Baldwin RA, Marcum DB, Orloff SB, Vasquez SJ, Wilen CA, Engeman RM. 2013. The influence of trap type and cover status on capture rates of pocket gophers in California. *Crop Protection* 46:7–12.

Baldwin RA, Meinerz R, Orloff SB. 2016. Burrow fumigation versus trapping for pocket gopher (*Thomomys* spp.) management: a comparison of efficacy and cost effectiveness. *Wildlife Research* 43:389–397.

Baldwin RA, Meinerz R, Orloff SB. 2014. The impact of attractants on pocket gopher trapping. *Current Zoology* 60:472–478.

Baldwin RA, Meinerz R, Witmer GW. 2017. Novel and current rodenticides for pocket gopher *Thomomys* spp. management in vineyards: what works? *Pest Management Science* 73:118–122.

Case RM, Jasch BA. 1994. Pocket gophers. In SE Hygnstrom, Timm RM, Larson GE, eds. *Prevention and Control of Wildlife Damage.* Vol. 1. Lincoln: Univ. Neb. Coop. Ext. pp. B.17–29.

Ingles LG. 1965. *Mammals of the Pacific States: California, Oregon, Washington.* Stanford: Stanford Univ. Press.

Salmon TP, Whisson, DA, Marsh, RE. 2006. *Wildlife Pest Control around Gardens and Homes, 2nd ed.* UC ANR Publication 21385. Oakland, CA.

WARNING ON THE USE OF PESTICIDES

Pesticides are poisonous. Some pesticides are more toxic than others and present higher risks to people, nontarget organisms, and the environment. A pesticide is any material (natural, organic, or synthetic) used to control, prevent, kill, suppress, or repel pests. "Pesticide" is a broad term that includes insecticides, herbicides (weed or plant killers), fungicides, rodenticides, miticides (mite control), molluscicides (for snails and slugs), and other materials like growth regulators or antimicrobial products such as bleach and sanitary wipes that kill bacteria.

Always read and carefully follow all precautions and directions provided on the container label. The label is the law and failure to follow label instructions is an illegal use of the pesticide. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, and animals. Never place pesticides in food or drink containers. Consult the pesticide label to determine active ingredients, correct locations for use, signal words, and personal protective equipment you should wear to protect yourself from exposure when applying the material.

Pesticides applied in your garden and landscape can move through water or with soil away from where they were applied, resulting in contamination of creeks, lakes, rivers, and the ocean. Confine pesticides to the property being treated and never allow them to get into drains or creeks. Avoid getting pesticide onto neighboring properties (called drift), especially onto gardens containing fruits or vegetables ready to be picked.

Do not place containers with pesticide in the trash or pour pesticides down the sink, toilet, or outside drains. Either use all the pesticide according to the label until the container is empty or take unwanted pesticides to your local Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Hazardous Waste Collection site nearest you. Follow label directions for disposal of empty containers. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

Produced by the **Statewide Integrated Pest Management Program**, University of California, 2801 Second Street, Davis, CA 95618-7774.

Technical Editor: K Windbiel-Rojas

ANR Associate Editor: AM Sutherland

Editor and Designer: B Messenger-Sikes

ILLUSTRATIONS: Figure 1: Jack Kelly Clark; Figure 2, 3, 4, 6: RA Baldwin; Figures 5, 7, 8: *Wildlife Pest Control around Gardens and Homes* (UCANR Publication 21385).

This and other Pest Notes are available at ipm.ucanr.edu.

For more information, contact the University of California Cooperative Extension office in your county. See your telephone directory for addresses and phone numbers, or visit: ucanr.edu/County_Offices.

University of California scientists and other qualified professionals have anonymously peer reviewed this publication for technical accuracy. The ANR Associate Editor for Urban Pest Management managed this process.

To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products that are not mentioned.

This material is partially based upon work supported by the Extension Service, U.S. Department of Agriculture, under special project Section 3(d), Integrated Pest Management.

Suggested citation: Baldwin RA. 2019. *UC IPM Pest Notes: Pocket Gophers*. UC ANR Publication 7433. Oakland, CA.