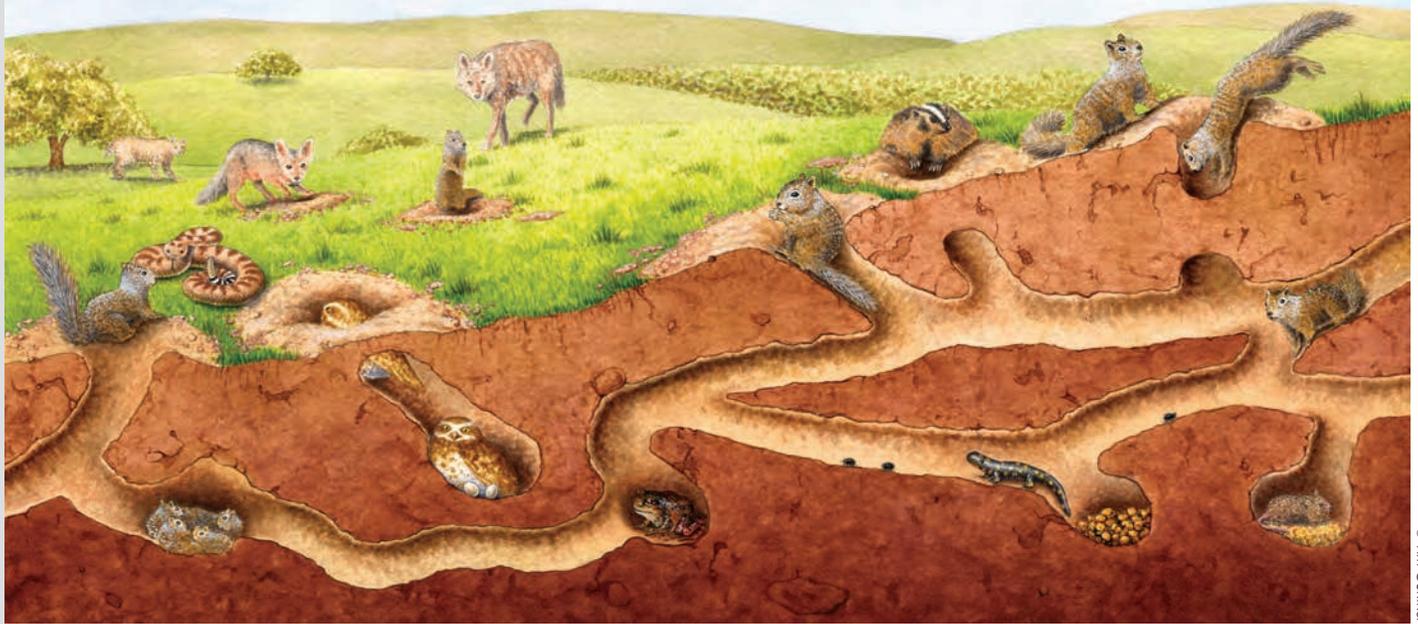


BURROWING RODENTS

GOPHERS & GROUND SQUIRRELS



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Gophers and ground squirrels are an important part of the ecosystem in which they live, although they are viewed as a nuisance because of the underground burrows, tunnels, and mounds that they create for their habitat. Gophers and ground squirrels have some similarities, but the biggest difference is that ground squirrels live in colonies, while gophers are usually solitary. Key to the role they play in supporting the ecosystem in which they live is the fact that both gophers and ground squirrels share their burrows with other animals.

Gophers are called “pocket gophers” because of the external fur-lined cheek pouches, extending to their shoulders, in which they carry food and nesting materials. Gophers are rarely seen above ground, and their burrow systems may cover an area of 200 to 2,000 square feet, with shallow tunnels for feeding, and deeper tunnels for food storage and nesting. Gophers do not hibernate. They are nocturnal herbivores who eat roots from their underground tunnels and foliage grabbed from around a hole.

Gophers push earth to the surface as they dig burrows. The mounds thus formed may be distinguished from molehills by their shape—in the form of a crescent or horseshoe, as opposed to the mole’s volcano-shaped mound. The shallow tunnels of moles tend to create a ridge of soil on the surface, while gopher tunnels are deeper and do not show up on the surface.

Ground squirrels range in size from chipmunks, who weigh a few ounces, to prairie dogs weighing 1–3 pounds, to groundhogs (also known as woodchucks), averaging around

8 pounds. They are known for sitting upright as they look for danger. Ground squirrels of all sorts live communally in burrows underground. Most ground squirrels are mainly herbivorous, consuming roots, seeds, fruits, buds, and foliage. They also eat fungi, some insects, and some have been observed eating other small animals and eggs. The herbivorous diet and burrowing behavior have earned these animals the label of “pests.”

Gophers and ground squirrels use their burrows to seek safety from predators and shelter from bad weather, hibernate, sleep, raise young, and defecate.

The burrow has separate chambers devoted to different uses. However, the burrows serve other functions as well. They help to aerate the soil, capture snowmelt and rainfall that would otherwise run off and cause erosion, and fertilize the soil. They help in seedling establishment of the seeds that the rodents harvest and store, and in distributing mycorrhizal fungi. Even more importantly, the burrows are home to many other animals, some of whom are predators of rodents.

Furthermore, these rodents and their burrows form the basis of large ecosystems. Many other animals, including some endangered species, depend on the burrows of gophers and ground squirrels. The following describes the importance of ground squirrels in California:



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“Belowground, the burrows are sheltered and cool no matter the weather above. This comfortable climate draws a diverse cast of grassland animals—mice, voles, tarantulas, and several species of beetles that live exclusively in rodent tunnels. Then there are the local amphibians. Ground squirrels actually make it possible for moisture-loving amphibians to live in the hot, dry hills of the Diablo Range. As the weather warms and ponds dry up, California red-legged frogs, western toads, ensatina salamanders, and California tiger salamanders retreat to the cool refuge of squirrel burrows—often while the squirrels are still living inside. The frogs and toads come and go, but the taxicab-tinted tiger salamanders move in for the long haul: they stay underground for up to ten months each year, emerging only in winter to breed. With this crowd, squirrel burrows are almost mini-ecosystems of their own. Worms and beetles crawling out of the walls may get eaten by the amphibians, while mice and voles go after the squirrels’ caches of nuts and seeds. Larger creatures—burrowing owls, coyotes, and San Joaquin kit foxes—often enlarge abandoned burrows and convert them into dens. But ground squirrels do even more for grassland ecosystems than spread seeds and build shelters. Plentiful and prolific, they are a dinnertime mainstay for most of California’s savanna predators. Local badger populations depend almost entirely on ground squirrel colonies, says retired district naturalist Ron Russo. And studies of golden eagles in the park district show that ground squirrels may comprise up to 70 percent of their diets when the birds are rearing their young. DiDonato says the sheer abundance of ground around San Antonio Reservoir and Sunol Regional Wilderness supports the densest population of nesting golden eagles anywhere in the world. And back when grizzly bears prowled California, they dug out entire colonies for a snack.”¹

Similarly, prairie dogs appear to be a keystone species, since other organisms in the food chain are so dependent on them:

“Interestingly enough, the survival of many other species seems to hinge on the survival of the prairie dog. About 90% of the [black footed] ferret’s diet consists of prairie dogs. In addition, the golden eagle, ferruginous hawk, and swift fox diets include a large percentage of prairie dogs. According to Nicole Rosmarino/Southern Plains Land Trust, the mountain plover appears to be a prairie dog obligate or, at the very least, is highly dependent on prairie dogs for survival, using the borrows for breeding, nesting, and feeding. Burrowing owls, prairie falcons, badgers and a host of other prairie animals are associated with prairie dog colonies. In fact, some ecologists consider the prairie dog to be a keystone species of the prairie. According to Miller et al., nearly 170 species rely on prairie dog colonies to some extent for their very survival. Miller further concludes that the prairie dog fits the definition of a keystone species because prairie dogs affect the ecosystem structure, function, and composition in a

way that is not duplicated by other species.”² A number of the inhabitants of rodent burrows are threatened or endangered species, including black-footed ferret, California red-legged frog, California tiger salamander, Northern Idaho ground squirrel, and Utah prairie dog.



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BOX 1

Managing Land with Burrowing Rodents

With an understanding of the ecosystem benefits of ground burrowing rodents, the goal of landscapers seeking to protect the playability of a sports field or the mowability and aesthetic impact on a grass yard or flower and vegetable garden is to create a deterrent for these animals to settle in the middle of your property. If you are in a position to let nature take its course, the ecosystem will find an equilibrium with natural predators reducing the population. Owls like to eat rodents and, over time, act as effective pest managers of rodents.

However, with the pressure to maintain a field or a garden, the key to a successful program that respects burrowing rodents’ role in the ecosystem, while discouraging them from choosing your site, is to reduce the animal’s food source and shelter, encouraging them to find another place to inhabit. Small mesh heavy gauge wire fencing, with two feet buried in the ground and three feet aboveground can exclude prairie dogs. Trenches may serve as barriers to other burrowing rodents. Plants that are cited as repelling gophers and ground squirrels include gopher purge (*Euphorbia lathyris*), castor bean (*Ricinus communis*), and garlic. In extreme cases, unwanted burrowing animals can be effectively managed in both agricultural and residential settings through use of traps, barriers, natural predation, and other physical methods. Predators include gopher snakes, corn snakes, rat snakes, owls, hawks, great blue herons, weasels, bobcats, coyotes, and domestic dogs and cats.³

Understanding the role that organisms play in the broader ecosystems provides the basis for seeking to avoid the use of poisons that have indiscriminate effects among numerous organisms and creates an imbalance that escalates pest problems. In the case of gophers and ground squirrels, finding a way to tolerate these rodents by separating them from susceptible plantings will help conserve other species that depend on them and their burrows.

¹ Lord of the Burrows: *The Incredible Edible Ground Squirrel*, <http://baynature.org/articles/jan-mar-2008/lord-of-the-burrows>.

² <http://environmentalchemistry.com/yogi/environmental/200706prairiedogreconciliation.html>.

³ Pesticide Research Institute, 2014. *Technical Evaluation Report for Exhaust Gas*. <https://www.ams.usda.gov/sites/default/files/media/Carbon%20Monoxide%20TR.pdf>.