

Rodent Control Within Woodside
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Introduction

The scientific studies and literature on rodent control are extensive. Every state extension service provides fact sheets and publications available to citizens. In addition, the USDA Extension Service and the USDA Animal Plant and Health Inspection Service have multiple publications on rodent control. The literature reports that numerous economic and health problems can result from rodent interactions with humans. The literature also reports positive contributions that rodents do contribute to habitats that they occupy in ecosystems. Damage by rodents can occur to agriculture crops, home vegetable and flower gardens, range lands and pastures, forests and orchards, vineyards, golf courses, urban yards, natural resources (flora and fauna), and disease hazards may be posed. In addition, chipmunks and ground squirrels can undermine cement slabs, house foundations, rock walls, landscape timbers, and they will chew electrical lines and cables. They will also invade houses and live within walls and roofs. Two of the most damaging animals to set up shop in fields and pastures and along trails and paths are pocket gophers and ground squirrels. These species leave behind extensive holes and tunnel activity posing serious threats for leg breakage for animals and humans.

Legal Status in Colorado of Nuisance Wildlife Including Rodents

Colorado Parks and Wildlife (CPW) states that if wildlife is causing damage to crops, real or personal property, or livestock - a person (or any employee or agent of the landowner) may hunt, trap, or kill the offending wildlife on lands owned or leased by the person without securing a license. CPW also states that the determination that a species has become a nuisance and should be removed is the prerogative of the landowner. Ground squirrels, pocket gophers, voles, cottontail rabbits, jackrabbits, mice and rats are some of the species identified. See Appendix 1 [Nuisance Wildlife Laws in Colorado](#) for a summary of Colorado's most common regulations and statutes pertaining to nuisance wildlife questions.

Disease Hazards Associated with Ground Squirrels and Chipmunks

Rodents are the most abundant and diversified order of living mammals in the world, and they represent about 43% of the total number of mammalian species. Its species are distributed on every continent except Antarctica and include many of the most abundant and taxonomically diverse mammals. In many places rodents live in close contact with human populations, their farm animals or pets. In other places, peri-urban rodents provide a nexus between wildlife communities and humans, exposing humans to some zoonoses circulating in these natural ecosystems. Rodents can spread pathogens to humans, e.g., by biting them or because humans consume food products or water that is contaminated with rodent feces. Rodents can serve as amplifying hosts of the pathogens and can bring them into direct contact with humans by mean

of ectoparasitic arthropod vectors (ticks, mites, fleas). (1) The incidence of human diseases being spread by rodents and their fleas is coming to the public's attention strongly in recent years, with particular concern for bubonic plague, rabies, and Lyme disease all having cases linked to rodents.

Ground squirrels and chipmunks are associated with the spread of Rocky Mountain spotted fever, rat bite fever, tularemia, Chagas' disease, adiospiromycosis, and encephalomyocarditis. Notably, ground squirrels and chipmunks can serve as reservoirs for sylvatic (bubonic) plague, a highly infectious disease caused by the bacteria *Yersinia pestis*. (2) (3) Plague is transmitted to people through flea bites and direct contact with infected hosts. People and their pets can get plague if they visit or live in areas where ground squirrels or other rodents are infected. In areas with high concentrations of ground squirrel tunnels, dogs passing through these areas or smelling entrance openings are susceptible to flea bites and flea infestation.

Rodent Control Strategies and Methods

Trapping

Traps are a feasible option for removing small pocket gopher or ground squirrel populations, but they are too time consuming for large infestations. Body-gripping traps (Death Clutch 1, Macabee, Victor, Guardian Gopher Trap), available from hardware and trapping supply stores, work exceptionally well for capturing gophers. Traps can be set in the main tunnel or in a lateral tunnel.

Live catch box traps for ground squirrels are baited with a suitable attractant such as walnuts, almonds, oats, barley, melon rinds or any other food source that the ground squirrels are eating. Box traps are set at the end of the tunnel to catch the animal as it surfaces. The modified gopher box trap and the conibear 110 body trap are lethal traps that are also used in controlling ground squirrel populations. (4)

Chemical Control

Introduction

Rodenticides consist of different types of poisons used to kill rodents. When using any rodenticide, label and guidelines should be understood prior to use to minimize non-target (i.e. dog, cats, and raptors) species poisoning. Rodenticides are meant to kill rodents but can be lethal for any mammal or bird that ingests them. As a result, all rodenticides pose a high risk of poisoning for non-target animals that might eat the rodenticide bait or consume a poisoned ground squirrel, pocket gopher, vole, chipmunk, rat or mouse.

Baits

Landowners may only use US EPA approved products that are sold and used with tamper resistant bait stations to protect children, pets, and wildlife. Baits come in grain or pellet form. A common type of toxic bait contains strychnine, and this type of bait cannot be used above-ground and must be placed in the burrows. Strychnine laced baits are very effective for pocket gophers, but the poison accumulates in body tissues. If a pet or some other animal eats a gopher that was poisoned with strychnine, it might die. Strychnine baits should never be used in areas where pets roam.

Another legal poison is zinc phosphide, but it's a restricted-use pesticide; one must have an applicator's license to purchase and use it. This requires learning how to handle it, taking a test, and becoming certified with the State Department of Agriculture.

The most common grain baits are: Chlorophacinone grain, Diphacinone grain bait or crimped oat groats treated with 0.005% anticoagulant (diphacinone, chlorophacinone). All anticoagulants have two actions: they reduce the clotting ability of the blood and cause damage to capillaries (tiny blood vessels). The rate of blood clotting gradually decreases and blood loss leads to an apparently painless death. Repeated daily doses of anticoagulants greatly increase efficacy. Baits containing anticoagulants such as Chlorophacinone are restricted use toxicants registered for ground squirrel control and pocket gopher control similar to zinc phosphide.

Fumigants/Poison Gas

Fumigants or poison gas use requires that individuals get trained/certified in utilizing a fumigant to kill burrowing animals. Poison gas is generally produced in pellet form that creates a lethal vapor on exposure to air or the rodent's stomach acid, depending on the type of poison. The best toxin available for gophers, voles or ground squirrels is aluminum phosphide. However, there have been human fatalities reported when aluminum phosphide gas has been misused. This is not a good option for homeowners.

Shooting

Small isolated colonies of Wyoming ground squirrels and golden mantel squirrels can be effectively controlled by shooting. Shooting lowers the population by removing individual squirrels and disrupting their life cycle. However, if there are other colonies of ground squirrels nearby, squirrels from those populations will migrate into the area where squirrels are being removed. For effective management of problem ground squirrels, a population must be kept under constant shooting pressure. Unlike other burrowing animals, the Wyoming ground squirrel is considered a small game species in Colorado, allowing licensed hunters to harvest them year around without a limit. However, shooting is unacceptable in most housing subdivisions and populated areas.

Habitat Modification

Ground squirrels can be limited by frequent tillage; deep disking or plowing are the two most frequent methods used by farmers and ranchers. Elimination of weed ground cover and tall grasses by frequent and close mowing, tilling, or herbicide application is the most successful and longest lasting method to reduce pocket gopher and vole damage to orchards and yards.

Ignited Gas Machines

Ignited gas machines have been on the market for fifteen plus years. The machines inject a mixture of propane and oxygen in a carefully calibrated percentage and dispense this gas mixture into the tunnel or holes of pocket gophers, ground squirrels, chipmunks, rabbits, groundhogs or other rodents. The premise behind concussion blast equipment is the creation of a shock wave that kills the target animal. Through the use of the oxygen and propane gas mixture detonation, a shock wave is generated, having sufficient power to quickly kill the target animal, and in some cases it also collapses the tunnel structure to prevent re-infestation. The Rodenator, Rodent Blaster and the VARMIT getter are three examples of these machines.

There are a number of reasons for the recent success of such devices in the marketplace. Among these is the public's desire to find a safe, non-hazardous method of vertebrate pest control. Research studies have been slow to appear in journaled literature that demonstrates

the success of this technology. However, that is changing. In a study conducted by Richard Shadel, S & S Wildlife Control Services Inc. and published in Proceedings of the 23rd Vertebrate Pest Conference in 2008 (5), he reported 100 percent efficacy in groundhog den sites at a Pennsylvania test site using the VARMIT getter device. The testing was done in three different soil types, and the burrow systems were completely dug up to confirm efficacy rates. In a test performed by the Montana Department of Agriculture, Technical Services Division of the Agricultural Sciences Division, a field trial was conducted to observe and record the results of the propane/oxygen activating device called Rodenator used to control black-tailed prairie dogs. Ignition of the gas mixture resulted in a reduction in activity by 85.4% and 86% on two test plots. (6)

Rodent Species Targeted Within the Woodside Home Owners Association

Colorado has eight species of voles, four species of pocket gopher, six species of ground squirrels and five species of chipmunks which are found widely throughout various ecosystems of Colorado. Rodent species that are targeted for population control within Woodside acreage are ground squirrels, pocket gophers, and chipmunks. The specific species are: 1) the Wyoming ground squirrel (*Urocitellus elegans* formerly *Spermophilus elegans* “Richardson’s” ground squirrel); 2) golden mantel ground squirrel (*Callospermophilus lateralis*); 3) the northern pocket gopher (*Thomomys talpoides*); and 4) the least chipmunk (*Eutamias minimas*).

A number of voles are found within ecosystems on home owner acreages within Woodside, and they likely include the Montane voles (*Microtus montanus*), Southern red-backed voles (*Myodes gapperi*), and the Meadow voles (*Microtus pennsylvanicus*). Voles eat a variety of grasses, forbs, and agricultural and garden crops. They also eat bark and roots on trees and shrubs, especially during fall and winter. However, these vole species have little contact with humans and pets. (7) (8)

Wyoming Ground Squirrel Distribution and Biology

The Wyoming Ground Squirrel (WGS) range covers much of the North American Great Plains and includes portions of Alberta, Saskatchewan, Manitoba, Montana, North and South Dakota, Minnesota, Southern Wyoming, western Nebraska, Colorado, and Utah. WGS is found within Woodside and in large numbers. The WGS averages 10 to 15 inches long and weighs 9 to 14 ounces as an adult; it is brown above, with gray on the shoulders, neck and head. There are no stripes or spotting on the back. The sides and underside are yellowish. The ears are larger than average for ground squirrel species. The eyes are surrounded by a white ring. They have large claws. (9)

WGS is an herbivore. It eats forage grasses, forage legumes, cereal crops, pulse crops, canola and native grasses. When green vegetation becomes scarce, the squirrels eat dry grasses and seeds. It also eats insects, including grasshoppers, crickets and caterpillars, and eggs from ground-nesting birds. When WGS occur in great numbers, agricultural producers can accrue significant financial losses. It competes with livestock for forage and can destroy food crops. The mounds of dirt that squirrels excavate to build burrows in hay fields can damage haying equipment and take fields out of production. Burrowing activity also can damage grasslands,

golf courses and lawns. A WGS population of over 8-10 per acre can pose a serious pest problem that won't simply take care of itself. (10)

Each adult WGS maintains a home range and allows only its closest kin to intrude. It prefers open sagebrush, grasslands, meadows, and large grassy areas with good visibility to detect approaching predators. It fares well in human modified habitats such as city parks, over-grazed pastures, fallow fields, the edges of cultivated fields and perennial forage stands. A female ground squirrel's home range during summer months averages about 240 square meters, and its borders will often overlap with those of its neighbors. Each adult female occupies at least one burrow system that has 5 to 10 surface openings, 2 to 5 sleeping chambers, and a latrine.

WGS can be seen above ground from mid-March to October. Adult males will emerge from the ground in mid-March followed by the females in April. Both sexes are reproductively mature at one year old. Mating occurs shortly after the females emerge from hibernation in April. Each female produces one litter of two to 10 per year with an average litter of 4 to 5. Juvenile squirrels first emerge above the ground when they are about four weeks old. Generally, 10 to 20 per cent of juvenile males and 40 to 50 per cent of juvenile females survive to adulthood. The maximum life span is three years for the male WGS and six years for females.

The WGS is diurnal, emerging from its burrow shortly after sunrise and returning before sunset. The ground squirrel lives in colonies. The burrow is the center of a ground squirrel's activity where they sleep, rest, rear young, store food, and avoid danger. Their burrows entrances are 2- 4 inches in diameter. The length of burrow systems usually ranges between 5 and 33 feet. Most burrow systems are within two to three feet of the surface of the ground, but they may occasionally be up to 6 feet or more in depth. Burrows can be single tunnels or complex branching systems. They may be occupied by a single squirrel or occupied by many. WGS is very conscious of its surroundings; if a burrow system becomes vacant, nearby squirrels begin investigating it within hours of the occupants disappearance. (11)

WGS is active during the day, mainly from midmorning through late afternoon, especially on warm, sunny days. It has two periods of dormancy during the year. During winter months the squirrel hibernates, but during the hottest times of the year, most adult squirrels go into a period of inactivity, called estivation, which can last a few days to a week or more. During these periods, the burrow appears open at the entrance, but the squirrel plugs it with soil near the nest. During mid-summer their food begins to convert to fat to sustain them through their winter hibernation period. Hibernation begins when the squirrel has reached a critical amount of fat, regardless of external environmental conditions. This usually occurs in late August or early September.

Golden Mantel Ground Squirrel (GMGS) Distribution and Biology

The Golden Mantel Ground Squirrel (GMGS) is native to western North America. It is distributed in British Columbia and Alberta throughout the western United States clear to the coastal states of California, Oregon and Washington. It occurs abundantly in Colorado in all ecosystems.

This ground squirrel is generally about 23 to 29 cm (9.1 to 11.4 in) in length. It has whitish or yellow-gray underparts. The tail is brown to black with buff edges and a yellowish to reddish

underside. It has pale rings around the eyes. Its head, face, front paws and chest are a coppery red. The "mantle" across the shoulders is tawny to reddish, with males having a deeper reddish tinge. This species is distinguished from similar ground squirrels by a black-bordered white stripe down each side of the back. (16)

The GMGS is commonly found near rocks and talus slopes in mountainous areas across the United States and Canada. It usually lives in coniferous forest openings but can range above tree line. These squirrels also inhabit a number of forest types, appearing to be the most abundant in open, pure stands of ponderosa and other pines. They also occur to a lesser extent in lodgepole pine, and mixed fir forests. Stands of ponderosa pine, lodgepole pine and mixed firs are common forest types in Woodside.

The GMGS is solitary and territorial, although aggregations sometimes form around artificial food sources such as campgrounds and home bird feeding systems. The GMGS digs its own 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, and conifer needles. The 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 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. (13)

In gardens, GMGS will eat flowers and vegetables in the seedling stage. It can damage young shrubs, vines, and trees by gnawing bark, girdling trunks (completely removing a strip of bark from a tree's outer circumference), eating twigs and leaves, and burrowing around roots. Burrows around trees and shrubs can damage them both by drying out roots. GMGS will gnaw on plastic sprinkler heads and irrigation boxes and lines. Cars and trucks left outside can become targets for the GMGS to gnaw on electrical lines. Burrowing beneath buildings and other structures sometimes produces damage that necessitates costly repair.

GMGS 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. GMGS undergoes a winter hibernation beginning in late summer or fall. It is not uncommon for it to hibernate 7 to 8 months a year. 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. In these instances, their tracks are frequently seen on top of the snow.

GMGS store's up large quantities of fat underneath the skin and elsewhere in its body and is 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.

Males are the first to emerge from hibernation and are fertile upon emergence. Females come out from hibernation two or three weeks after the males. 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.

Research indicates that GMGS is highly susceptible to sylvatic plague and present potentially major public health problems in campgrounds within national forests, state and federal parks. Because it can become very numerous, very tame, and often in close contact with park or campground visitors, the GMGS can transmit plague to humans whenever an epizootic is occurring. It may also carry other diseases such as Rocky Mountain spotted fever, various tick fevers and others. (14) Research indicates that the GMGS and the least chipmunks are the principal hosts of nymphal wood ticks. The circulation of Colorado tick fever virus is maintained through the interactions of wood ticks, GMGS and least chipmunks. (15) For these reasons it is prudent for Woodside residents to monitor GMGS populations in close proximity near their homes.

Least Chipmunk Distribution and Biology

Least Chipmunks (LC) are found in the western portion of the United States and throughout much of Canada. This species of chipmunk also has the largest range of habitat; it inhabits low sagebrush deserts, high mountain coniferous forests, and northern mixed hardwood forests. It is the smallest squirrel found in Woodside. Their bodies range from less than seven inches to nine inches long (including the tail). They weigh from 1 to 2 ounces. The most apparent feature is the five stripes on the back and sides of their small bodies. Two of the stripes extend onto the head. Only the LC has stripes on its face. They have large fur-lined cheek pouches that they use for carrying nuts and seeds. (16)

LC are generally solitary except during courtship or when rearing young. A group of chipmunks is called a scurry. The home range of a chipmunk may be up to 1/2 acre, but the adult only defends a territory about 50 feet around the burrow entrance. Chipmunks are most active during the early morning and late afternoon. Chipmunk burrows often are well hidden near objects or buildings (for example, rock walls, stumps, wood piles or brush piles, basements, and garages). Burrows are typically dug directly underneath or next to cover because a chipmunk always requires protection from predators. The burrow entrance is usually about 2 inches in diameter. There are no obvious mounds of dirt around the entrance because the chipmunk carries the dirt in its cheek pouches and scatters it away from the burrow, making the burrow entrance less conspicuous. (17)

In most cases, the chipmunk's main tunnel is 20 to 30 feet in length, but complex burrow systems occur where cover is sparse. Burrow systems normally include a nesting chamber, one or two food storage chambers, various side pockets connected to the main tunnel, and separate escape tunnels. The LC is not a true hibernator. They enter a state of torpor or restless hibernation with the onset of cold weather from which they occasionally arouse to feed on stored food. Thus the LC are relatively inactive from late fall through the winter months and rely on the cache of food they have brought to their burrow. Occasionally some do become active on warm, sunny days during the winter and will emerge above ground for short periods of time. (17)

LC's emerge from hibernation in March and breeding takes place over a period of 4 to 6 weeks from April to mid-July. LC's produce 1 litter of 2 to 7 young in May or June and may produce a second litter in the fall. Chipmunk pups appear above ground when they are 4 to 6 weeks old — 2/3 the size of an adult. Young will leave the burrow at 6 to 8 weeks. (17)

The diet of chipmunks consists primarily of grains, nuts, berries, seeds, mushrooms, insects, and carrion. Although chipmunks are mostly ground-dwelling rodents, they regularly climb trees in the fall to gather nuts, fruits, and seeds. Chipmunks cache food in their burrows throughout the year. By storing and scattering seeds, they promote the growth of various plants. Chipmunks also prey on young birds and bird eggs.

Most conflicts with chipmunks are nuisance problems. Chipmunks enter buildings for shelter and nesting. Chipmunks don't necessarily want to come inside a home, but their small size makes it easy for them to venture inside. Because they are good climbers they can easily find openings under roofs and into wall spaces. When chipmunks are present in large numbers they can cause structural damage by burrowing under patios, stairs, retention walls, or foundations.

Repellents alone aren't effective for chipmunk removal, but they can be an additional step toward making a yard less appealing to the tiny critters. When used along property perimeter and near garden plants, repellents will cause chipmunks to stay away because of the smell. But these repellents will wash away after a while, so the animals will eventually return. Chipmunks can also get used to repellents, so switch to different types of repellent to keep the critters at bay.

Most store-bought repellents come in liquid spray form or in the form of granules. They contain natural substances that repel chipmunks with their smell. These include certain essential oils, or traces of predator urine. The latter is much more effective because chipmunks know to stay away from certain animals that prey on them, such as coyotes and foxes.

The symptoms that people often experience when eating spicy food (watering eyes, mouth pain, and coughing) are similar to what a small animal like a chipmunk experiences when put in direct contact with repellents. Therefore, spicy peppers like cayenne pepper and chili pepper are both effective and non-toxic to plants and vegetation. To create your own repellent; mix crushed cayenne pepper, chili peppers or hot sauce into a spray bottle, fill it with water, and then spray the mixture whenever chipmunks are in your area. There are also plants and essential oils that chipmunks cannot withstand. The smell of peppermint, citrus, cinnamon, and eucalyptus can deter them from invading your home or property. (18)

Northern Pocket Gopher Distribution and Biology

The Northern Pocket Gopher (NPG) has the greatest range of any pocket gopher in North America. The species occurs on both sides of the continental divide ranging from mid-Manitoba in the north, to Mexico in the south, and as far west as the east side of Cascade Mountains and Northern Sierra Range, and as far east as the Dakota plains, east of the Black Hills. This area is generally called the North American West and Midwest (12). The NPG uses a wide variety of habitats, from cultivated fields and prairie to alpine meadows. It avoids only dense forests, very shallow, rocky soils, and areas with poor snow cover where the soil freezes over.

The NPG's are burrowing rodents that get their name from the fur-lined external cheek pouches, or pockets, that they use for carrying food and nesting materials. They are well equipped for a digging, tunneling lifestyle with powerfully built forequarters, large-clawed front paws, fine short fur that doesn't cake in wet soils, small eyes and small external ears, and highly sensitive facial whiskers to assist movements in the dark. They measure about 8 inches length in total, with a short, nearly hairless tail of 2 1/2 inches. Its weight varies from 2 3/4 to 4 3/5 ounces. It has soft reddish-brown upper fur and a dark gray underside. (21)

Pocket gophers do not hibernate. Some observers believe their activities peak at dawn and dusk, but various studies have shown them to be active throughout the day, with activity periods interspersed with rest. Pocket gophers reach sexual maturity in the spring following their birth. In the northern part of their range they have 1 litter per year. In the southern portion they may have 2 litters per year. Litter sizes range from 1 to 10 but typically average 3 to 4.

Burrow systems consist of a main burrow, generally 4 to 18 inches (10 to 46 cm) below and parallel to the ground surface, with a variable number of lateral burrows off the main one. These end at the surface with a soil mound or sometimes only a soil plug. There are also deeper branches off the main burrow that are used as nests and food caches. Enlargements along the main tunnel are probably feeding and resting locations. Nest chambers have dried grasses and other grasslike plants formed into a sphere. The maximum depth of at least some portion of a burrow may be as great as 5 or 6 feet (1.5 or 1.8 m). The diameter of a burrow is about 3 inches (7.6 cm) but varies with the body size of the gopher. (19)

Burrow systems may be linear or highly branched. The more linear systems may be those of reproductive males, since this shape would increase the likelihood of encountering a female's burrow. The number of soil mounds on the surface of the ground may be as great as 300 per animal in a year. Burrows are sometimes quite dynamic, with portions constantly being sealed off and new areas excavated. A single burrow system may contain up to 200 yards (180 m) of tunnels. The poorer the habitat, the larger the burrow system required to provide sufficient forage for its occupant. Not everything a pocket gopher does is bad. It is estimated that a single pocket gopher will bring over 1 ton of soil to the surface each year. All this digging aerates the soil and brings fresh soil to the surface for new species of plants to establish themselves in. The plant parts the gopher brings into their tunnels also increases the organic matter and fertility of the soil. (20)

The tunnel system reveals much about its inhabitant. The system is rigorously defended against intruders and constitutes the home range of the pocket gopher, which may be up to 700 square yards (560 m²). Pocket gophers are anti-social; intruding individuals are aggressively repelled. Burrow entrances are plugged to prevent entry by predators and to stabilize temperature and moisture within the burrow system. Pocket gophers also tunnel through snow, above the ground. Soil from below ground is pushed into the snow tunnels, but mounds are not built. When the snow melts, the soil casts (tubes) remain on the ground until they weather away. Soil casts are left by the NPG's in areas where snow cover is adequate for burrowing.

Pocket gophers can be serious pests. They are active throughout the year and if uncontrolled and food is plentiful, they can increase to 30 to 40 individuals per acre. They will consume all parts of a plant, but damage is often centered on the roots and crown a plant. Pocket gopher

mounds can also cause extensive damage to hay equipment, and dirt from the mounds can lower hay quality. Tunnel systems often lead to a loss or diversion of irrigation water and may lead to severe erosion. While herbaceous cover crops are their preferred food, pocket gophers also feed on the bark of tree crowns and roots. Bark consumption may be extensive enough to completely girdle and kill young trees in reforestation efforts and vines in grape vineyards. Usually pocket gophers feed on trees, shrubs, and vines from underground so the damage may not be evident until they show signs of stress. Pocket gophers sometimes gnaw on plastic irrigation lines.

Management practices to reduce pocket gopher damage include silvicultural practices, such as minimizing disturbance of an area, habitat manipulation, trapping, repellents, fumigation, and seedling barriers such as Vexar tubing. However, strychnine baiting is the most widely used method to reduce large populations of pocket gophers.

Summary

Comprising over 1400 species worldwide, rodents are the largest taxonomic group of mammals. Rodent use of habitats is extensive and varied. Most rodent species are relatively small, secretive, prolific, adaptable, and have continuously growing incisors which require constant eroding by gnawing. Rodents are known for their high reproductive potential; however, there is much variability between species as to the age at first reproduction, size of litters, and the number of litters per year. All rodent species have ecological, scientific, social, and/or economic values. They recycle nutrients, aerate soils, distribute seeds and spores, and affect plant succession.

In addition, rodents pose challenges to land and resource managers, commodity producers, and homeowners. They can cause extensive damage to all types of crops, and serve as a nexus between wildlife communities and humans, exposing humans to some zoonoses circulating in these natural ecosystems. Ground squirrels and chipmunks in Colorado are associated with the spread of Rocky Mountain spotted fever, rat bite fever, tularemia, Chagas' disease, adiospiromycosis, and encephalomyocarditis. Notably, ground squirrels and chipmunks can serve as reservoirs for sylvatic (bubonic) plague. Rodent populations can be a direct threat to the health of humans and their pets. Rodent populations need to be controlled around homes, pastures, gardens, dog enclosures, walking and riding paths to ensure the safety of human health and pets, and protection of property.

I have been a resident in Woodside since January 1993. During this period I have seen a residence of a neighbor invaded by least chipmunks and get into the roof and walls of the residence. I also witnessed a truck that was parked outside of a Woodside residence and had ignition cables chewed through by golden-mantled ground squirrels. I have been a quarter horse owner and have seen where one of my horses broke through into a gopher tunnel on my property. It is prudent for home owners to be aware of what is happening with rodent populations around their homes and act accordingly when populations grow exponentially.

Five techniques commonly used in population control of rodent populations are: (1) rodenticides (baits and fumigants/gas), (2) habitat modification, (3) ignited gas machines, (4) trapping and (5) shooting. The commonly used toxicants in rodenticides are strychnine alkaloid, zinc phosphide, chlorphacinone and diphacinone. These toxicants are impregnated on

some type of grain (milo, kernelled wheat, barley) or in some case mixed with and pelleted in a dried alfalfa type mix. Strychnine alkaloids baits are formulated with anywhere from 0.1% to 3% active ingredient and generally, the higher the concentration of strychnine, the more effective is the bait. Strychnine is one of the most toxic pesticides known to humans and other vertebrates. The use of rodenticides poses the largest risk to non-target species. As noted earlier many rodenticides and gas fumigants are controlled substances by the Environmental Protection Agency and must be administered by licensed operators.

The use of ignited gas machines (such as the Rodenator presently being used by the Woodside Homeowner's Association) are an excellent alternative for controlling large and small populations of rodents. When used properly on targeted species, ignited gas machines have a high rate of efficacy and rarely affect non-targeted species. For example: the 3 main periods when Wyoming ground squirrels are most susceptible and available for control are: (1) during breeding season when equal numbers of male and females are active above ground; (2) when the young appear above ground in the spring until aestivation; and (3) in the fall of the year when adults emerge from aestivation and before they enter hibernation in the winter. Trapping and shooting, although effective means of rodent control, are time consuming and best used for small areas with light populations.

Conclusion

In the opinion of this Woodside resident, the use of the Rodenator as a means of controlling rodent populations near residences, in horse corrals, dog enclosures, and trails within the Woodside Homeowners Association is one that should continue and be promoted.

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Appendices

Appendix 1 Nuisance Wildlife Laws in Colorado

Note:

This article has been prepared by Dr. Mit Parsons at the request of the leadership of Woodside Home Owners Association. The author has been a resident within Woodside since 1993 and is a retired Wildlife and Fisheries Ecologist from the USDA Forest Service. Dr. Parsons is a certified Wildlife Biologist and Certified Fisheries Scientist. He is a consultant in natural resource management and has his own business, MitPar Enterprises.