

- The number of available baiters must be sufficient to permit complete coverage of the area requiring protection. This often becomes a problem on large areas of several hundred acres or more in size.

Probing. This is the most commonly followed method of hand baiting. It is the fastest hand-baiting technique but requires considerable knowledge of gopher habits to be done effectively.

Ideally, a probe should be of metal. It should have a small end of 1/4" to 3/8" diameter for exploration and a larger end of 3/4" diameter for opening the bait-drop hole. Both ends should be sharpened for easier soil penetration. A short handle welded at a right angle to the large end is also helpful when probing in hard soil or heavy sod.

Expertness in using the probe is gained largely through experience and self-training. The first step is to select a spot on which to check for the presence of a burrow. The probe then should be forced gradually into the ground at that location. If the choice is correct, a sudden release of pressure will be felt when the point enters the burrow.

Initial attempts at probing should be verified by digging out the lateral and part of the main runway. In this way, errors can be discovered quickly and corrected.

The following sequence should be followed when baiting with a probe:

1. Select an area with recent mound-building activity.
2. Locate the main runway by probing-out a lateral runway to its junction with the main runway. Laterals usually will join a main run within two feet or less. One or two test probes down each arm of the main runway to form a rough "T" will verify the location of the runway.

Main runways also may be located by the presence of small convex earth plugs. The plugs are made when gophers close their burrows upon returning from surface excursions. A probe should be made directly into the earth plug, as the main runway is often immediately below.

3. Enlarge a probe hole in the main runway to accept the bait—being careful to avoid making a deep hole in the bottom of the burrow.
4. Drop a level teaspoonful of strychnine-treated oats into the burrow.
5. Carefully cover all probe holes with clods, rocks, or other suitable material to prevent light from entering the burrow system.
6. Bait two to five spots in what appears to be the active working area of a single gopher.
7. Mark treated areas by scuffing the tops of several earth mounds. This will prevent confusion if several people are working in the same area.

Excavating. Opening main runways with a garden trowel is a positive method for locating the best baiting spot. The only disadvantage is that it is relatively slow.

Excavating is an excellent way to study the nature and arrangement of the burrow systems of gophers and in this respect serves as a useful tool for training inexperienced baiters to use a probe. One or two days of burrow excavation before advancing to a probe will help insure good control results.

Baiting should be done in the following way:

1. Select an area with recent mound-building activity.
2. Open an earth plug at a lateral or main runway to its junction with the main runway. Avoid disturbing the main burrow, if possible.
3. Place a teaspoonful of strychnine-treated oats into the main burrow, several inches from the opening.
4. Carefully close the opening with a clod or rock to exclude all light. Do not allow an excessive amount of soil to fall into the burrow.
5. Bait two spots in what appears to be the active working area of a single gopher.

Machine Baiting. The forest-land burrow builder provides an effective means for controlling pocket gophers within limits determined by slope, surface and subsurface obstructions, soil texture, and soil moisture.

The machine is pulled through the soil creating an artificial burrow, and at the same time depositing small amounts of strychnine-treated oat bait. Gophers locate the new burrows and eat the deposited bait within a few days. Maximum control is usually achieved within 7 to 10 days after treatment.

Individual Tree Protection. "Vexar" plastic seedling protectors offer excellent protection of roots and stems of several conifer species (Anthony et al. 1978) and are being used operationally on several national forests in western United States to minimize pocket gopher-reforestation conflicts.

Snowshoe Hares (*Lepus americanus*)

Life History Information

Preferred Habitats. Snowshoe hares occupy most commercial forest lands in the region provided there is an abundance of brush, bracken fern, and other good protective cover.

Feeding Habits. Foliage of a wide variety of grasses, forbs, shrubs, and trees are eaten readily. Hares prefer a woody diet of foliage, stems, and bark of shrubs and trees throughout most of the year, although herbaceous vegetation is the predominant food in summer. Damage to conifer tree seedlings, however, occurs mainly from late fall through early spring.

Control

Follow the same measures as outlined for snowshoe hares.

Mountain Beaver (*Aplodontia rufa*)

Life History Information

Preferred Habitat. Distribution is limited mainly to western Oregon and Washington, although the range of the species extends from southern British Columbia to central California. Mountain beaver are found in suitable forested habitats throughout their range; mountain beaver populations thrive on suitable sites on cutover areas. Populations are most abundant near drainages and on areas with moist, deep soils.

Feeding Habits. The mountain beaver is herbivorous and eats a wide variety of herbaceous and woody plants. Sword fern, bracken fern, and salae comprise an important part of its diet throughout the year.

Activity. Most surface activity takes place at night, but movements within the extensive burrow system may occur during the night or day. Mountain beaver do not hibernate. Some burrowing may occur in the snow. Late spring is the season of greatest activity for burrowing and "cleaning out" burrow systems.

The burrow system consists of extensive irregular tunnels, 4 to 8 inches in diameter. These tunnels form a network of passages from a few inches to several feet beneath the ground surface. There are many entrances and unrepaired roof openings.

The nest is a deep and fairly elaborate structure containing numerous layers of packed leaves and other foliage.

Although not sociable, mountain beaver often densely populate areas. One sample area 100 by 500 feet was estimated to have a population of 11 animals. There were 100 burrow entrances in this area.

Reproduction. Breeding takes place once a year in late February or early March. Two or three young are born at the end of a gestation period of 28 to 30 days. Females do not bear young until they are in their second year.

Control

Control of mountain beaver in large areas often has been unsuccessful. Control measures are effective only when the animals are actively feeding and moving about. At the present time, kill-trapping is the only method available for reducing mountain beaver populations. Its relation to reducing damage is not known.

No federally registered rodenticides are available now for use for control of mountain beaver on public or private lands in Oregon and Washington. An EPA ruling on field use of strychnine, subsequent to

Executive Order No. 11643, prevent use of strychnine (shipped in interstate commerce) on fresh baits for control of mountain beaver except under special state registration.

Trapping. Trapping is an effective method of removing mountain beaver from small areas. The conibear trap is recommended. Traps should be set on the ground inside the entrance of an active burrow. Before setting a trap in a burrow, be certain that the opening is not being used for pushing out soil or plant debris. Secure traps with stakes and chains. Set upright and at right angles to the underground runways. There is no need to conceal or cover traps. Visit sets at least twice daily to insure maximum effectiveness of traps. Steel leg-hold traps are not recommended for use against mountain beavers.

Meadow Voles (*Microtus* sp.)

Life History Information

Preferred Habitat. Meadow voles occur in a variety of sites in which sufficient vegetation is produced to provide food and cover. Areas of dense grass provide the most desirable habitat.

Feeding Habits. Vegetation, including grass, herbaceous foliage, twigs, roots, seeds, and bark are acceptable foods.

Activity. Meadow voles are active both day and night throughout the year. Their presence is readily detected by distinct winding runways beneath the vegetation. Each vole generally maintains its own set of runways, but its territory may be occupied by several voles. Individual home ranges vary from a few square feet to areas as large as a tennis court.

Reproduction. Four to 10 young are born after a short gestation period of 3 weeks. Females can breed when only weeks old and many have litters continuously from early spring to late fall. Populations often fluctuate drastically from year to year.

Control

Baiting. Meadow voles usually can be controlled with a 1-percent, zinc phosphide-treated grain bait. Distribute the bait in quantities of one-half teaspoonful directly in runways and burrows. The quantity of bait needed per acre will vary depending upon mouse density and distribution and density of cover.

Two pounds of bait per acre normally will be enough to control high populations in dense cover. Correct bait placement is very important, as the voles seldom venture from the protection of their runways. Baiting is most effective in late fall, but should be initiated as soon as meadow voles are detected on the plantation. Baiting may be needed for several years in problem areas.

Habitat Manipulation. Removing food and cover is an effective method for controlling damage by meadow voles, but it may have adverse effects on other wildlife. This approach to damage control is generally limited to old fields and other areas where heavy equipment can be operated. Habitat manipulation can be accomplished by cutting, cultivating, burning, or spraying grasses with herbicides.

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Activity. Daily movements usually are limited to a small area. The period of greatest activity is from dusk to dawn. Snowshoe hares do not migrate but may shift their feeding activities to different vegetative types during deep snow conditions in winter.

Reproduction. Snowshoe hares normally have three to four young per litter and may have up to four litters a year. Young are born from April through August. The gestation period is from 36 to 40 days. Hares are precocial at birth—the newborn young are well-developed and are soon able to move about.

Control

No federally registered rodenticides are available now for use on fresh baits for control of hares or rabbits on public or private lands in Oregon and Washington. An EPA ruling on field use of strychnine, subsequent to Executive Order No. 11643, prevents use of strychnine (shipped in interstate commerce) on fresh baits for control of hares or rabbits.

Silvicultural Practices. Disposing of slash, brush, and accumulations of logging debris will reduce the attractiveness of the habitat for hares. When a serious, hare damage problem is anticipated, use of large seedlings 2 or more feet in height will reduce feeding damage.

Individual Tree Protection. Plant trees that have been treated with Thiram (TMTO) animal repellent. Repeated applications of Thiram in the field may be required, after each growing season, until trees grow large enough to be out of danger. The repellent can be applied effectively with a back-pack sprayer. The recommended dilution is 1 gallon of 20 percent Thiram to 1 gallon of water.

Tubes of plastic fabric also may be used to protect individual tree seedlings. The tubes can be placed on newly planted or established seedlings and will provide protection of new and old foliage from clipping by hares (Campbell, 1969; Campbell and Evans 1975a).

Brush Rabbit (*Sylvilagus bachmani*)

Life History Information

Preferred Habitat. Dense brush interspersed with openings provides ideal habitat. Distribution is limited to the area west of the Cascades' crest in Oregon. Brush rabbits do not occur in Washington.

Feeding Habits. Buds, twigs, bark, grasses, and a wide variety of succulent forbs are eaten.

Activity. The main period of activity is from dusk to dawn. Movements are confined to very small areas. The young are born nearly hairless and blind at birth and spend a much longer time in the nest than do hares.

Reproduction. Brush rabbits normally have two or three litters per year, with three to six young per litter.

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