

**VOLES IN MONTANA
THEIR BIOLOGY, DAMAGE AND CONTROL**

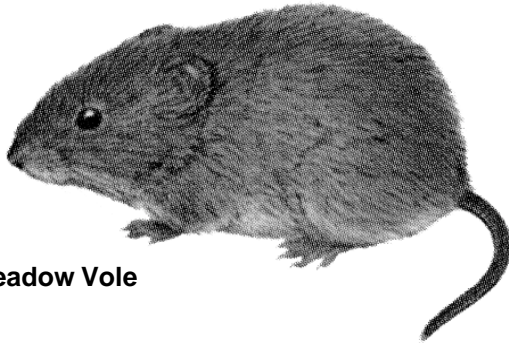


**MONTANA DEPARTMENT OF AGRICULTURE
BOX 200201
HELENA, MT 59620-0201**

VOLES OF MONTANA - THEIR BIOLOGY, DAMAGE, AND CONTROL

IDENTIFICATION

Voles (often called meadow or field mice) have stocky bodies with short legs and short or long tails depending on the species. They vary from gray to dark brown in color. Their eyes are small and the ears are inconspicuous.



Meadow Vole

Voles belong to the Genus *Microtus*. There are 8 species of voles in the Montana. Four species may cause significant economic damage. These four species and their habitats are:

Meadow vole (*Microtus pennsylvanicus*): 5 1/2 to 7 1/2 inches in total length; the tail is short; the fur is gray to yellow-brown with black tipped guard hairs; the most common and widely distributed vole species in Montana; usually found in moist, grassy habitats.

Prairie vole (*Microtus ochrogaster*): 5 to 7 inches in total length (nose to tip of tail); gray to dark brown in color; found in the drier prairie habitats of central and eastern Montana.

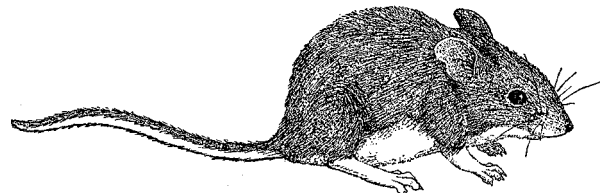
Long-tailed vole (*Microtus longicaudus*): 6 to 8 1/2 inches long (the tail length is more than 50% of body length); gray to dark brown with grayish-white or yellowish underparts; found in a wide variety of habitats in the western half of Montana.

Montane vole (*Microtus montanus*): 5 1/2 to 8 1/2 inches long; brown with silver-gray feet and whitish underparts; short tail; found in dry grasslands to moist meadows from valleys to tundra in SC and SW Montana.

Other common rodent species in Montana that may occupy similar habitat that are sometimes confused with voles are the deer mouse (*Peromyscus maniculatus*) and the northern pocket gopher

(*Thomomys talpoides*). These species are easily distinguished from voles by appearance and habits.

Deer mice are strongly bi-colored with tannish-brown backs and white stomachs, large ears and eyes, and a long bi-colored tail. Deer mice are widely distributed and found in many habitats. Deer mice do not make ground surface runways or tunnel systems and leave little sign of their presence. They are predominately seed eaters. Deer mice commonly occupy homes and other structures.



Deer Mouse

Pocket gophers are somewhat similar to voles in appearance but are larger and better adapted for digging. They inhabit closed, underground burrow systems and are seldom seen above ground. The presence of pocket gophers is evident by the presence of mounds of soil excavated from underground burrows that have no obvious opening to the burrow system. Pocket gophers feed on plant roots that they search for by digging shallow burrows beneath the ground surface.



Pocket Gopher

VOLE HABITAT

In general, voles prefer areas with a dense ground cover of grasses and litter. They live in underground tunnel systems with open entrances approximately 1 to 2 inches in diameter. These burrow openings

are connected by a maze of 1 to 2 inch wide surface runways over the ground usually beneath vegetation or litter. Feces and small pieces of vegetation may be found in these runways. Vegetation near runways may be clipped to ground level. Stripping and gnawing of the bark of shrubs or trees may indicate the presence of voles.

In addition to natural habitats, voles will occupy areas modified by humans such as orchards, reforested areas, windbreaks, lawns, nurseries, golf courses, cemeteries, and agricultural fields such as hay and alfalfa. Voles do not generally inhabit buildings or structures as do pack rats, house mice, and deer mice.

FOOD HABITS

Voles eat a wide variety of plants, mostly grasses and forbs, including alfalfa. They also readily consume seeds, bulbs, rhizomes, tubers, and perhaps some insects. In fall and winter when grasses are dry or decomposing, voles may strip the bark of trees and shrubs and consume the cambium layer. Voles can cause economic damage to agricultural crops, particularly when populations are high.

BIOLOGY, REPRODUCTION, AND BEHAVIOR

Voles live in a complex system of tunnels interconnected by runways along the ground surface. Their home range is about 1/4 acre and a single tunnel system may contain several adults and numerous young. Voles do not hibernate and are active day and night throughout the year.

Voles normally breed in the spring and summer but may continue throughout the year. They produce 1 to 5 litters per year per female with an average of 5 or 6 young per litter. The gestation period is 21 days and females are sexually mature in 35 to 40 days. The life span of voles in the field is short, 2 to 16 months, and mortality is high in the first month of life.

Vole population densities fluctuate widely from year to year. Typical population numbers vary from several voles per acre in low cycles to several thousand

per acre in high cycle years. Although populations usually peak every 2 to 5 years, these cycles are not predictable. High vole populations often decline suddenly because of food shortages or diseases.

DAMAGE

Damage caused by voles can occur in many forms and degrees of severity, depending on population numbers and environmental conditions. Most damage consists of gnawing, clipping, eating plants and damage usually occurs in fields or outside locations since voles rarely occupy buildings, storage facilities, or homes.

Voles eat agricultural crops such as alfalfa, clover, sugar beets, grains, potatoes, and other vegetables. Such damage is usually directly proportional to vole population numbers. Burrowing activities and tunnel systems may disrupt irrigation.

During winter months or at times of drought, voles often move from surrounding areas into yards, gardens, golf courses or cemeteries. They may burrow and create runways that damage lawns or gnaw and consume flowers, bulbs, or tree and shrub bark.

Orchards, trees farms, shelter belts, and nurseries can experience damage when bark is shredded and the cambium layer is gnawed and eaten. This usually results in permanent damage or death of the trees, shrubs, or seedlings and most often occurs in the fall and winter months.

Identification of damage caused by voles can be distinguished from that of other animals by observing the gnawing marks and signs in the vicinity. Vole gnawing marks are in irregular patches and at various angles. Teeth marks are about 1/8 inch wide, 3/8 inch long, and 1/16 inch or more deep.

VOLE DAMAGE PREVENTION AND CONTROL

As with most pest or damage control situations, there is seldom a single solution to preventing vole damage. Several of the following damage control methods used in an integrated pest management approach may be necessary to prevent or reduce vole dam-

age. Which methods should be used will depend on cost, time, labor, size of area affected, vole population numbers, environmental conditions, effect on nontarget species, and personal control philosophies.

Cultural Methods and Habitat Modification

Modifying vole habitat and initiating certain cultural practices can reduce the occurrence and severity of vole damage. The ability of an area to support a population of voles can be greatly reduced by eliminating or reducing ground cover and litter. Lawns, turf, ornamental areas and orchards should be mowed regularly. Mulch and litter should be cleared for a 3-foot or more distance from tree bases. Adjacent crop fields and irrigation systems can be protected by mowing, spraying or grazing ditch banks, rights-of-way and water ways. Vole runways and burrow systems, cover, and food supply are destroyed by soil tillage. Flood irrigation can reduce numbers of voles and other rodents.

Exclusion

Use of hardware cloth with 1/4 inch mesh, metal flashing cylinders, or rodent proof wraps can exclude voles from seedlings or young trees. These barriers should be buried at least 6 inches beneath the soil surface to prevent voles from burrowing under them. These wraps should extend up the trunk of the tree above the expected snow depth.



Exclusion of large areas by fencing or similar mechanical barriers is not practical.

Repellants

Currently, the only registered repellent for voles in Montana is thiram. This repellent formulation is mixed and sprayed on non-bearing fruit trees, shrubs, nursery stock and ornamentals to reduce or prevent gnawing. It may only provide short term protection and requires frequent reapplication which is difficult to accomplish in freezing temperatures.

Fumigants

Fumigant gases do not disburse effectively throughout vole burrows because burrows are complex and gases tend to escape because the burrows are shallow. Fumigants are not generally ineffective in controlling voles and not recommended.

Trapping

Trapping voles is usually restricted to small areas such as yards since time and labor cost are too prohibitive for use on large areas. Trapping is a good tool for identification and for monitoring vole numbers. Voles can be caught in mouse snap traps by placing the traps perpendicular to the runways with the unbaited trap trigger in the runway. If snap traps with enlarged trigger pans are used, voles will usually trip them and be caught by running across them during normal travel in the runway system. If bait is used, apple slices or a peanut butter/oat mixture are usually effective.

Predation

Voles provide a prey base for a large variety of mammalian, avian, and reptilian predators. However, factors affecting vole reproduction such as postpartum breeding, early maturity, synchronous breeding, and high reproductive potential prevent predators from eliminating vole populations or substantially reducing their numbers. Predators do consume large numbers of voles and their presence should be encouraged in any integrated vole control program.

Toxicants

Although widely used previously for vole control, toxicants currently registered are limited to specific uses. The use of toxicants is not a control option for the homeowner because baits are not registered for home/yard/garden use. The registered vole toxicants can only be used on rangeland, pastures, orchards and nurseries - not on other types of cropland. Read and follow all label instructions.

Zinc phosphide baits used for vole control are restricted use pesticides that require a license for purchase and application. Various formulations of zinc phosphide pellets, grain, and concentrate baits are registered and used for controlling vole damage. These baits are generally hand baited in runways and burrow openings or broadcasted at a rate of 6 to 10 lbs of bait per acre. Prebaiting (applying a similar, nontoxic bait prior to treatment with the toxic bait) is usually not needed for vole control but may be necessary if bait shyness is evident. Zinc phosphide baits should not be used in areas frequented by seed eating birds such as waterfowl and grouse.

Ramik Brown, an anticoagulant bait, is registered for vole control in orchards. This rodenticide is slower acting than acute toxicants requiring 5 to 15 days to take affect. Multiple feedings of the bait over several days are usually required to be effective. Apply anticoagulant baits according to label instructions which may consist of hand baiting, broadcasting, or use of bait stations.

Use restrictions of toxicants and environmental safety stress the need to use an integrated approach to vole control that considers all possible damage reducing techniques.

SAFETY

Hazard to nontarget animals from toxic baits is present in two ways: primary poisoning - direct consumption of the bait material; and secondary poisoning - consumption of poisoned vole carcasses by predators and scavengers.

Nontarget animals most at risk from primary poisoning are domestic livestock and poultry and cer-



tain species of seed-eating birds including waterfowl, grouse, and some songbirds. Hazards from primary poisoning can be reduced by following pesticide label directions and precautions and common sense safety such as:

- 1) Keep baits in original labeled containers and store in locked weather tight storage when not in use.
- 2) During application keep excess bait in locked or latched storage to prevent access by livestock or children.
- 3) Use calibrated dippers or spoons for applying bait. Apply only the label recommended amount. Scatter the bait along runways and near burrow openings. Do not pile the bait because this increases hazard to livestock and wildlife.
- 4) Remove livestock from treated areas when possible. In addition to reducing risk to livestock, vole control will improve if livestock are not trampling on bait placements.
- 5) In areas known to be frequented by waterfowl or other seed-eating birds, consider additional precautions such as patrolling the area or using scare devices after bait application.
- 6) Pick up and bury any spilled bait.

Secondary hazard from anticoagulants is of most concern with dogs, fox, coyote, and other canids. Most birds have a higher tolerance for exposure to anticoagulants but can become sick or be killed if they have opportunity to feed on several carcasses. Voles poisoned with an anticoagulant generally die below ground in their burrows. Some will die above ground and if found should be buried and covered with soil. This will reduce the risk to scavengers. Always notify neighbors of your bait applications. Suggest confinement of dogs, cats, or other animals for a period of time after bait application. In warm weather, carcasses decompose rapidly and present little hazard after 5 to 10 days.

Secondary hazard from zinc phosphide is considered low but scavengers can and do die from eating carcasses containing zinc phosphide. Zinc phosphide in the presence of digestive acids within the intestinal tract converts to phosphine gas, the actual poisoning agent. The phosphine gas dissipates from the carcass quickly after death leaving little residue to cause secondary poisoning.

DISEASE

Although voles are capable of carrying rodent borne disease organisms such as plague, tularemia and hanta virus, human exposure is greatly reduced because of infrequent contact. Voles rarely inhabit homes and other structures as do rodents such as deer mice, house mice, and pack rats. However, people who trap or directly handle any rodents should take recommended precautions and wear protective clothing and gloves. Contact public health officials or official publications for further information.

**MONTANA POISON CONTROL
INFORMATION CENTER
1-800-525-5042**

DEPARTMENT SERVICES

As with most programs, rodent control will be most effective where a coordinated effort is established by all landowners. A Department of Agriculture specialist will work with county commissioners, extension agents, and landowners to establish a program suited to local and county needs. Field demonstrations are provided free of charge to inform landowners how, when, and where to control voles and other rodent pests. Interested individuals should contact the:

**Montana Department of Agriculture
Box 200201
Helena, MT 59620-0201
Telephone: (406) 444-5400
TDD (406) 444-4687]:**

In Billings: Monty Sullins
Telephone - (406) 652-3615

In Helena: Daniel Sullivan
Telephone - (406) 444-5400

**ROCKY MOUNTAIN
POISON CENTER
1-800-332-3073**