Vole

Ecology & Damage Management

USDA Wildlife Services
Extension
Wisconsin DNR

Meadow vole – Andrew Hope/USGS

Voles are a type of rodent native to Wisconsin. Many people commonly but mistakenly refer to them as meadow or field mice. Voles and mice, however, are two different types of small mammals.

There are four species of voles in Wisconsin that are found in a variety of habitats throughout the state. In addition, the southern bog lemming is typically considered a type of vole as it is in the same subfamily as voles. While populations of voles fluctuate year to year, vole densities can be high because of their ability to have multiple litters throughout the year.

SUMMARY

When and where possible, the key to successfully managing damage from voles is to take action before damage occurs. Oftentimes this means implementing non-lethal practices, lethal practices, or both in the fall before damage occurs throughout the winter and is concealed by snow.

There are other management practices that are used to manage vole damage, but the ones detailed in this publication tend to be the most effective.

(see individual species descriptions inside)

"The key to successfully managing damage from voles is to take action before damage occurs."

David L. Clement, University of Maryland, Bugwood.org

Vole tunnels in a lawn.

Brenda Lucas, Bugwood.org

Vole tree girdling.

Description/Habits

WISCONSIN VOLES AND THE SOUTHERN BOG LEMMING


FIGURE 1

Meadow vole (*Microtus pennsylvanicus*)

The meadow vole (Figure 1) is distributed and common across all of Wisconsin. The head and body measure 4–5 inches in length, and the tail adds another 1.5–2.5 inches. Their fur has a grizzled appearance with the back being dark brown with red and black highlights, and the belly is grayish. Meadow voles occupy aboveground areas with overgrown grass or meadows as well as the edges of forestlands. They are active year-round and during the day and night.


FIGURE 2

Prairie vole (*Microtus ochrogaster*)

The prairie vole (Figure 2) is found primarily in the southern and western parts of the state. The head and body measure 4–5 inches in length, and the tail adds another 1–1.5 inches. The prairie vole's coarse, long fur is grizzled gray-brown to yellow-brown on the back and buff/cream on the belly. Prairie voles are found in prairies and dry grassy meadows and fields. They are active year-round and during the day and night, and they use both aboveground runways and underground dens.


FIGURE 3

Southern red-backed vole (*Clethrionomys gapperi*)

The southern red-backed vole (Figure 3) is found in the northern two-thirds of Wisconsin. The head and body measure 3–4 inches in length, and the tail adds another 1–2 inches. Red-backed voles are unique because of the distinctive dark red/brown or chestnut coloring that runs from the top of their head down the back. The belly fur, however, appears silvery white. This species occupies pine forests, spruce bogs, swamps, and wetlands and is active year-round and during the day and night. Red-backed voles use aboveground runways as well as the underground tunnels of larger mammals.


FIGURE 4

Woodland vole (*Microtus pinetorum*)

The woodland vole (Figure 4) is found primarily in the southwestern corner of the state. The head and body measure 3.25–4.5 inches in length, and the tail adds another 0.5–1.25 inches. The woodland vole's coat is generally chestnut brown with a gray underside. Although woodland voles are sometimes referred to as pine voles, they primarily inhabit areas with hardwood trees and abundant leaf litter. They are active year-round during both the day and night, and they can spend a considerable amount of time in underground tunnels and dens.


FIGURE 5

Southern bog lemming (*Synaptomys cooperi*)

The southern bog lemming (Figure 5) is distributed throughout all of Wisconsin. The head and body measure 5–5.5 inches in length, and the tail adds another 0.5–1 inch. They are reddish-brown on their back and sides with silvery gray on their bellies. Despite their name, lemmings do not inhabit bogs but rather grassy meadows and hardwood and pine forests. They are active year-round during the day and night, and they travel in underground tunnels and runways on top of the ground.

Photos: Meadow vole – Andrew Hope/USGS; Prairie vole – Carnivora; Southern red-backed and woodland voles and southern bog lemming – Phil Myers, Zoology Museum, University of Michigan.

Description/Habits (continued)

Food Resources

The diet across all of Wisconsin's vole species consists primarily of green plant materials such as grasses and forbs. In fall, it is common for most vole species to begin storing seeds, tubers, and bulbs. When food is scarce or population numbers are high, voles will consume bark from woody vegetation and agricultural or garden crops. Occasional food items for some vole species may also include insects, nuts, fruits, and fungi.

Reproduction

Voles are highly prolific breeders. Depending on the species, voles may breed 2–15 times per year between January and November. Because voles have an average of 2–7 young per litter and relatively short gestation periods (19–26 days on average), they are able to increase populations quickly.

LEGAL STATUS

Neither federal nor Wisconsin state law protects meadow voles, southern red-backed voles, or southern bog lemmings. Landowners are allowed to manage these species lethally or non-lethally whenever damage occurs. Both woodland and prairie voles are listed as species of special concern in Wisconsin.

Although there are no laws regulating possession or harvesting of these two species, it is recommended that you contact the Wisconsin Department of Natural Resources prior to using lethal methods for guidance on managing damage caused by woodland and prairie voles in order to sustain their populations.

IDENTIFYING VOLE DAMAGE

The following damage identification tips and management options focus mostly on meadow voles because they are the most common vole species and cause the most damage.

Surface runways are one of the most recognizable signs of meadow voles (Figures 6 and 7). Surface runways are 1–2 inches wide, and frequently used runways may have grass and other nearby vegetation clipped close to the ground. Feces and small pieces of clipped vegetation can also be found in surface runways. Although not as easily seen as the surface runways of meadow voles, shallow tunnels constructed just under the ground's surface by woodland voles may be detectable. Tunnel and burrow construction can cause damage to roots of plants and interfere with crop irrigation by displacing water and causing levees to wash out.

Additional problems caused by voles include girdling and gnawing damage (Figure 8) on orchards, ornamentals, and tree plantings, and voles can eat plant material ranging from field crops (i.e., grain, potatoes) to seeds, bulbs, and rhizomes. Girdling and gnawing damage tends to be more common in the fall and winter and can occur to seedlings, mature trees, and other woody vegetation like shrubs. Gnawing damage is often distinguished by non-uniform gnaw marks at various angles and in irregular patches. Gnaw marks are about ⅛ inch wide, ⅜ inch long, and 1/16 inch or more deep.


Purdue Extension

FIGURE 6

Surface runways created by meadow voles. This damage typically occurs under snow cover during winter but disappears once the turf begins to grow again in the spring.


icwdm.org

FIGURE 7

Close-up view of a meadow vole runway.


Missouri Botanical Garden

FIGURE 8

Gnawing damage to woody vegetation caused by voles.

CONTROLLING VOLE DAMAGE

Non-lethal Management

The best way to deal with damage by meadow voles may be to prevent the damage in the first place. The most effective non-lethal prevention methods can include habitat modification or exclusion.

HABITAT MODIFICATION

The elimination of weeds, ground cover, and crop litter in and around the garden and lawn areas reduces the availability of food and cover for voles. Mulch should be cleared at least 3 feet from the base of trees to also eliminate cover. Lawn and turf should be mowed regularly. A weed-free or vegetation-free strip is an excellent buffer around areas to be protected. The wider the buffer strip, the less likely voles (primarily meadow voles) will cross it. Frequent tillage in the garden removes cover, destroys existing runways, tunnels, and burrows, and may eliminate a majority of the vole population.

In addition to decreasing available vole habitat, you may want to experiment with providing habitat that will attract predators of voles. Predators include, but are not limited to, raptors (hawks and owls), coyotes, fox, weasels, and mink. If you do not have adequate natural perches for raptors (for example, mature trees with extending branches), you can erect a perch pole. Plans for perch poles can be found online. For mammalian predators, the presence of voles may be enough to attract them. If not, you may want to try and concentrate voles in an area of your property by leaving overgrown vegetation or building a brush pile. Plans for a brush pile can also be found online.

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EXCLUSION

Wire or metal barriers, at least 12 inches high and with a mesh size of ¼ inch or less, can exclude voles from an area. Barriers can also be used to protect seedlings and young trees by encircling the seedling or tree (Figure 9). They should not be placed directly on the seedling or tree, however, but rather 1–2 inches from the trunk. This distance ensures that water is not held against the bark, which can cause mold and fungus issues, and it prevents leaves and grass from getting caught between the barrier and tree, which can attract wood-boring insects. The bottom edge of any barrier should be buried 6 inches below the ground to prevent ground-dwelling vole species from digging under the barrier. For vole species that tunnel under the ground, the barrier should be buried 12 inches below the ground surface. For increased protection, a 12 inch deep by 12 inch wide trench should be dug, and the barrier should be buried 12 inches deep and then bent in an "L" shape and extended 12 inches outward from the area being protected. Once the barrier is installed, the trench should be backfilled.

DFW photo illustration

FIGURE 9

Tree guards can be an effective way to reduce or even eliminate vole damage to woody vegetation. It is important to put tree guards in place before winter as significant gnawing damage from voles can occur under the snow.

REPELLENTS

Repellents have not been demonstrated to be an effective management option. Those that contain thiram or capsaicin as an active ingredient may work; however, repellents require frequent reapplication and may only be effective on a short-term basis.

Lethal Management

TOXICANTS

Toxicants can be a useful tool for vole control, but there are some hazards that come along with using this technique. As with all toxicants, follow the manufacturer's suggested guidelines on the container, and do not use the toxicant in any way that is not manufacturer approved and recommended (referred to as "off-label"). Be sure to wear proper protective gear like rubber gloves and any other recommended personal protective equipment. Toxicants should be used with considerable care not to harm humans, domestic animals, or other non-target species. To avoid injury and death to non-target species, broadcasting bait should not be done. Instead, tamper-resistant bait stations should be used. Bait stations can be purchased commercially or constructed from PVC pipe, among other materials. A T-shaped bait station can be constructed from 1½ inch diameter PVC pipe (Figure 10). The pipe forming the bottom of the "T" should be left open so voles can enter and exit, and the ends of the "T" should be capped. The caps should be removable so bait can be placed in each end of the "T". In addition, any carcasses on the landscape that died as a result of ingesting toxicants should be collected and disposed of properly to avoid secondary poisoning of non-target wildlife.

Rutgers New Jersey Agricultural Experiment Station Cooperative Extension

FIGURE 10

A bait station made from PVC pipe. Bait stations protect non-target animals from accessing toxic bait.

One of the most commonly used single-dose (non-anticoagulant) toxicants for vole control is zinc phosphide. Zinc phosphide is a Registered Use Pesticide available as a concentrate or in pelleted or grain bait applications. As a Registered Use Pesticide, application must be done by a certified pesticide applicator. Zinc phosphide is marketed in Wisconsin under many different trade names and is available at farm supply, hardware, and garden stores, among others. Single-dose baits are most effective on vole species that live aboveground and do not store food. A permit from the Wisconsin DNR, Form 2300-081 "Pesticide Purchase and Use Permit Application For Small Mammal Control," is required to use zinc phosphide or any other restricted use pesticide.

Baits with anticoagulants may also be effective in controlling vole damage. Because most anticoagulants require more than one feeding for maximum effectiveness, these types of toxicants are most effective for vole species that live in belowground tunnel systems and eat food stored in underground caches. However, anticoagulant baits are slow-acting and may take up to 15 days to be successful. Anticoagulants may be purchased at farm supply, hardware, and garden stores.

Hand placement of baits directly in tunnels and burrow openings is more effective for woodland (pine) vole control since their activities are largely confined to their subterranean burrows. Since woodland voles cache food and meadow voles do not, woodland voles can be more susceptible to baits that require repeated intake, such as anticoagulants. The differing food preferences of voles should also inform the selection of bait. Meadow voles will feed on dry baits such as corn and oats, whereas woodland voles prefer fleshy baits like apples.

TRAPPING

Trapping can be an effective management option for voles on relatively small properties like residential yards and may be cost-effective for nursery and agricultural operations that are either experiencing relatively little vole damage or are farming relatively small acreages. Trapping generally becomes expensive both in time and money when vole populations are large.

Trapping is most effective for vole species that are active aboveground. Snap traps (mousetraps) should be baited with a small dollop of peanut butter on the trigger and placed in areas where vole activity is noticeable, such as visible surface runways in the grass. For best results, the trap should be placed perpendicularly to the surface runway with the trigger of the trap in the middle of the runway. If non-target animals are getting caught in traps or eating the bait, you may want to enclose the trap(s) by building a mesh enclosure where voles can squeeze through the mesh openings but other animals cannot.

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Vole Ecology & Damage Management

This fact sheet is part of a series designed to help you successfully manage wildlife damage problems on your property. The series includes additional publications that focus on controlling damage from specific animals, plus an introduction to wildlife damage management.

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