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White-Footed and Deer Mice

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WHITE-FOOTED AND DEER MICE

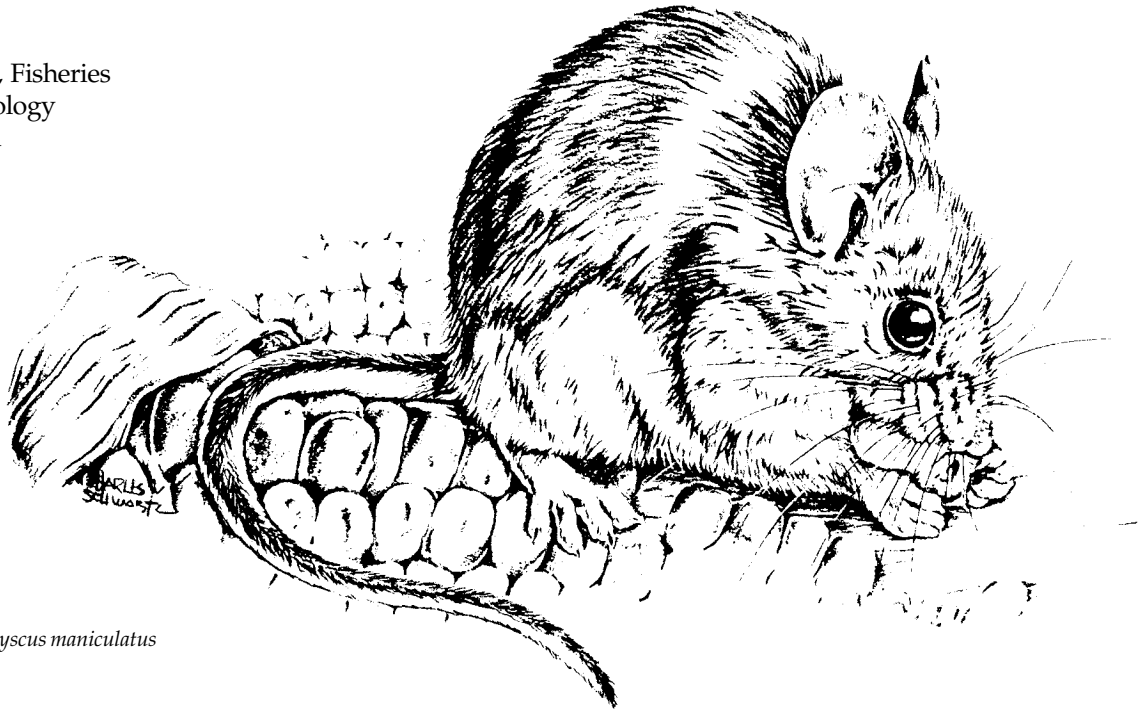


Fig. 1. The deer mouse, *Peromyscus maniculatus*

Damage Prevention and Control Methods

Exclusion

Rodent-proof construction will exclude mice from buildings and other structures.

Use hardware cloth (1/4-inch [0.6 cm] mesh) or similar materials to exclude mice from garden seed beds.

Habitat Modification

Store food items left in cabins or other infrequently used buildings in rodent-proof containers.

Store furniture cushions, drawers, and other items in infrequently used buildings in ways that reduce nesting sites.

Frightening

Not effective.

Repellents

Naphthalene (moth balls or flakes) may be effective in confined spaces.

Toxicants

Anticoagulants.

Zinc phosphide.

Fumigants

None are registered.

Trapping

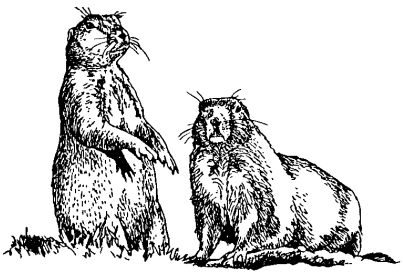
Snap traps.

Box- (Sherman) type traps.

Automatic multiple-catch traps.

Other Methods

Alternative feeding: Experiments suggest that application of sunflower seed may significantly reduce consumption of conifer seed in forest reseeding operations, although the tests have not been followed to regeneration.



PREVENTION AND CONTROL OF WILDLIFE DAMAGE — 1994

Cooperative Extension Division
Institute of Agriculture and Natural Resources
University of Nebraska - Lincoln

United States Department of Agriculture
Animal and Plant Health Inspection Service
Animal Damage Control

Great Plains Agricultural Council
Wildlife Committee

Identification

Fifteen species of native mice of the genus *Peromyscus* may be found in the United States. The two most common and widely distributed species are the deer mouse (*Peromyscus maniculatus*, Fig. 1) and the white-footed mouse (*P. leucopus*). This chapter will deal primarily with these species. Collectively, all species of *Peromyscus* are often referred to as "white-footed mice" or "deer mice." Other species include the brush mouse (*P. boylei*), cactus mouse (*P. eremicus*), canyon mouse (*P. crinitus*), cotton mouse (*P. gossypinus*), golden mouse (*P. nuttalli*), piñon mouse (*P. truei*), rock mouse (*P. difficilis*), white-ankled mouse (*P. pectoralis*), Merriam mouse (*P. merriami*), California mouse (*P. californicus*), Sitka mouse (*P. sitkensis*), oldfield mouse (*P. polionotus*), and the Florida mouse (*P. floridanus*).

All of the *Peromyscus* species have white feet, usually white undersides, and brownish upper surfaces. Their tails are relatively long, sometimes as long as the head and body. The deer mouse and some other species have a distinct separation between the brownish back and white belly. Their tails are also sharply bicolored. It is difficult even for an expert to tell all of the species apart.

In comparison to house mice, white-footed and deer mice have larger eyes and ears. They are considered by most people to be more "attractive" than house mice, and they do not have the characteristic mousy odor of house mice. All species of *Peromyscus* cause similar problems and require similar solutions.

Range

The deer mouse is found throughout most of North America (Fig. 2). The white-footed mouse is found throughout the United States east of the Rocky Mountains except in parts of the Southeast (Fig. 2).

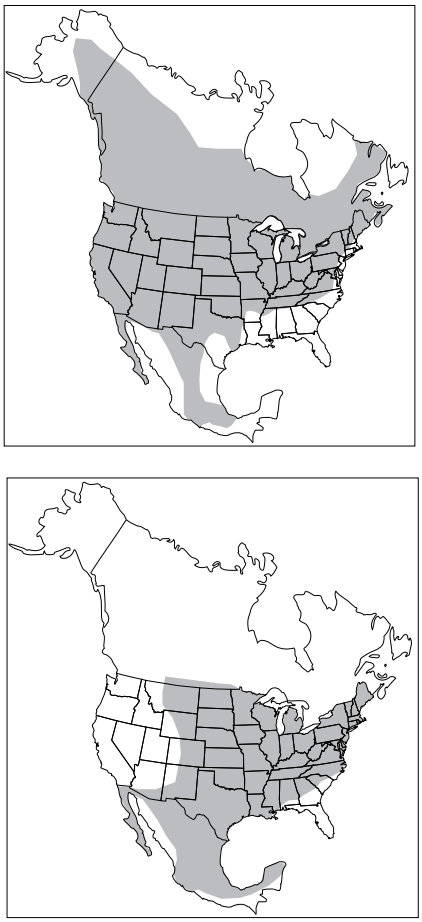


Fig. 2. Range of the deer mouse (*P. maniculatus*) (a) and white-footed mouse (*P. leucopus*) (b) in North America.

The brush mouse is found from southwestern Missouri and northwestern Arkansas through Oklahoma, central and western Texas, New Mexico, southwestern Colorado, Utah, Arizona, and California. The cactus mouse is limited to western Texas, southern New Mexico, Arizona (except the northeast portion), and southern California. The canyon mouse occurs in western Colorado, northwestern New Mexico, northern and western Arizona, Utah, Nevada, southern California, southeast Oregon, and southwestern Idaho.

The cotton mouse is found only in the southeastern United States from east Texas and Arkansas through southeastern Virginia. The golden mouse occupies a similar range but it extends slightly farther north.

The piñon mouse is found from southwestern California through the southwestern United States to the Texas panhandle. The rock mouse is limited to Colorado, southeastern Utah, eastern Arizona, New Mexico, and the far western portion of Texas. The white-ankled mouse is found only in parts of Texas and small areas in southern New Mexico, southern Oklahoma, and southern Arizona.

The Merriam mouse is limited to areas within southern Arizona. The California mouse ranges from San Francisco Bay to northern Baja California, including parts of the southern San Joaquin Valley. The Sitka mouse is found only on certain islands of Alaska and British Columbia.

The oldfield mouse is distributed across eastern Alabama, Georgia, South Carolina, and Florida. The Florida mouse, as its name indicates, is found only in Florida.

Habitat

The deer mouse occupies nearly every type of habitat within its range, from forests to grasslands. It is the most widely distributed and abundant mammal in North America.

The white-footed mouse is also widely distributed but prefers wooded or brushy areas. It is sometimes found in open areas.

The other species of *Peromyscus* have somewhat more specialized habitat preferences. For example, the cactus mouse occurs in low deserts with sandy soil and scattered vegetation and on rocky outcrops. The brush mouse lives in chaparral areas of semi-desert regions, often in rocky habitats.

Food Habits

White-footed and deer mice are primarily seed eaters. Frequently they will feed on seeds, nuts, acorns, and other similar items that are available. They also consume fruits, insects and insect larvae, fungi, and possibly some green vegetation. They often store quantities of food near their nest sites, particularly in the fall when seeds, nuts, or acorns are abundant.

General Biology, Reproduction, and Behavior

White-footed and deer mice are mostly nocturnal with a home range of 1/3 acre to 4 acres (0.1 to 1.6 ha) or larger. A summer population density may reach a high of about 15 mice per acre (37/ha).

In warm regions, reproduction may occur more or less year-round in some species. More typically, breeding occurs from spring until fall with a summer lull. This is especially true in cooler climates. Litter size varies from 1 to 8 young, but is usually 3 to 5. Females may have from 2 to 4 or more litters per year, depending on species and climate.

During the breeding season, female white-footed and deer mice come into heat every fifth day until impregnated. The gestation period is usually 21 to 23 days, but may be as long as 37 days in nursing females. Young are weaned when they are 2 to 3 weeks old and become sexually mature at about 7 to 8 weeks of age. Those born in spring and summer may breed that same year.

Mated pairs usually remain together during the breeding season but may take new mates in the spring if both survive the winter. If one mate dies, a new one is acquired. Family groups usually nest together through the winter. They do not hibernate but may become torpid for a few days when winter weather is severe.

Nests consist of stems, twigs, leaves, roots of grasses, and other fibrous materials. They may be lined with fur, feathers, or shredded cloth. The deer mouse often builds its nest underground in cavities beneath the roots of trees or shrubs, beneath a log or board, or in a burrow made by another rodent. Sometimes deer mice nest in aboveground sites such as a hollow log or fencepost, or in cupboards and furniture of unoccupied buildings.

White-footed mice spend a great deal of time in trees. They may use abandoned bird or squirrel nests, adding a protective "roof" of twigs and other materials to completely enclose a bird's nest (Fig. 3). Like deer mice, they nest at or just below ground level or in buildings.

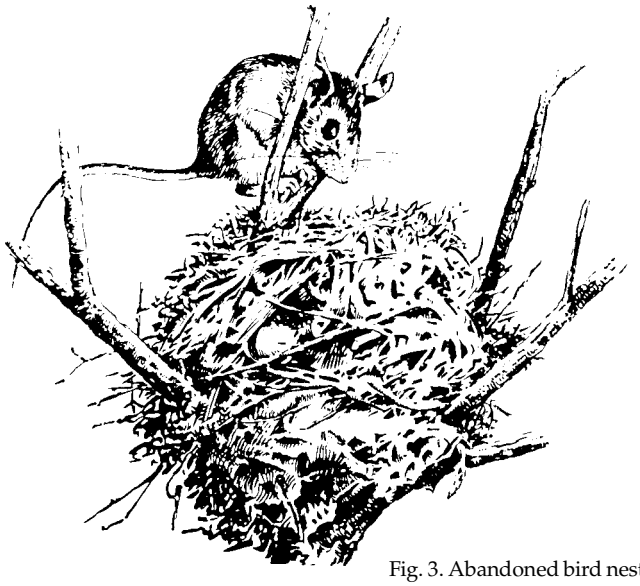


Fig. 3. Abandoned bird nests are frequently roofed and converted into white-footed mouse (*P. leucopus*) homes.

Damage and Damage Identification

The principal problem caused by white-footed and deer mice is their tendency to enter homes, cabins, and other structures that are not rodent-proof. Here they build nests, store food, and can cause considerable damage to upholstered furniture, mattresses, clothing, paper, or other materials that they find suitable for their nest-building activities. Nests, droppings, and other signs left by these mice are similar to those of house mice. White-footed and deer mice have a greater tendency to cache food supplies, such as acorns, seeds, or nuts, than do house mice. White-footed and deer mice are uncommon in urban or suburban residential areas unless there is considerable open space (fields, parks) nearby.

Both white-footed and deer mice occasionally dig up and consume newly planted seeds in gardens, flowerbeds, and field borders. Their excellent sense of smell makes them highly efficient at locating and digging up buried seed. Formerly, much reforestation was attempted by direct seeding of clear-cut areas, but seed predation by deer mice and white-footed mice, and by other rodents and birds, caused frequent failure in the regeneration. For this reason, to reestablish Douglas fir and other commercial timber species today, it is often necessary to hand-plant seedlings, despite the increased expense of this method.

In mid-1993, the deer mouse (*P. maniculatus*) was first implicated as a potential reservoir of a type of hantavirus responsible for an adult respiratory distress syndrome, leading to several deaths in the Four Corners area of the United States. Subsequent isolations of the virus thought responsible for this illness have been made from several Western states. The source of the disease is thought to be through human contact with urine, feces, or saliva from infected rodents.

Legal Status

White-footed and deer mice are considered native, nongame mammals and receive whatever protection may be afforded such species under state or local laws. It is usually permissible to control them when necessary, but first check with your state wildlife agency.

Damage Prevention and Control Methods

Exclusion

Rodent-proof construction is the best and most permanent method of preventing rodents from entering homes, cabins, or other structures. White-footed and deer mice require measures similar to those used for excluding house mice. No openings larger than 1/4 inch (0.6 cm) should be left unmodified. Mice will gnaw to enlarge such openings so they can gain entry. For additional information, see the chapter **Rodent-proof Construction** and **Exclusion Methods**.

Use folded hardware cloth (wire mesh) of 1/4 inch (0.6 cm) or smaller to protect newly seeded garden plots. Homemade wire-screen caps or bowls can be placed over seeded spots. Bury the edges of the wire several inches beneath the soil. Plastic strawberry-type baskets inverted over seeded spots serve a similar purpose.

Habitat Modification

Store foodstuffs such as dry pet food, grass seed, and boxed groceries left in cabins in rodent-proof containers.

Mouse damage can be reduced in cabins or other buildings that are used only occasionally, by removing or limiting nesting opportunities for mice. Remove padded cushions from sofas and chairs and store them on edge, separate from one another, preferably off the floor. Remove drawers in empty cupboards or chests and reinsert them upside-down, eliminating them as suitable nesting sites. Other such techniques can be invented to outwit mice. Remember that white-footed and deer mice are excellent climbers. They frequently enter buildings by way of fireplace chimneys, so seal off fireplaces when not in use.

When cleaning areas previously used by mice, take precautions to reduce exposure to dust, their excreta, and carcasses of dead mice. Where deer mice or related species may be reservoirs of hantaviruses, the area should be disinfected by spraying it thoroughly with a disinfectant or a solution of diluted household bleach prior to beginning any swepping, vacuuming, or handling of surfaces or materials with which mice have had contact. Use appropriate protective clothing, including vinyl or latex gloves. Contact the Centers for Disease Control (CDC) Hotline for current recommendations when handling rodents or cleaning areas previously infested.

Frightening

There are no methods known for successfully keeping white-footed or deer mice out of structures by means of sound. Ultrasonic devices that are commercially sold and advertised to control rodents and other pests have not proven to give satisfactory control.

Repellents

Moth balls or flakes (naphthalene) may effectively repel mice from closed areas where a sufficient concentration of the chemical can be attained in the air. These materials are not registered for the purpose of repelling mice, however.

Toxicants

Anticoagulants. Anticoagulant baits such as warfarin, diphacinone, chlorophacinone, brodifacoum, and bromadiolone are all quite effective on white-footed and deer mice, although they are not specifically registered for use on these species. Brodifacoum and bromadiolone, unlike the other anticoagulants, may be effective in a single feeding. If baiting in and around structures is done for house mice in accordance with label directions, white-footed and deer mice usually will be controlled. No violation of pesticide laws should be involved since the "site" of bait application is the same.

Behavioral differences may result in white-footed and deer mice carrying off and hoarding more bait than house mice normally do. For this reason, loose-grain bait formulations or secured paraffin wax bait blocks may be more effective, since these cannot be easily carried off. Cabins should be baited before being left unoccupied. For further information on anticoagulant baits and their use, see the chapter **House Mice.**

Zinc phosphide. Various zinc phosphide grain baits (1.0% to 2.0% active ingredient) are registered for the control of *Peromyscus* as well as voles and for post-harvest application in orchards and at other sites. Zinc phosphide is a single-dose toxicant, and all formulations are Restricted Use Pesticides. Follow label directions when applying. There are few damage situations where control of white-footed or deer mice require the use of zinc phosphide.

Fumigants

None are registered for white-footed or deer mice. Because of the species' habitat, there are few situations where fumigation would be practical or necessary.

Trapping

Ordinary mouse snap traps, sold in most grocery and hardware stores, are effective in catching white-footed and deer mice. Bait traps with peanut butter, sunflower seed, or moistened rolled oats. For best results, use several traps even if only a single mouse is believed to be present. Set traps as you would for house mice: against walls, along likely travel routes, and behind objects. Automatic traps designed to live-capture several house mice in a single setting also are effective against white-footed and deer mice. They should be checked frequently to dispose of captured mice in an appropriate manner: euthanize them with carbon dioxide gas in a closed container, or release them alive into an appropriate location where they won't cause future problems. For further details on trapping, see **House Mice.**

Other Methods

Recent research has revealed the possibility that supplemental feeding at time of seeding can increase survival of conifer seed by reducing predation by deer mice, although the tests were not carried out to germination.

Sunflower seed, and a combination of sunflower and oats, were applied along with Douglas fir and lodgepole pine seed in ratios ranging from two to seven alternate foods to one conifer seed. Significantly more conifer seeds survived mouse predation for the 6- and 9-week test periods than without the supplemental feeding. For further details on the experimental use of this technique, see Sullivan and Sullivan (1982a and 1982b).

Economics of Damage and Control

Damage by both white-footed and deer mice is usually a nuisance. When mice destroy furniture or stored materials, the cost of such damage depends upon the particular circumstances. The greatest economic impact of deer mice is their destruction of conifer seed in forest reseeding operations. In west coast forest areas, *Peromyscus* seed predation has resulted in millions of dollars worth of damage and has been documented to have been a serious problem since the early 1900s. New efficacious, cost-effective methods of reducing this seed predation are needed.

Acknowledgments

Much of the information in this chapter was taken from Marsh and Howard (1990) and from Schwartz and Schwartz (1981).

Figures 1 through 3 from Schwartz and Schwartz (1981).

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