



Mice and Voles

Mice and voles are small, unobtrusive creatures at the base of nature's food chain. Though rarely seen in multitude, in terms of biomass—the total mass of living matter in each area—they greatly outweigh the many predators that depend on them for food. This is because they are extremely prolific breeders, despite their short lifespans. Pennsylvania has two native species of mice, four voles, a bog lemming, two types of jumping mouse, and two imported European species. All are rodents, with two pairs of constantly growing, chisel-shaped incisor teeth, one pair on the upper jaw opposing another pair on the lower jaw.

Mice and voles mainly eat vegetation—nuts, seeds, fruits, leaves, and grasses. Most species collect and hoard foodstuffs to eat later and to subsist on throughout winter. Most are predators, in a small way, on insects and their larvae, as well as snails, slugs, spiders, and, in some cases, bird eggs and even other mammals. In turn, mice and voles are fodder for a vast assortment of creatures including snakes, shrews, weasels, raccoons, skunks, bobcats, foxes, coyotes, domestic dogs and cats, and even creatures as large as black bears. Many of the hawks and owls prey mainly on mice and voles, and the larger heron species take these rodents occasionally.

Mice and voles live in nearly every available habitat, from rocky slopes in forested mountains to low boggy meadows to urban streets and inside people's houses. Some move about on the surface of the ground, while others keep to thick vegetation, rock crevices, or tunnels. Most feed at night and remain active yearround. Only the two species of jumping mice hibernate in winter; during bitter cold, the other mice and voles become torpid and sleep for a time in their nests, which are round masses of leaves and grasses whose inside chambers are lined with soft plant matter. Some species are social in winter when small groups huddle together for warmth.



deer mouse

The gestation period for most mice and voles is around three weeks. Young are born without fur and with their eyes closed. The mother nurses them, and they grow rapidly; litters are weaned and on their own within a month, and the mother—who has already ovulated and bred again—gives birth within a few weeks. Young from early litters can reproduce during their first year. In one of the most prolific species, the meadow vole, a single female can potentially give birth to nine litters with a total of 72 offspring per year: it's not hard to see how quickly a population might explode were it not for constant attrition from predators, parasites, disease, and accidents such as fires and floods.

Deer mouse (*Peromyscus maniculatus*)—A small mouse with a huge range (the Northeast, Midwest, and the West from Alaska to Mexico), the deer mouse occurs statewide in Pennsylvania. It is six and a half to eight inches long, including the tail, which is three to four inches. A deer mouse weighs 0.4 to 1 ounce. For the first month of its life, an individual is colored gray; then it molts into its brownish gray adult pelt. In both juveniles and adults, the undersides are white. The deer mouse has large dark eyes well adapted to night vision.

Deer mice inhabit nearly every type of land habitat in Pennsylvania: farm fields, fencerows, grassy berms of roads, brushland, and deep woods, both dry and damp, pine, and hardwood. Some taxonomists recognize two forms of

Peromyscus maniculatus, the “woodland deer mouse” and “prairie deer mouse.” Deer mice eat seeds of many plants, cultivated grains, soybeans, corn, berries, buds, nuts, and mushrooms. They consume beetles, grasshoppers, crickets, caterpillars (including those of the gypsy moth), other invertebrates such as earthworms, centipedes, slugs, spiders, and even carrion.

Deer mice have sharp hearing and good eyesight. They locate most of their food by smell. They can swim if necessary and even run at nearly five miles per hour for short distances. The tail, covered with fur, acts as a tactile organ and a balancing aid; when climbing, a deer mouse wraps its tail around twigs or branches to gain steadiness.

The species weaves ball-shaped nests, six to eight inches in diameter, out of leaves, grasses, and other plants, lined with fur, feathers, and shredded plant matter. Deer mice nest in hollow logs, stumps, fenceposts, beneath rocks, in root channels underground, and rather frequently in abandoned squirrels’ and birds’ nests in trees up to 50 feet above ground. Deer mice rest in their nests during the day, and there they

rear their young. Nests at ground level may have a nearby burrow with a latrine area for waste and a chamber for storing food.

In winter, if snow covers the ground, deer mice spend most of their time beneath the white blanket, where the temperature is warmer than in the open air. Here, they eat stored food. In extreme cold, deer mice cut down on their activity, sometimes sleeping for several days, perhaps huddled in a communal nest with two to four other mice (some of which may be white-footed mice, a different, although closely related, species).

Deer mice breed from March to October. Females raise three or four litters per year, each with three to seven young. In one year, a single female can produce nearly 30 young, although few survive long enough to do so. Young mice, called pups, utter high-pitched squeaking sounds. Males do not help females raise the litters. Deer mice are preyed on by foxes, cats, short-tailed shrews, mink, weasels, hawks, owls, and snakes. Home ranges vary in size from 0.05 to 2.5 acres, with 3 to 36 mice per acre of habitat. Like most other small mammals, deer mice are very abundant in some years and rather scarce in others, depending on environmental conditions.

White-footed Mouse (*Peromyscus leucopus*)—Found statewide, this nocturnal mouse may be the most abundant rodent in Pennsylvania. It looks much like a deer mouse, except that its tail is shorter in relation to its body. The coat is reddish brown above, white on the belly and feet. Length is 6 to 7½ inches, including a 2½- to 3½-inch tail. Weight: 0.6 to 1 ounce.

White-footed mice live in shrubby areas, woods, cultivated fields, pastures, rhododendron thickets, fencerows, stream margins, ravines, revegetated strip mines, and in farm buildings and houses. Some authorities believe the white-footed mouse prefers a slightly drier habitat than the deer mouse. White-footed mice nest in stone walls and rock crevices, under old boards, and in woodchuck burrows, tree cavities, and the abandoned nests of squirrels and birds. Like deer mice, white-footed mice do not dig burrows but use the runways of other small mammals. They are very agile and can climb trees. Individual home ranges vary from 0.11 to 0.86 acres, with ranges being slightly larger for males. From 1 to 13 white-footed mice may inhabit one acre.

White-footed mice eat about a third of their body weight daily, or around 0.2 ounces: seeds, nuts, berries, fungi, green plant matter, insects (chiefly caterpillars and ground beetles), centipedes, snails, and even small birds and other mice. They cache food in autumn, carrying seeds in their cheek pouches to chambers beneath logs and stumps. They breed from March through October; the three or four annual litters have three to seven young apiece. Females can mate when two months old. Males sometimes help females rear the young.

Meadow Vole (*Microtus pennsylvanicus*)—The meadow vole is a stocky mouselike creature with a blunt head, beady eyes, and a short, scantily-furred tail. Its upper parts are a dull chestnut brown, with a darker area along the middle



white-footed mouse

meadow vole



of the back, and its underparts are grayish or buffy white. The meadow vole is 6 to 7.6 inches long, including a 1.3- to 2.5-inch tail; weight is 0.7 to 2.3 ounces. The species, often called a “field mouse,” lives across northern North America and is the most common vole in the East. In Pennsylvania it is abundant statewide.

Meadow voles thrive in moist meadows and fields thick with grasses and sedges. They do not live in forests but may inhabit small clearings, bogs, and grassy openings in the woods. They are good swimmers and can run at five miles per hour. Meadow voles move about in low, thick grass and weeds that screen them from hawks and owls

Meadow voles eat grasses and sedges (cut stalks with seedheads are stored in small piles in the runways to be eaten later), tubers, roots, grains, and the inner bark of shrubs and trees; voles sometimes girdle small trees, killing them. Meadow voles are active all year, by night and by day, especially around dawn and dusk. Voles nest in shallow

burrows three to four inches underground or hidden in grass. During winter, voles huddle together in the nests or move about and feed in runways beneath the snow.

In breeding season, meadow voles vigorously defend individual territories of 0.1 to 0.8 acres, which fluctuate from larger in summer to smaller during peak population years—when up to 166 voles may live on a single acre. Usually, a high population crashes to a low level, then builds up again to another high. Females produce from eight to ten litters in a high population year and five or six litters in a year when food is scarce, with each litter averaging four to seven young. Among the myriad of predators that attend to the vole population are herons, crows, gulls, foxes, house cats, weasels, opossums, skunks, shrews, bears, bass, pickerel, and snakes. Many voles are snatched up by hawks and owls, particularly barn owls. Maximum longevity is around a year and a half in the wild.

Southern Red-backed Vole (*Clethrionomys gapperi*)—This rodent is 4.7 to 6.2 inches long, including a 1.2- to 2-inch tail, and weighs 0.6 to 1.3 ounces. A reddish band down the back and a pale gray belly distinguish the species, found in much of upland Pennsylvania. A woods dweller, the red-backed vole favors cool, damp forests with hemlocks, mossy rocks, stumps, and rotten logs. It also inhabits deciduous and mixed woodlands with mosses and ferns, rocky outcrops, stone walls, reverting fields, and grassy clearings. When traveling, it uses the burrows of moles and shrews and casts about beneath the fallen leaves. It also climbs into low trees. This species breeds from late March through November, nesting in cavities or appropriating abandoned nests of other species. It feeds on nuts, seeds, berries, green vegetation, roots, and fungi.

Rock vole (*Microtus chrotorrhinus*)—This species of New England and Canada inhabits a limited area of northeastern Pennsylvania. It closely resembles the more common meadow vole, except that the rock vole has a yellowish orange nose.



**southern
red-backed vole**



rock vole

The rock vole inhabits forests. In Pennsylvania it lives in cool, damp woods of maple, yellow birch, and hemlock, among boulders and lush ground cover, mainly ferns. Foods include green plants, seeds, leaves, stems, fungi, and insect larvae. Weasels, foxes, timber rattlesnakes, and copperheads prey on rock voles. Females bear two or three litters of one to seven young each year. Considered rare in Pennsylvania, *Microtus chrotorrhinus* was classified as a “vulnerable” species by the Pennsylvania Biological Survey in 1985.

Woodland Vole (*Microtus pinetorum*)—Also called the pine vole, this species is found in the Midwest, the East, and New England. In Pennsylvania it is statewide, with the greatest numbers in the southeastern lowlands. *Microtus pinetorum* is Pennsylvania’s smallest vole: length, 4.3 to 5.5 inches; tail, 0.7 to 1 inch; weight, 0.9 to 1.3 ounces. Its soft, glossy fur is chestnut brown on the upper parts and gray on the belly. Preferred habitats include wooded bottomlands, hemlock and hardwood forests, old fields, thickets, fencerows, farmland edges, and orchards.

The woodland vole is a molelike species that burrows into the soil just below the leaf litter. It breaks up the dirt with its head, incisors, and forefeet, turns around, and shoves the dirt out the tunnel’s entry, forming a cone-shaped pile two or three inches high. Meadow voles, hairy-tailed moles, and shrews use the burrows of *Microtus pinetorum*. Woodland voles seldom leave their burrows, and an individual’s home range is small, around a hundred feet in diameter. Foods include roots, stems, leaves, seeds, fruits, and tree bark. In gardens, these voles eat potatoes and flower bulbs. Woodland voles kill fruit trees by girdling the bark or damaging the roots. They cache food in storage chambers as deep as 18 inches underground, and they rear their young in nests under rocks, logs, and stumps. Woodland voles breed less prolifically than other voles, bearing one to four litters per year, each with one to five young.

woodland vole



Southern Bog Lemming (*Synaptomys cooperi*)—The southern bog lemming looks much like the meadow vole, with chestnut brown upper parts and silver-gray sides and belly. Length is 4.5 to 5.7 inches, including a tail of 0.6 to 1 inch; weight is 0.9 to 1.6 ounces. The species is found in scattered pockets across Pennsylvania, mainly in old fields grown up with poverty grass, timothy, broom sedge, hawthorns, crab apples, and locust. Bog lemmings live beneath matted dead grass in surface runways created by their cutting of, and feeding on, low-growing plants. They eat stems and seeds of grasses and sedges, along with berries, fungi, and mosses. The species breeds from early spring to late autumn, with three to five young per litter and several litters each year. Southern bog lemmings often share a habitat with red-backed voles, meadow voles, white-footed mice, and deer mice.

Meadow Jumping Mouse (*Zapus hudsonius*)—The meadow jumping mouse has big feet, long hind legs, and a skinny, tapering, sparsely furred tail that is longer than the head and body combined. Length is eight to nine inches, including a five- to six-inch tail; weight is around 0.6 ounces. Found in the East, Midwest, Canada, and Alaska, *Zapus hudsonius* is

statewide in Pennsylvania. The fur is yellowish brown, with a dark stripe on the back, and orangish sides; the belly and feet are white.

Meadow jumping mice inhabit moist grassy and brushy fields, thick vegetation, and woodland edges. The home range is usually less than an acre. The name “jumping mouse” is something of a misnomer, as these animals do not normally travel by jumping, rather, they prefer taking short hops of a foot or two. Active at night, they eat seeds, grasses, berries, nuts, roots, fungi, earthworms, insects, spiders, and slugs.

The species breeds from May to October, with two litters of three to six young born yearly, in nests beneath boards, in hollow logs, and in grass tussocks. *Zapus hudsonius* hibernates in winter; after adding up to 0.2 ounces of body fat (a third of its body weight). In October or November, the meadow jumping mouse retires to a nest about 18 inches below the ground. The creature curls into a tight ball, buries its nose in its belly, coils its tail around itself, and sleeps. Its breathing lags, its temperature falls to a few degrees above freezing,

and its heart rate slows to a few beats per minute. After six months’ suspended animation, the meadow jumping mouse emerges in late April or early May.

Woodland Jumping Mouse (*Napaeozapus insignis*)—Found in the Northeast, New England, and Canada, the woodland jumping mouse lives throughout Pennsylvania except for the southeastern lowlands. It is 8.4 to 9.8 inches long, including a 5½-inch tail. It has a bright yellowish-brown back and sides and a white belly; the tail is tipped with a prominent white tuft. *Napaeozapus insignis* prefers cool, moist hemlock forests in the mountains; it lives near streams, rarely in open fields or meadows, occasionally in dry oak and maple woods.

Woodland jumping mice eat seeds, berries, nuts, green plants, fungi (particularly subterranean fungi of genus *Endogone*), insects, worms, and millipedes. An individual home range is 1.2 to 8 acres. Although mainly nocturnal, woodland jumping mice venture out on cloudy days. They use burrows and trails made by moles and shrews. Normally they travel on all four feet, but for greater speed they hop with their long hind legs and can leap up to ten feet. They evade predators by taking several bounds, then stopping suddenly under cover. Screech owls, weasels, skunks, minks, bobcats, and snakes prey on woodland jumping mice. Like its cousin the meadow jumping mouse, the woodland species hibernates from October to late April or early May (about half the year) in an underground nest, singly or in pairs. Females bear three to six young in late June or early July; a second litter may be born in August.

meadow jumping mouse



woodland jumping mouse



house mouse



Norway Rat (*Rattus norvegicus*)—The Norway rat is 12 to 18 inches in length, including a naked, scaly six to nine-inch tail. Weights range from ten ounces to more than a pound. This rodent's fur is thin, coarse, reddish to grayish brown above and paler below. The species arrived from Europe aboard ships around 1775. Today it is found statewide, and it ranges across North America and Central America.

Norway rats have poor vision, but their senses of smell, taste, hearing, and touch are well developed. Extremely adaptable, they live in and under barns and farm buildings, in city sewers and dumps, along streams and rivers, and in marshes and open fields. They dig burrows about three feet long with several escape holes lightly plugged with weeds or dirt and hidden in grass or under rubbish. *Rattus norvegicus* lives in colonies composed of several family groups that share feeding and nesting areas. Although they're mainly nocturnal, rats also move about and feed during the day. Rats eat anything they can find or subdue, including fish, eggs, vegetables,

grain, fruits, nuts, garden crops, carrion, and garbage. They kill poultry, snakes, young rats from neighboring colonies, and wild birds. In local areas, rats may suppress or wipe out native birds and mammals, especially ground-nesting birds. In turn, rats are preyed on by dogs, cats, minks, snakes, and large hawks and owls.

Norway rats breed throughout the year, with peak activity in spring and autumn; a female may bear six to eight litters per year, with an average of six to nine young per litter. Rats carry many diseases, including rabies, tularemia, typhus, and bubonic plague. Another introduced Old World rat, the black rat (*Rattus rattus*) is found in small numbers in southeastern Pennsylvania.

House Mouse (*Mus musculus*)—Like Norway and black rats, the house mouse is an Old World species inadvertently brought to North America by European settlers. It inhabits Pennsylvania statewide, living in and near houses and on farms. Six to eight inches long, it has a three-inch, scaly, nearly hairless tail; its weight is one half to one ounce. House mice come in various shades of gray. Omnivorous, they eat everything from grain and seeds (their preferred foods) to paper, glue, and household soap. *Mus musculus* is agile and quick, able to run at eight miles per hour. An adult female produces five to eight litters annually, each with an average of five to seven young. The species is active the year around.