



Best Survey Period



Status: State endangered

Global and state rank: G5/S1

Family: Cricetidae (voles, lemmings, New World rats and mice)

Range: The prairie vole (*Microtus ochrogaster*) is a common resident of North American prairies, grasslands and other open habitats. It has a broad distribution in the central United States and south-central Canada, ranging from Alberta in the northwest, south to northern New Mexico and east through the Great Plains states to central Ohio, western West Virginia, and central Tennessee (Kurta 1995). Michigan lies on the northeastern edge of its range.

State distribution: In Michigan, the prairie vole has only been documented in the southwestern corner of the state (i.e. “the prairie peninsula”). MNFI (2014) has records of prairie voles in only four counties (Berrien, Cass, Kalamazoo, and Van Buren), and all but the Kalamazoo County record are from before 1970. There is a marked lack of survey effort for this species, and it is likely that other populations may exist, particularly in southwestern Michigan.

Recognition: The prairie vole is a medium-sized vole with a total length of 4.9-6.1 in (125-155 mm). Its tail is relatively short at 1.2-1.6 in (30-40 mm). The muzzle is stout and, like other voles, the ears are very small and not obviously visible. The pelage is dark grayish-

brown and hairs are tipped with brownish-yellow and black, giving the prairie vole a grizzled, salt-and-pepper appearance. Fur on the underside is tan or brownish-yellow (Baker 1983). Superficially, the prairie vole is similar in appearance to the meadow vole (*Microtus pennsylvanicus*), which is common throughout Michigan. **Prairie voles can be distinguished by their grizzled pelage, tan underside, five plantar tubercles on the hind feet, and three pairs of mammary glands** (compared to a uniformly brown pelage, slate gray underside, six plantar tubercles, and four pairs of mammary glands in the meadow vole; Kurta 1995).

Best survey time: The prairie vole is active year round, but population sizes vary throughout the year. Generally, the highest populations occur during the summer and fall, and chances of observing a prairie vole are highest at this time. Prairie voles are known to have 2-4 year population cycles, so surveys over several years are required to accurately assess a population (Kurta 1995, Getz et al. 2001). Prairie voles tend to be crepuscular, so live trapping from before dusk to after dawn is most likely to yield the highest capture rate in occupied areas. Pre-baiting of traps 1-2 days before actually setting the traps is vital for trapping success.

Habitat: Throughout most of their range, prairie voles occur in a wide variety of open habitats, including prairie, ungrazed pastures, hay fields, fallow fields, fencerows, and occasionally soybean or alfalfa fields (VanderLinden 2002). They prefer thick, lush vegetation



over areas with short, sparse vegetation, and generally prefer slightly drier habitats than the meadow vole (Baker 1983, Klatt and Getz 1987). Ideal habitat contains a mixture of forbs and grasses. Not only does mixed vegetation provide increased heterogeneity, but it also provides the varied food sources that prairie voles prefer (Pascarella and Gaines 1991).

Biology: Prairie voles occupy relatively small home ranges which are usually less than 0.25 acres (0.1 ha; Kurta 1995). However, home range size varies seasonally and with location. They are most active in the hours around dawn and dusk, and usually move throughout their home range via a network of runways through the vegetation. These runways offer protection from predation because they are usually covered by overhanging grassy vegetation. Runways radiate from well hidden burrows to feeding and foraging areas. Burrows are usually short (less than 3 feet long) and shallow (less than 2 feet deep; Klatt pers. comm.), though they can be complex, containing multiple chambers (Klatt pers. comm.) and they are used for both nesting and feeding purposes. In warmer months, prairie voles will frequently select above ground nests beneath old boards or dense clumps of vegetation instead of underground burrows (Kurta 1995). Nests, both above ground and below, are made from shredded grasses. Eastern mole (*Scalopus aquaticus*) tunnels are also utilized, but to a lesser extent. When vegetation is sparse, underground tunnels are more likely to be used than above ground channels (Jameson 1947), likely as a response to predator avoidance (Klatt and Getz 1987). In tallgrass prairies, prairie vole runways can impact small scale plant nutrient availability; thus performing an important ecological role (Ross et al. 2007).

Prairie voles breed year round except during especially severe summers and winters. Reproductive rates are highest from May to October and lowest in December and January (VanderLinden 2002). Females can give birth to up to five litters of pups per year if they breed year round (Kurta 1995). However, it is unlikely that breeding occurs year round in Michigan unless the winter is unusually mild. Females generally give birth to four pups after a three week gestation period. Pups normally weigh 0.1 oz. (2.9 g) at birth and are nearly hairless with thin pink skin. Young prairie voles open their eyes about nine days after birth, and are usually weaned by day 17, when their dentition allows for the chewing of solid foods (Baker 1983). Prairie voles frequently have a *post-partum* oestrus, allowing females to conceive again shortly after the birth of a litter of pups, and young females can first conceive at 5-6 weeks of age. Younger females generally produce smaller litters than more experienced females (Kurta 1995).

Prairie voles have a complex social structure. Many male-female pairs are monogamous, and those that are not often live in communal groups. Many communal groups are familial; and the oldest female inhibits reproductive activity in her daughters with pheromones, and mates with only one male (Getz and Carter 1996). Males often aid in protecting and caring for their offspring, and communal groups of at least 12 voles have been reported (Getz and Carter 1996). In paired prairie voles, males and females stay together, usually until one of the pair dies. Females whose mates have died will often nest alone, whereas single males will wander unpaired for the remainder of their lives (Getz and Hofmann 1986). Paired individuals will often join communal groups in the winter months, but will then separate when breeding begins (Getz and Carter 1996).

Like most voles, the prairie vole is largely herbivorous. They eat a wide variety of plant material, including grasses, forbs, seeds, roots, acorns, tree bark, fruit, and grains. On rare occasions, invertebrates or small vertebrates are also consumed (Baker 1983). They will cache food in underground storage chambers. These chambers can be quite large, holding up to four liters of food (Fisher 1945). Because prairie voles are a common species throughout the majority of their range, they serve as an important food source for many predators. Known prairie vole predators include hawks (*Accipitridae*), owls (*Strigiformes*), shrikes (*Lanius* spp.), red fox (*Vulpes vulpes*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), weasels (*Mustelidae*), domestic cats (*Felis catus*), and snakes.

Conservation and management: The distribution and relative abundance of this species in Michigan is not well known. However, this species is abundant throughout the majority of its range, so conservation and management practices can be cautiously applied from knowledge gained in other regions. Because prairie voles occupy open habitats, it is vital to keep occupied areas from succeeding to more forested ecosystems. Encroaching woody vegetation can decrease grassland small mammal diversity; and the likelihood of prairie vole presence decreases as woody vegetation increases (Matlack et al. 2008). There are several management options to maintain grassland habitats, including burning, mowing and grazing. Burning is a very effective means of grassland management, as it is a natural part of the grassland ecosystem regime. Geluso and Bragg (1986) found that underground burrows are usually deep enough to provide enough insulation from the heat emitted by fires. Because prairie voles are active year round, there is no season where casualties from prescribed fire can be eliminated; however, slower moving fires allow voles more time to get to burrows.



These low intensity types of fires should be selected over faster moving, high intensity fires, if possible. Because prairie voles depend on vegetation for cover, burning should only take place in a small portion of a site to limit the exposure of bare ground after a burn.

Grazing and mowing are generally not recommended when managing for small mammals. While both of these management techniques are useful in maintaining the open quality of grasslands, the negative impacts on small mammal communities outweigh the possible benefits, especially when there are other alternatives. Both mowing and grazing decrease vegetation density and diversity in open grassland habitats. The movements of large herd animals can destroy small mammal runways and tunnels and disrupt home range establishment, particularly when grazing levels are high (Steen et al. 2005). Mowing and haying can be equally destructive to small mammal populations. These practices reduce vegetative cover, making small mammals more susceptible to predation. When haying occurs, vegetation is removed from the habitat, thus decreasing food availability. Mowing and haying also disrupt vole runways and home range establishment (Edge et al. 1995).

Herbicide and pesticide use should be avoided when managing for small mammals, as both direct and secondary consumption can be harmful. Predation by high densities of non-native predators, such as house cats, can also be detrimental to small mammal populations. Predator control can be useful in these situations, although supporting such a practice can be costly and time consuming.

Research needs: The establishment of a survey regime is needed to identify the current range and abundance of this species in the state. Basic knowledge of habitat preference, predation, population density and reproduction in Michigan is lacking. There has been no research done in Michigan on the response of this species to management. At a minimum, resurveying sites known to have previously supported prairie voles should be conducted.

Related abstracts: Dry-mesic prairie, mesic prairie, mesic sand prairie, bur oak plains, oak openings, oak barrens, Henslow's sparrow, grasshopper sparrow, dickcissel.

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