

Woodland Vole

Microtus pinetorum (LeConte, 1830)

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CONTENT AND TAXONOMIC COMMENTS

Currently, seven subspecies of the woodland vole (*Microtus pinetorum*) are recognized (Smolen 1981), six of which occur in the South: *M. p. auricularis*, *M. p. carbonarius*, *M. p. nemoralis*, *M. p. parvulus*, *M. p. pinetorum*, and *M. p. scalopsoides*. Van der Meulen (1978) and Repenning (1983) regarded *M. p. nemoralis* and *M. p. parvulus* as distinct species, although Whitaker and Hamilton (1998) suggest that all subspecies occurring in the South are referable to *M. p. pinetorum*. *Pitymys* was a recent generic synonym (Van der Meulan 1978, Zakrzewski 1985). Smolen (1981) reviewed the literature on this species. The woodland vole also is commonly referred to as the pine vole (Whitaker and Hamilton 1998).

DISTINGUISHING CHARACTERISTICS

The woodland vole is a small vole with a short tail and well developed forelimbs and claws that reflect semi-fossorial habits. The measurements are: total length 97–145 mm; tail 17–25 mm; hind foot 13–20 mm; ear 8–13 mm; weight 18–35 g. The dental formula is: I 1/1, C 0/0, P 0/0, M 3/3 = 16 (Figure 1). The pelage is smooth and silky, reddish to chestnut brown dorsally, and buffy to silvery gray ventrally. The tail is short (less than 20% body length) and slightly bicolor. The woodland vole skull is distinctive, with the third upper molar having two closed triangles, and the first lower molar three closed triangles and two anterior loops. See keys for details.

CONSERVATION STATUS

Microtus pinetorum has a global rank of Secure (NatureServe 2007). It is also considered Secure in Alabama, Georgia, Kentucky, Mississippi, North Carolina, Oklahoma, Tennessee, and Virginia. Louisiana and Arkansas list it as Apparently Secure, and Texas lists it as Vulnerable. It is unranked in South Carolina and Florida.

DISTRIBUTION

The woodland vole is distributed across most of eastern United States and southern Canada. It is present throughout the South (Figure 2) including all of Virginia (Handley and Patton 1947, Handley 1979, Rose et al. 1990, Handley 1992, Pagels et al. 1992), Kentucky

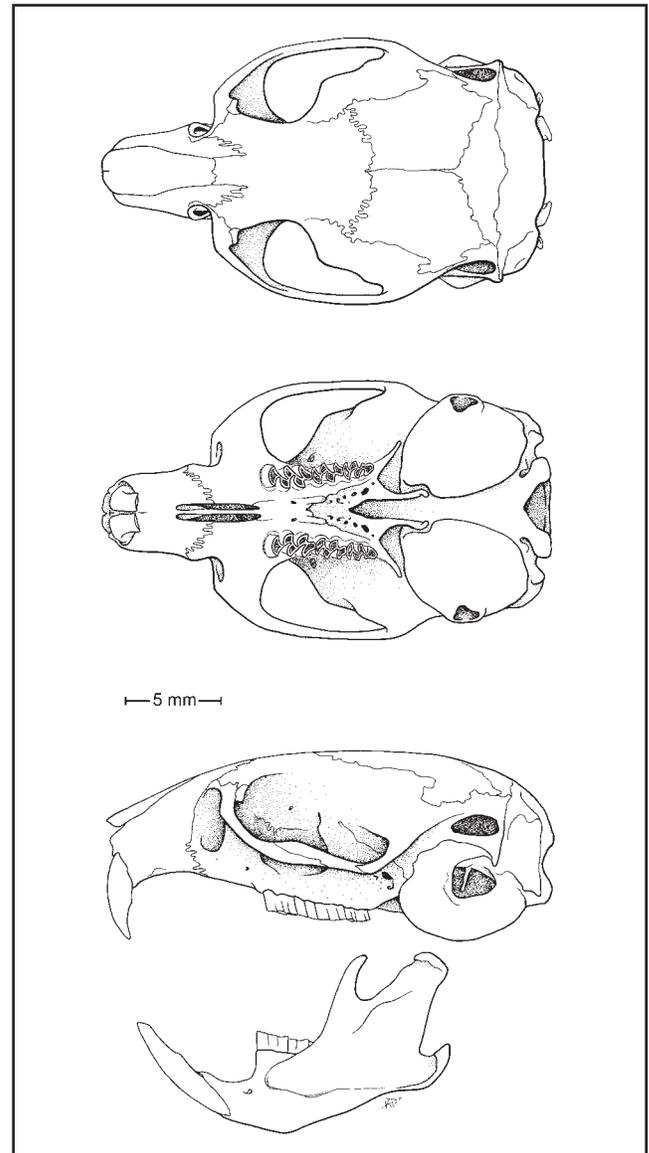


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Microtus pinetorum* from Autauga County, Alabama (USNM 222589, male).

(Barbour and Davis 1974, McPeck et al. 1983, McGehee-Marsh et al. 1992, Kiser and Meade 1993), Tennessee (Smith et al. 1974, Kennedy 1991, Linzey 1995), North Carolina (Lee et al. 1982, Clark et al. 1985), South Carolina (Golley 1966, Cothran et al. 1991), Arkansas (Sealander and Heidt 1990), and eastern Oklahoma (Caire et al. 1989, Haner et al. 1999). In Georgia, the

species occurs statewide except for the extreme southeastern coast (Golley 1962, Laerm et al. 1982, Ford et al. 1994). Apart from the coastal regions along the Gulf of Mexico, the woodland vole also occurs throughout Alabama (Holliman 1963, Wolfe and Rogers 1969, Linzey 1970), Mississippi (Kennedy et al. 1974, Jones and Carter 1989), Louisiana (Lowery 1974, Williams et al. 1980, Mullin and Williams 1987) and eastern Texas (Davis and Schmidly 1994). In Florida, the species is restricted to the northern portions of the panhandle and north-central peninsular area as far south as the Ocala area (Neill and Boyles 1955, Arata 1965, Whitaker and Hamilton 1998).

ABUNDANCE STATUS

The species is common to abundant throughout the region. Density estimates vary by season and habitat, and have been reported as high as 14/ha (Fitzgerald and Madison 1983). The species undergoes cyclic population fluctuations, usually with peak numbers in spring and fall and fewer in summer, primarily due to reproductive output (Paul 1970). Typically, woodland voles are underreported in most small mammal surveys in the region, in part due to their semi-fossorial nature and difficulty of capture (Bellows et al. 2001).

PRIMARY HABITATS

The woodland vole occurs in a diversity of woodland and grassland habitats throughout the South, but deciduous forest sites with mesic, well-drained soils and a dense ground cover of litter or vegetation are preferred (Smolen 1981, Miller and Getz 1969, Getz 1985, Rhoades and Richmond 1985, Linzey 1995, Haner et al. 1999). The species spends much of its time below the litter and humus layer where it burrows and nests. There are records of woodland voles at elevations >1,300 m in the Southern Appalachian Mountains. However, generally the species is found from 600 m in the mountains to near sea level on the Atlantic Coastal Plain (Linzey 1995, Ford et al. 2000, Bellows et al. 2001). It also is commonly associated with upland grassy areas, fencerows, railroad rights-of-way, cropland, and orchards. Woodland voles frequently can cause economic damage by root-girdling fruit trees and consuming crops (Eadie 1954, Anthony and Fisher 1977, Smolen 1981, Whitaker and Hamilton 1998).

REPRODUCTION

Regional populations probably breed throughout the year; however, some studies suggest most activity is concentrated from March through October. Farther north, reproductive activity may decline or cease by

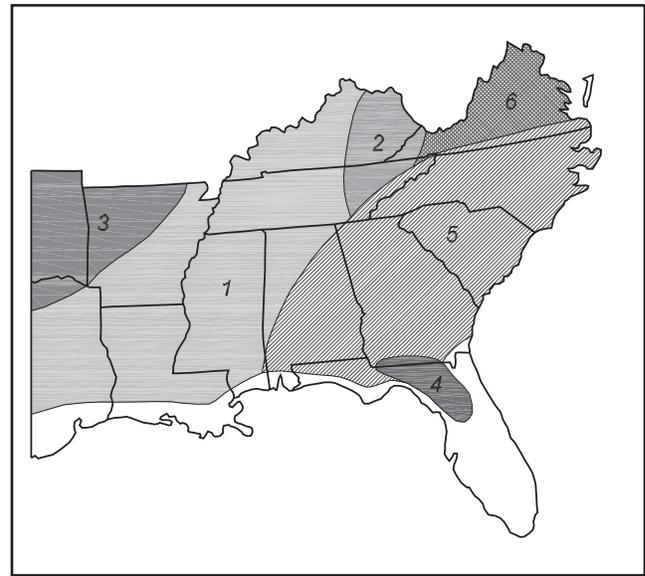


Figure 2. Distribution of *Microtus pinetorum* in the South: (1) *M. p. auricularis*; (2) *M. p. carbonarius*; (3) *M. p. nemoralis*; (4) *M. p. parvulus*; (5) *M. p. pinetorum*; (6) *M. p. scalopsoides*.

early winter (Benton 1955). Upwards of 4 litters of 1–6 neonates are produced annually. Gestation is 20–24 days and young are weaned at 17–21 days. Individuals are sexually mature by 6–8 weeks (Horsfall 1963, Paul 1970, Valentine and Kirkpatrick 1970, Goertz 1971, Cengel et al. 1978, Schadler and Butterstein 1979).

FOOD HABITS

The diet of the woodland vole varies seasonally. Forb and grass roots predominate in spring and summer, whereas seeds and fruit are consumed in fall, and bark and roots are utilized in winter (Benton 1955, Cengel et al. 1978). Habitat also effects diet as woodland voles in orchards and grassland habitats feed primarily on green vegetation and those in woodlands eat greater seed amounts. *Endogone* fungus and insects also have been recorded as food items (Linzey 1995, Whitaker and Hamilton 1998).

ASSOCIATED SPECIES

Regionally, common faunal associates include the northern short-tailed shrew (*Blarina brevicauda*), southern short-tailed shrew (*B. carolinensis*), least shrew (*Cryptotis parva*), pygmy shrew (*Sorex hoyi*), southeastern shrew (*S. longirostris*), cotton mouse (*Peromyscus gossypinus*), white-footed mouse (*P. leucopus*), eastern harvest mouse (*Reithrodontomys humulis*), hispid cotton rat (*Sigmodon hispidus*), meadow jumping mouse (*Zapus hudsonius*), meadow vole (*M. pennsylvanicus*), and prairie vole (*M. ochrogaster*).

VULNERABILITY AND THREATS

Nowhere within its distribution does the woodland vole appear to be vulnerable or threatened. Locally, it often is regarded as a serious pest species for agriculture, horticulture, and silviculture that requires control (Eadie 1954, Anthony and Fisher 1977, Smolen 1981).

MANAGEMENT SUGGESTIONS

In areas where woodland voles are causing economic damage, population control or cultural management may be necessary. Grass and weed control around young fruit trees can prevent damage by woodland voles during the growing season. Additionally, stem enclosures constructed of hardware cloth extending below the ground line can protect young trees during the winter months. Toxic baits have been used in areas where high vole populations are causing extensive damage (Fisher and Hygnstrom 2003).

REFERENCES

- Anthony, R. G., and A. R. Fisher. 1977. Wildlife damage in orchards: A need for better management. *Wildlife Society Bulletin* 5:107–112.
- Arata, A. A. 1965. Taxonomic status of the pine mouse in Florida. *Journal of Mammalogy* 46:87–94.
- Barbour, R. W., and W. H. Davis. 1974. *Mammals of Kentucky*. University of Kentucky, Lexington, Kentucky, USA.
- Bellows, A. S., J. F. Pagels, and J. C. Mitchell. 2001. Macrohabitat and microhabitat affinities of small mammals in a fragmented landscape on the upper Coastal Plain of Virginia. *American Midland Naturalist* 146:345–360.
- Benton, A. H. 1955. Observations on the life history of the northern pine mouse. *Journal of Mammalogy* 36:52–62.
- Caire, W. J. D. Tyler, B. P. Glass, and M. A. Mares. 1989. *Mammals of Oklahoma*. University of Oklahoma, Norman, Oklahoma, USA.
- Cengel, D. J., J. E. Estep, and R. L. Kirkpatrick. 1978. Pine vole reproduction in relation to food habits and body fat. *Journal of Wildlife Management* 42:822–833.
- Clark, M. K., D. S. Lee, and J. B. Funderburg, Jr. 1985. The mammal fauna of Carolina bays, pocosins, and associated communities in North Carolina. *Brimleyana* 11:1–38.
- Cothran, E. G., M. H. Smith, J. O. Wolfe, and J. B. Gentry. 1991. *Mammals of the Savannah River Site*. Savannah River Ecology Laboratory, Savannah River Site, National Environmental Research Park Program SRO-NERP-21:1–176.
- Davis, W. B., and D. J. Schmidly. 1994. *The mammals of Texas*. Texas Parks and Wildlife, Austin, Texas, USA.
- Eadie, W. R. 1954. *Animal control in field, farm, and forest*. MacMillan, New York, New York, USA.
- Fisher, D. D. and S. E. Hygnstrom. 2003. Controlling vole damage. <http://www.ianr.unl.edu/pubs/wildlife/g887.htm>.
- Fitzgerald, R. W. and D. W. Madison. 1983. Social organization of a free-ranging population of pine voles, *Microtus pinetorum*. *Behavioral Ecology and Sociobiology* 13:183–187.
- Ford, W. M., J. Laerm, D. C. Weinand, and K. Barker. 1994. Abundance and distribution of shrews and other small mammals in the Chattahoochee National Forest of Georgia. *Proceedings of the Annual Conference Southeastern Association Fish and Wildlife Agencies* 48:310–320.
- Ford, W. M., M. A. Menzel, T. S. McCay, J. W. Gassett, and J. Laerm. 2000. Woodland salamander and small mammal responses to alternative silvicultural practices in the southern Appalachians of North Carolina. *Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies* 54:214–250.
- Getz, L. L. 1985. Habitats. Pages 286–309 in R. H. Tamarin, editor. *Biology of New World Microtus*. Special Publication, American Society of Mammalogists 8:1–893.
- Goertz, J. W. 1971. An ecological study of *Microtus pinetorum* in Oklahoma. *American Midland Naturalist* 86:1–12.
- Golley, F. B. 1962. *Mammals of Georgia: A study of their distribution and functional role in the ecosystem*. University of Georgia, Athens, Georgia, USA.
- Golley, F. B. 1966. *The mammals of South Carolina*. Contributions from the Charleston Museum XV, Charleston, South Carolina, USA.
- Handley, C. O., Jr. 1979. *Mammals of the Dismal Swamp: A historical account*. Pages 297–357 in P. W. Kirk, Jr., editor. *The Great Dismal Swamp*. University of Virginia, Charlottesville, Virginia, USA.
- Handley, C. O., Jr. 1992. Terrestrial mammals of Virginia: Trends in distribution and diversity. *Virginia Journal of Science* 43:157–169.
- Handley, C. O., Jr., and C. P. Patton. 1947. *Wild Mammals of Virginia*. Virginia Commission of Game and Inland Fisheries, Richmond, Virginia, USA.
- Haner, T. W., R. W. Farrar, and G. D. Schnell. 1999. Range extensions of the woodland vole (*Microtus pinetorum*) and two other species in northwestern Oklahoma. *The Southwestern Naturalist* 44:407–409.
- Holliman, D. C. 1963. *The mammals of Alabama*. Dissertation, University of Alabama, Tuscaloosa, Alabama, USA.
- Horsfall, F., Jr. 1963. Observations on fluctuating pregnancy rate of pine mice and mouse feed potential in Virginia orchards. *American Society of Horticulture Science* 83:276–279.
- Jones, C., and C. H. Carter. 1989. Annotated checklist of the recent mammals of Mississippi. *Occasional Papers of The Museum, Texas Tech University*, 128:1–9.

- Kennedy, M. L. 1991. Annotated checklist of the mammals of western Tennessee. *Journal of the Tennessee Academy of Science* 66:183–185.
- Kennedy, M. L., K. N. Randolph, and T. L. Best. 1974. A review of Mississippi mammals. *Natural Science Research Institute, Eastern New Mexico University*, 2:1–36.
- Kiser, J., and L. Meade. 1993. A survey of small mammals in the Morehead Ranger District, Daniel Boone National Forest. *Transactions of the Kentucky Academy of Science* 54:87–92.
- Laerm, J., L. E. Logan, M. E. McGhee, and H. N. Neuhauser. 1982. Annotated checklist of the mammals of Georgia. *Brimleyana* 7:121–135.
- Lee, S. D., J. B. Funderburg, Jr., and M. K. Clark. 1982. A distributional survey of North Carolina mammals. *Occasional Papers of the North Carolina Biological Survey*, Raleigh, North Carolina, USA.
- Linzey, D. W. 1970. Mammals of Mobile and Baldwin counties, Alabama. *Journal of the Alabama Academy of Science* 41:64–99.
- Linzey, D. W. 1995. The mammals of the Great Smoky Mountains National Park. McDonald and Woodward, Blacksburg, Virginia, USA.
- Lowery, G. H., Jr. 1974. The mammals of Louisiana and its adjacent waters. Louisiana State University, Baton Rouge, Louisiana, USA.
- McGehee-Marsh, J., R. K. Kessler, and R. A. Mattingly, Jr. 1992. A preliminary survey of the small mammals on the Fort Knox (Meade, Hardin, and Bullitt counties), Kentucky, U. S. Army Facility. *Transactions of the Kentucky Academy of Science* 53:5–8.
- McPeck, M. A., B. L. Cook, and W. C. McComb. 1983. Habitat selection of small mammals in an urban woodlot. *Transactions of the Kentucky Academy of Science* 44:68–73.
- Miller, D. H., and L. L. Getz. 1969. Life notes on *Microtus pinetorum* in central Connecticut. *Journal of Mammalogy* 50:777–784.
- Mullin, K., and K. L. Williams. 1987. Mammals of the longleaf-slash pine stands in central Louisiana. U. S. Forest Service, General Technical Report 68:121–124.
- NatureServe. 2007. An online encyclopedia of life [Database]. Version 6.1. Association for Biodiversity Information. <http://www.natureserve.org/>.
- Neill, W. T., and J. M. Boyles. 1955. Notes on the Florida pine mouse, *Pitymys parvulus* Howell. *Journal of Mammalogy* 36:138–139.
- Pagels, J. F., S. Y. Erdle, K. L. Uthus, and J. C. Mitchell. 1992. Small mammal diversity in forested and clearcut habitats in the Virginia Piedmont. *Virginia Journal of Science* 43:171–176.
- Paul, J. R. 1970. Observation on the ecology, populations and reproductive biology of the pine vole, *Microtus pinetorum*, in North Carolina. *Report of Investigations, Illinois State Museum*, 20:1–28.
- Repenning, C. A. 1983. *Pitymys meadensis* Hibbard from the Valley of Mexico and the classification of North American species of *Pitymys* (Rodentia: Cricetidae). *Journal of Vertebrate Paleontology* 2:471–482.
- Rhoades, D. H., and M. E. Richmond. 1985. Influence of soil texture, moisture, and temperature on nest selection and burrowing by the pine vole, *Microtus pinetorum*. *American Midland Naturalist* 113:102–108.
- Rose, R. K., R. K. Everton, J. F. Stankavitch, and J. W. Walke. 1990. Small mammals in the Great Dismal Swamp of Virginia and North Carolina. *Brimleyana* 16:87–101.
- Schadler, M. H., and G. M. Butterstein. 1979. Reproduction in the pine vole, *Microtus pinetorum*. *Journal of Mammalogy* 60:841–844.
- Sealander, J. A., Jr., and G. A. Heidt. 1990. Arkansas mammals: Their natural history, classification and distribution. University of Arkansas, Fayetteville, Arkansas, USA.
- Smith, C. R., J. Giles, M. E. Richmond, J. Nagel, and D. W. Yambert. 1974. The mammals of northeastern Tennessee. *Journal of the Tennessee Academy of Science* 49:88–94.
- Smolen, M. J. 1981. *Microtus pinetorum*. *Mammalian Species* 147:1–7.
- Valentine, G. L., and R. L. Kirkpatrick. 1970. Seasonal changes in reproductive and related organs in the pine vole, *Microtus pinetorum*, in southwestern Virginia. *Journal of Mammalogy* 51:553–560.
- Van der Meulen, J. J. 1978. *Microtus* and *Pitymys* (Arvicolidae) from Cumberland Cave, Maryland with a comparison of some New and Old World species. *Annals of the Carnegie Museum* 47:101–145.
- Whitaker, J. O. and W. J. Hamilton. 1998. Mammals of the eastern United States. Cornell, Ithaca, New York, USA.
- Williams, K. L., D. T. Stalling, and J. Scarborough. 1980. Range extension of the woodland vole in west central Louisiana. *Proceedings of the Louisiana Academy of Sciences* 43:12–14.
- Wolfe, J. L., and D. T. Rodgers. 1969. Oldfield mammals in western Alabama. *Journal of Mammalogy* 50:609–612.
- Zakrzewski, R. J. 1985. The fossil record. Pages 1–51 in R. H. Tamarin, editor. *Biology of New World Microtus* Special Publication, American Society of Mammalogists 8:1–893.