

Long-tailed Shrew

Sorex dispar (Batchelder, 1911)

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CONTENT AND TAXONOMIC COMMENTS

Two subspecies of the long-tailed shrew (*Sorex dispar*) currently are recognized (Kirkland 1981), but controversy exists regarding their distributions. Schwartz (1956) described *S. d. blitchi*, restricting the species to Tennessee and North Carolina. Populations from Pennsylvania northward were referred to as *S. d. dispar*, whereas populations in Virginia and West Virginia were characterized as intergrades. Handley (1979, 1991) and Pagels and Tate (1976) considered populations from West Virginia and Virginia as far south as Clinch Mountain and Whitetop Mountain as *S. d. dispar*. However, Kirkland and Van Duesen (1979) and French and Kirkland (1983) revised the taxon and referred to populations south of Pennsylvania as *S. d. blitchi*. The long-tailed shrew also is known as the rock shrew, an alternate vernacular name. The literature on the long-tailed shrew is reviewed by Kirkland (1981).

DISTINGUISHING CHARACTERISTICS

The long-tailed shrew is a medium-sized, long-tailed soricid. The measurements of the long-tailed shrew are: total length, 103–136 mm; tail, 46–67 mm; hind foot, 12–16 mm; weight, 3–8 g. The dental formula is: I 3/1, C 1/1, P 3/1, M 3/3 = 32 (Figure 1). The small ears are concealed in pelage, which is slate gray dorsally and slightly paler ventrally. The tail usually is well furred (older individuals may lose significant tail hair), but not distinctly bicolored. Specimens of the long-tailed shrew are often confused with the smoky shrew (*S. fumeus*) because both species are of similar size and coloration. However, the smoky shrew has a wider body and a shorter, bicolored tail (Junge and Hoffman 1981).

CONSERVATION STATUS

The long-tailed shrew has a global rank of Apparently Secure (NatureServe 2007). It is Vulnerable in Virginia and Imperiled in North Carolina and Tennessee. Both Georgia and Kentucky classify it as Critically Imperiled.

DISTRIBUTION

Figure 2 depicts the distribution of the long-tailed shrew in the South. The shrew is endemic to the Appalachian Mountains and is distributed from New Brunswick south to Georgia (Schwartz 1956, Handley

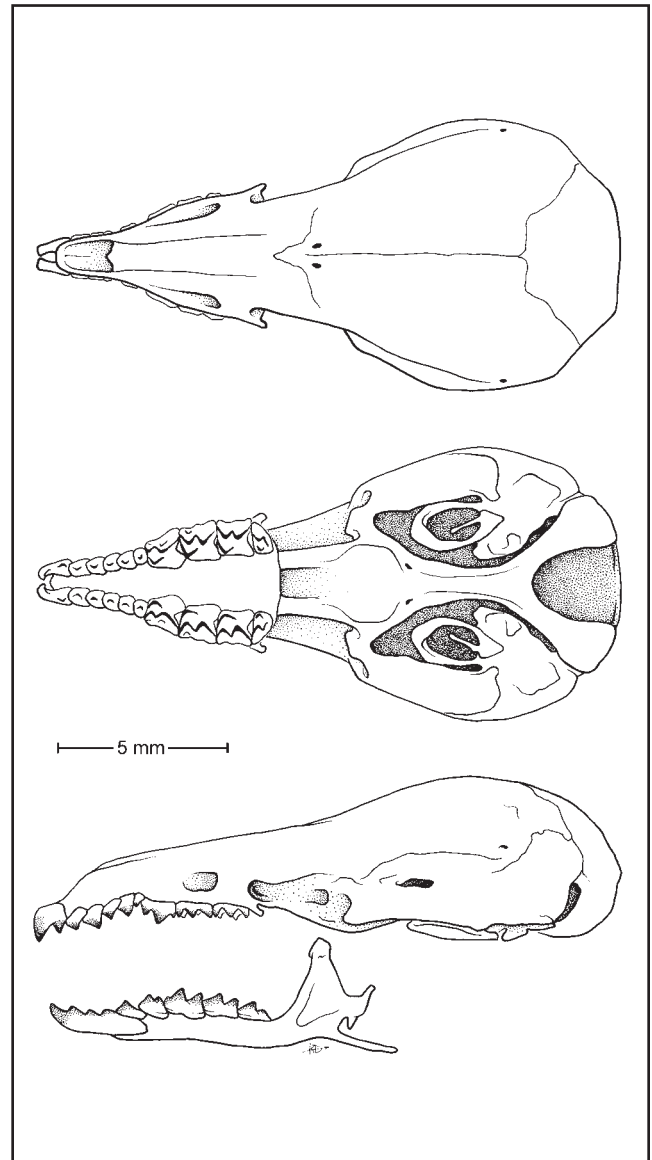


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Sorex dispar* from Ulster County, New York (USNM 555462, male).

1971, Kirkland et al. 1979, Kirkland 1981, French and Kirkland 1983, Laerm et al. 1997). It occurs in the higher elevations of western Virginia (Holloway 1957, Pagels and Tate 1976, Pagels 1987, Mitchell et al. 1997, Linzey 1998), and eastern Tennessee (Conaway and Pfitzer 1952, Conaway and Howell 1953, Linzey and Linzey 1971, Smith et al. 1974, Harvey et al. 1992). Stucki

(1967) reported a disjunct population of long-tailed shrews in the gorge of Fall Creek Falls State Park, Van Buren County, Tennessee. Two additional records have been recorded from Savage Gulch, Grundy County, Tennessee (M. L. Kennedy, University of Memphis, personal communication), perhaps indicating that the species might occur in other rock-strewn, sheltered gorge areas in the Cumberland Mountains and Plateau of Kentucky and Tennessee. The long-tailed shrew is known from Black Mountain in Harlan and Letcher counties, Kentucky (Caldwell 1980, Bryan 1991) and one record in Rabun County in northeastern Georgia (Laerm et al. 1997). Its range is extremely limited in western North Carolina (Lee et al. 1982, Webster 1987), and it has not been reported in South Carolina (Laerm et al. 1999).

ABUNDANCE STATUS

Once considered very rare in the central and southern Appalachians, the long-tailed shrew is considered more widely distributed than previously supposed (Kirkland and Van Duesen 1979, Pagels 1987, Handley 1991, Kalko and Handley 1993, Laerm et al. 1999). No population estimates are available. Published records and trapping records do suggest that it is rare, particularly near its distributional limit in the southern Appalachians. It may be locally common in appropriate habitat (Ford and Rodrigue 2001). Kalko and Handley (1993) reported that the long-tailed shrew constituted about 10% of the *Sorex* recovered over a 15-year period in the northern Ridge and Valley section of Virginia.

PRIMARY HABITATS

Forest cover associations inhabited by the long-tailed shrew include red spruce–Fraser fir (*Picea rubens-Abies fraseri*), northern hardwood, cove hardwood, and white pine–eastern hemlock (*Pinus strobus-Tsuga canadensis*). Although it has been reported from younger seral stages (Kirkland 1977, Ford and Rodrigue 2001), it is found generally in mature forest stands characterized by cool, moist, moss-covered, humus-laden habitats associated with rockslides and talus slopes at high elevations or north-facing slopes. In the northern and central Appalachians, the long-tailed shrew can occur along small mountain streams and bogs (Kirkland et al. 1976, Kirkland and Van Duesen 1979, Kirkland 1981). Ford and Rodrigue (2001) speculate that moist and sheltered riparian zones might serve as dispersal or travel corridors between suitable talus areas. Most descriptions emphasize the significance of emergent rock and colluvial talus in the habitat (Richmond and Grimm 1950, Conaway and Pfitzer 1952, Holloway 1957, Kirkland and Van Duesen 1979, Kirkland 1981, Laerm et al. 1997, Ford et al.

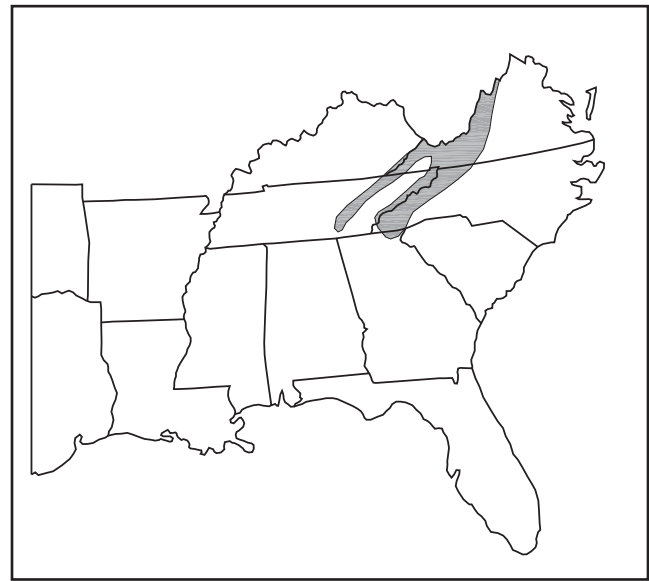


Figure 2. Distribution of *Sorex dispar* in the South.

2006), where it apparently uses cool deep crevices and underground burrows. Elevational distributions range from as low as approximately 500 m on the Cumberland Plateau of Tennessee and possibly Kentucky to 1,000 m and higher in the Allegheny Plateau and northern Ridge and Valley in Virginia and throughout the Blue Ridge in Georgia, Tennessee, North Carolina and Virginia.

REPRODUCTION

Little is known about reproduction in the long-tailed shrew. The breeding season extends from early spring to late summer. Pregnant and lactating females are reported from May through August. Two to 5 embryos are documented, but gestation is unknown. Reproductive information is reviewed by Richmond and Grimm (1950), Kirkland and Van Duesen (1979), and Kirkland (1981).

FOOD HABITS

The food habits of the long-tailed shrew also are poorly known. The species feeds on invertebrates including dipterans, coleopterans, orthopterans, arachnids, and chilopods (Richmond and Grimm 1950, Conaway and Pfitzer 1952, Kirkland 1981).

ASSOCIATED SPECIES

Within emergent rock habitat, the long-tailed shrew commonly is associated with other insectivores that occur in Appalachian mesophytic forests including the northern short-tailed shrew (*Blarina brevicauda*), masked shrew (*S. cinereus*), and smoky shrew, as well as rodents such as the deer mouse (*Peromyscus*

maniculatus), southern red-backed vole (*Clethrionomys gapperi*), and rock vole (*Microtus chrotorrhinus*). The American water shrew (*S. palustris*) and woodland jumping mouse (*Napaeozapus insignis*) are common associates along streamsides where long-tailed shrews occur in the central Appalachians.

VULNERABILITY AND THREATS

The long-tailed shrew is one of the least known mammals of the region; additional demographic and life history data are needed. The extent of appropriate forest cover types and microhabitat features throughout the Appalachians suggests that significant habitat exists in public ownership on inoperable and rugged sites, and there are no apparent short-term threats to the species viability. Nonetheless, impacts to long-tailed shrews from eastern hemlock reduction from hemlock woolly adelgid (*Adelges tsugae*) and global climate change effects on northern hardwood and montane boreal communities in the southern Appalachians merit future research and monitoring.

MANAGEMENT SUGGESTIONS

Although management effects on long-tailed shrews are unknown, activities that reduce micro-site moisture and shading in talus slopes or along montane riparian zones should be avoided. Kirkland (1977) found long-tailed shrews in young clearcuts in red spruce (<5 years) and Ford and Rodrigue (2001) found them in intermediate-aged (e.g., 70 yrs) red spruce-eastern hemlock stands indicating this species is tolerant of overstory disturbance in very mesic, high elevation sites. Regardless, identification and protection of favorable colluvial rock habitats would benefit this species.

REFERENCES

- Bryan, H. D. 1991. The distribution, habitat, and ecology of shrews (Soricidae: *Blarina*, *Sorex* and *Cryptotis*) in Kentucky. *Journal of the Tennessee Academy of Science* 66:187–189.
- Caldwell, R. S. 1980. First records of *Sorex dispar* and *Microsorex thompsoni* in Kentucky with distributional notes on associated species. *Transactions of the Kentucky Academy of Science* 41:46–47.
- Conaway, C. H., and J. C. Howell. 1953. Observations on the mammals of Johnson and Carter counties, Tennessee, and Avery County, North Carolina. *Journal of the Tennessee Academy of Science* 28:53–61.
- Conaway, C. H., and D. W. Pfitzer. 1952. *Sorex palustris* and *Sorex dispar* from the Great Smoky Mountains National Park. *Journal of Mammalogy* 33:106–108.
- Ford, W. M., and J. L. Rodrigue. 2001. Soricid abundance in partial overstory removal harvests and riparian areas in an industrial forest landscape of the central Appalachians. *Forest Ecology and Management* 152:159–168.
- Ford, W. M., T. S. McCay, M. A. Menzel, W. D. Webster, C. H. Greenberg, J. F. Pagels, and J. Merritt. 2006. Influence of elevation and forest type on shrew community assemblage and species distribution in the central and southern Appalachians. Pages 303–315 in J. F. Merritt, S. Churchfield, R. Hutterer and B. A. Sheftel, editors. *Advances in the Biology of the Shrews II*. Special Publication of the International Society of Shrew Biologists, No. 1, New York, New York, USA.
- French, T. W., and G. L. Kirkland, Jr. 1983. Taxonomy of the Gaspè shrew, *Sorex gaspensis*, and the rock shrew, *Sorex dispar*. *Canadian Field-Naturalist* 97:75–78.
- Handley, C. O., Jr. 1971. Appalachian mammalian geography—Recent Epoch. Pages 263–303 in P. C. Holt, editor. *Distributional history of the biota of the southern Appalachians*. Part III, Vertebrates. Research Division Monograph 4, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA.
- Handley, C. O., Jr. 1979. *Sorex dispar dispar* Batchelder. Pages 541–544 in D. M. Linzey, editor. *Endangered and threatened plants and animals of Virginia*. Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA.
- Handley, C. O., Jr. 1991. Mammals. Pages 539–613 in K. Terwilliger, editor. *Virginia's endangered species*. McDonald and Woodward, Blacksburg, Virginia, USA.
- Harvey, M. J., M. D. McGimsey, and C. S. Chaney. 1992. Distribution, status, and ecology of small mammals of the Cherokee National Forest, Tennessee (Northern Districts). Report to the United States Forest Service. Center for the Management, Utilization, and Protection of Water Resources, Tennessee Technological University, Cookeville, Tennessee, USA.
- Holloway, C. O. 1957. *Sorex dispar* at Mountain Lake, Virginia. *Journal of Mammalogy* 38:406.
- Junge, J. A., and R. S. Hoffmann. 1981. An annotated key to the long-tailed shrews (Genus *Sorex*) of the United States and Canada, with notes on Middle American *Sorex*. *Occasional Papers of the Museum of Natural History, University of Kansas* 94:1–48.
- Kalko, E. K. V., and C. O. Handley, Jr. 1993. Comparative studies of small mammal populations with transects of snap traps and pitfall arrays in southwestern Virginia. *Virginia Journal of Science* 44:3–18.
- Kirkland, G. L., Jr. 1977. Responses of small mammals to the clearcutting of northern Appalachian forest. *Journal of Mammalogy* 58:600–609.
- Kirkland, G. L., Jr. 1981. *Sorex dispar* and *Sorex gaspensis*. *Mammalian Species* 155:1–4.
- Kirkland, G. L., Jr., and H. M. Van Duesen. 1979. The shrews of the *Sorex dispar* group: *Sorex dispar* Batchelder and *Sorex gaspensis* Anthony and Godwin. *American Museum Novitates* 2675:1–21.

Long-tailed Shrew (*Sorex dispar*)

- Kirkland, G. L., Jr., C. R. Schloyer, and D. K. Hull. 1976. A novel habitat record for the long-tailed shrew, *Sorex dispar*. Proceedings of the West Virginia Academy of Science 48:77–79.
- Kirkland, G. L., Jr., D. F. Schmidt, and C. J. Kirkland. 1979. A novel habitat record for the long-tailed shrew (*Sorex dispar*) in New Brunswick. Canadian Field-Naturalist 93:195–197.
- Laerm, J., C. H. Wharton, and W. M. Ford. 1997. The rock shrew, *Sorex dispar* (Insectivora: Soricidae), in Georgia with comments on its conservation status in the southern Appalachians. Brimleyana 24:1–5.
- Laerm, J. W. M. Ford, M. A. Menzel, T. S. McCay, L. T. Lepardo, and J. L. Boone. 1999. Soricid communities in the southern Appalachians. Pages 177–193 in R. P. Eckerlin, editor. Proceedings of the Appalachian Biogeography Symposium. Virginia Museum of Natural History 7.
- Lee, D. S., J. B. Funderburg, Jr., and M. K. Clark. 1982. A distributional survey of North Carolina Mammals. Occasional Papers of the North Carolina Biological Survey 10:1–70.
- Linzey, A. V., and D. W. Linzey. 1971. The mammals of the Great Smoky Mountains National Park. University of Tennessee, Knoxville, Tennessee, USA.
- Linzey, D. W. 1998. The mammals of Virginia. McDonald and Woodward, Blacksburg, Virginia, USA.
- Mitchell, J. C., S. C. Rinehart, J. F. Pagels, K. A. Buhlmann, and C. A. Pague. 1997. Factors influencing amphibian and small mammal assemblages in central Appalachian forests. Forest Ecology and Management 96:65–79.
- NatureServe. 2007. An online encyclopedia of life [Database]. Version 6.1. Association for Biodiversity Information. <http://www.natureserve.org/>.
- Pagels, J. F. 1987. The pygmy shrew, rock shrew, and water shrew: Virginia's rarest shrews (Mammalia: Soricidae). Virginia Journal of Science 38:364–368.
- Pagels, J. F., and C. M. Tate. 1976. Shrews (Insectivora: Soricidae) of the Paddy Knob-Little Back Creek Area of western Virginia. Virginia Journal of Science 27:202–203.
- Richmond, N. D., and W. C. Grimm. 1950. Ecology and distribution of the shrew *Sorex dispar* in Pennsylvania. Ecology 31:279–282.
- Schwartz, A. 1956. A new subspecies of the long-tailed shrew (*Sorex dispar* Batchelder) from the Southern Appalachian Mountains. Journal of the Elisha Mitchell Scientific Society 72:24–30.
- Smith, C. R., J. Giles, M. E. Richmond, J. Nagel, and D. W. Lambert. 1974. The mammals of northeastern Tennessee. Journal of the Tennessee Academy of Science 49:88–94.
- Stucki, P. D. 1967. Small mammal distribution in four mature forest communities in the gorges of Fall Creek Falls State Park, Tennessee. Thesis, Tennessee Technological University, Cookeville, Tennessee, USA.
- Webster, W. D. 1987. *Sorex dispar*. Pages 39–40 in M. K. Clark, editor. Endangered, threatened, and rare fauna of North Carolina. Part 1. A reevaluation of the mammals. Occasional Papers of the North Carolina Biological Survey.