

# Southern Bog Lemming

*Synaptomys cooperi* (Baird, 1858)

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## CONTENT AND TAXONOMIC COMMENTS

There are eight subspecies of the southern bog lemming (*Synaptomys cooperi*) recognized, four of which occur in the South: *S. c. gossii*, *S. c. helaletes*, *S. c. kentucki*, and *S. c. stonei* (Wetzel 1955, Barbour 1956, Hall 1981, Linzey 1983, Long 1987). However, Whitaker and Hamilton (1998) indicate that *S. c. gossii*, *S. c. kentucki*, and *S. c. stonei* could be referable to *S. c. cooperi*. The literature was reviewed by Linzey (1983).

## DISTINGUISHING CHARACTERISTICS

The southern bog lemming is a robust, short-tailed vole with a broad head, small ears, and small eyes. Its measurements are: total length, 119–154 mm; tail, 13–25 mm; hind foot, 16–24 mm; ear, 8–14 mm; weight, 20–50 g. The dental formula for this species is: I 1/1, C 0/0, P 0/0, M 3/3 = 16 (Figure 1). The pelage is bright chestnut to dark grizzled brown dorsally, grading into silver grizzled white ventrally, with gray to brown feet and tail. The southern bog lemming readily is distinguished from other voles by its short tail (usually less than hind foot length), presence of a shallow longitudinal groove along upper incisors, and deep reentrant angles on molars. See keys for details.

## CONSERVATION STATUS

The southern bog lemming has a global rank of Secure (NatureServe 2007). It is listed as Secure in Virginia and Apparently Secure in Kentucky and Tennessee. It is listed as Vulnerable in North Carolina, Imperiled in Arkansas, and Critically Imperiled in Georgia. It is unranked in South Carolina.

## DISTRIBUTION

The southern bog lemming is distributed throughout southeastern Canada and the north-central and northeastern portions of the United States. Although specimen records have been reported from the Delmarva Peninsula of Maryland (Paradiso 1969), the species is not known from the Virginia portion of the peninsula. There are disjunct populations of *S. c. helaletes* in the Great Dismal Swamp region of Virginia to Carteret and Jones counties, North Carolina, approximately 170 km south (Handley 1979, Clark et al. 1985, Rose 1981, Webster et al. 1984, Rose et al.

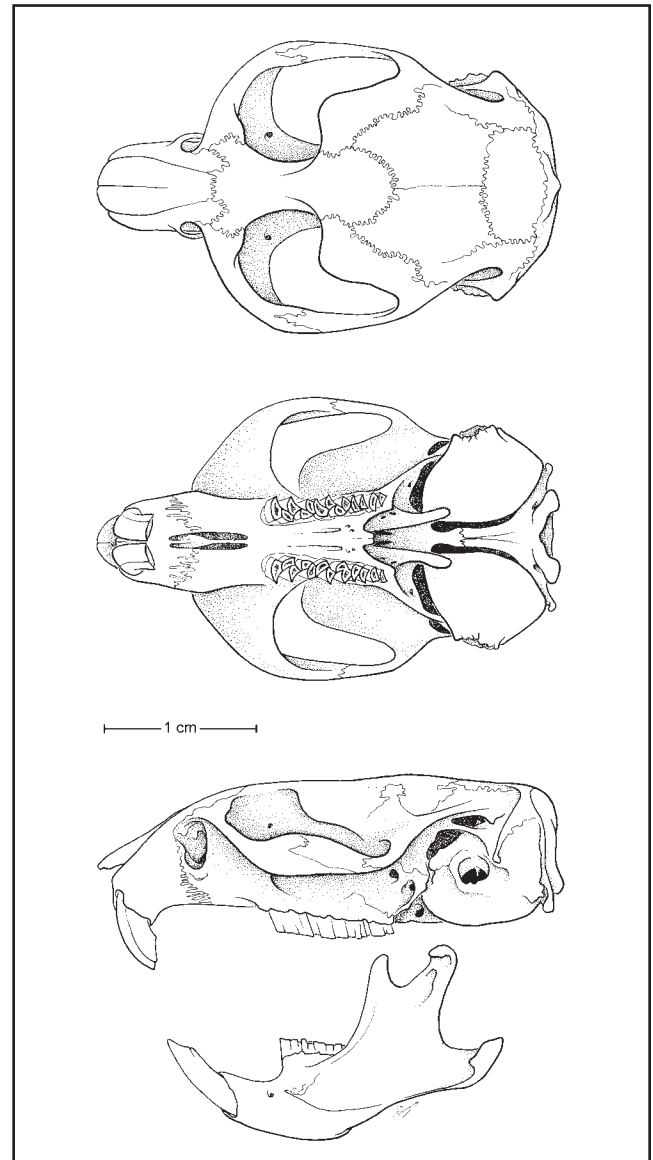


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Synaptomys cooperi* from The Great Dismal Swamp National Wildlife Refuge, Southampton County, Virginia (USNM 95879, male).

1990, Webster et al. 1992, Clark et al. 1993). *Synaptomys c. stonei* occurs at middle to high elevations throughout the Appalachian region of western Virginia (Stewart 1943, Smyth 1946, Linzey and Cranford 1984, Linzey 1984, Handley 1992), eastern Kentucky (Barbour and Davis 1974, Kiser and Meade 1993),

eastern Tennessee (Smith et al. 1974, Linzey 1995), western North Carolina (Odum 1948, Johnston 1967, Lee et al. 1982), and extreme northern Georgia (Brown 1993). Populations in the interior Bluegrass and eastern outer Bluegrass of Kentucky were thought to be *S. c. kentucki* by Barbour (1956), however Robinson (1981) was unable to discriminate between *S. c. kentucki* and *S. c. stonei* there.

*Synaptomys c. gossii* is found in northeastern Arkansas in the Mississippi Alluvial Valley (Sealander and Heidt 1990; Figure 2).

## ABUNDANCE STATUS

The regional abundance of the southern bog lemming is poorly known. The species is difficult to catch and is underreported in small mammal survey efforts even where present (Linzey 1995, Whitaker and Hamilton 1998, Francl 2003). The species may be relatively common in the central Appalachians of Virginia where densities above 20/ha were reported (Linzey and Cranford 1984, Linzey 1984, Kalko and Handley 1993). Generally, in the southern Appalachians, the species is considered rare and patchily distributed (Johnston 1967, Lee et al. 1982, Kiser and Meade 1993, Linzey 1995). In the Kentucky Bluegrass, it is regarded as fairly common (Barbour and Davis 1974); Krupa and Haskins (1996) believed it was once the dominant small mammal in woodland openings and clearings. The southern bog lemming is sporadically distributed in small colonies in Arkansas (Sealander and Heidt 1990). Populations of *S. c. helaletes* may be locally common in the Great Dismal Swamp in Virginia (Rose et al. 1990), whereas Clark et al. (1993) thought the species to be comparatively rare in eastern North Carolina.

## PRIMARY HABITATS

In the South, the southern bog lemming has been reported from a wide variety of relatively open habitats such as glades, grassy woodland openings, oldfields, moist meadows, marshes, and shrub bogs (Welter and Sollberger 1939, Conaway and Howell 1953, Barbour and Davis 1974, Smith et al. 1974, Linzey and Cranford 1984, Sealander and Heidt 1990, Krupa and Haskins 1996, Francl 2003). The species also has been reported on high elevation grassy balds, along roadside rights-of-way, and rhododendron (*Rhododendron maximum*) streamside communities in the southern Appalachians (Linzey 1995). Populations in the Coastal Plain of North Carolina and Virginia have been reported from pocosin swamps and young loblolly pine (*Pinus taeda*) plantations and new regeneration areas with thick herbaceous cover (Clark et al. 1985, Rose et al. 1990, Webster et al. 1992, Clark et al. 1993). Southern bog

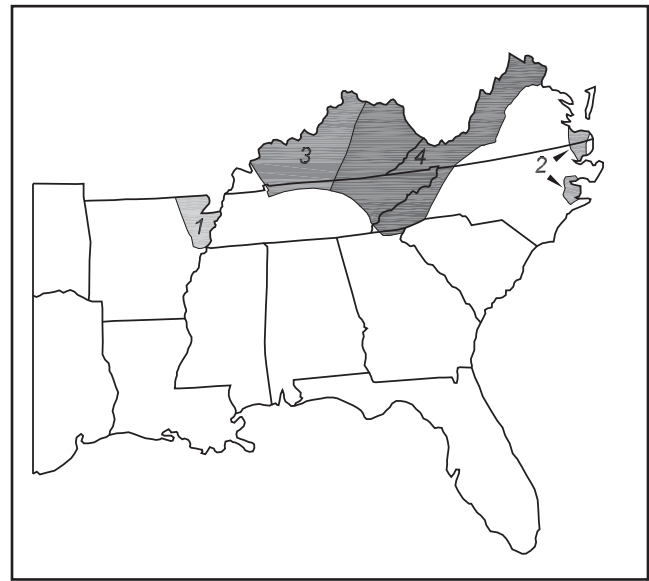


Figure 2. Distribution of *Synaptomys cooperi* in the South: (1) *S. c. gossii*; (2) *S. c. helaletes*; (3) *S. c. kentucki*; (4) *S. c. stonei*.

lemmings construct surface runways and underground burrows. Nests are usually constructed underground; in saturated soils, these may be located under coarse woody debris above ground. Fresh grass cuttings and bright green feces in the runways often indicate the presence of the southern bog lemming (Sealander and Heidt 1990). Home range is typically 0.3 ha or less (Whitaker and Hamilton 1998).

## REPRODUCTION

Breeding occurs year-round, but is highest in warmer months and usually is depressed between November and February (Connor 1959, Robinson 1981, Linzey 1983). Gestation is 23–26 days; mean litter size is approximately 4 (Linzey 1983). Young are weaned in 2–3 weeks (Connor 1959). Longevity is 8–12 months (Connor 1959), although individuals living over 2 years have been reported (Whitaker and Hamilton 1998).

## FOOD HABITS

Preferred foods of the southern bog lemming are the leaves, shoots, and roots of grasses and sedges, as well as fruits such as blackberries (*Rubus* spp.) or blueberries (*Vaccinium* spp.) and hypogeous fungi (Hamilton 1941, Connor 1959, Knopf 1978, Linzey 1983, Linzey 1995, Whitaker and Hamilton 1998).

## ASSOCIATED SPECIES

The masked shrew (*Sorex cinereus*), northern short-tailed shrew (*Blarina brevicauda*), eastern harvest mouse (*Reithrodontomys humulis*), white-footed mouse

(*Peromyscus leucopus*), deer mouse (*P. maniculatus*), southern red-backed vole (*Clethrionomys gapperi*), prairie vole (*Microtus ochrogaster*), and meadow jumping mouse (*Zapus hudsonius*) are common faunal associates of the southern bog lemming. In the South, the spotty distribution and ephemeral nature of regional populations are suggested to relate, in part, to competitive exclusion by meadow voles (*M. pennsylvanicus*) from areas with dense ground cover. Forest clearing and replacement of native grasses by introduced species apparently favors meadow voles to the exclusion of southern bog lemmings (Linzey 1983, Linzey 1984, Krupa and Haskins 1996). On the other hand, artificial clearings in larger forested areas not readily accessible to meadow voles may favor southern bog lemmings (Linzey 1983, Linzey 1984, Francl 2003).

## VULNERABILITY AND THREATS

The southern bog lemming has a wide distribution, but is at the southern limit of its range regionally. In many areas, the species may be in competition with meadow voles. Local populations may be subject to extirpation due to successional change within isolated grassland, wet meadow or early succession habitats.

## MANAGEMENT SUGGESTIONS

Maintenance of woodland openings, bogs and moist meadows, and montane grassy balds by periodic mowing, haying, or grazing seems appropriate. In prairie systems, southern bog lemmings showed negative short-term response to prescribed burning, though long-term impacts or benefits were not known (Clark and Kaufman 1990). Connections to habitats that allow expansion or establishment of meadow voles should be avoided.

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