

Moles

Hairy-tailed Mole *Parascalops breweri*

Star-nosed Mole *Condylura cristata*

Contributors: Mary Bunch, Mark Ford and David Webster

DESCRIPTION

Taxonomy and Basic Description

Three species of moles occur in South Carolina. These include the eastern mole, (*Scalopus aquaticus*) which is widely distributed and common. The other two species, the star-nosed mole (*Condylura cristata*) and hairy-tailed mole (*Parascalops breweri*), are less commonly encountered in South Carolina. All three possess velvety fur; eyes that are small and concealed in the fur; and large well developed forelimbs with backward facing palms and long claws. They also lack external ear structures.

The star-nosed mole was first described by Linnaeus in 1758. Two subspecies are recognized for the star-nosed mole: *Condylura cristata cristata* and *Condylura cristata parva*. Star-nosed moles in South Carolina are considered to be *C. c. parva* (Peterson and Yates 1980). As the name implies, the rostrum of the star-nosed mole is star-like and consists of 22 fleshy appendages. Total length of this species ranges from 153 to 238 mm (6.24 to 9.3 inches). The moderately haired tail is approximately one-third to one-half the body length. The fur is black or a black-brown on the back (Peterson and Yates 1980; Webster et al. 1985; Laerm et al. 2005a).



The hairy-tailed mole, first described by Bachman in 1842, is the smallest of South Carolina's moles, ranging from 139 to 174 mm (5.4 to 6.8 inches). The name suggests its identifying attribute, a densely furred tail. The tail is less than one-quarter of the body length. The fur is black to a gray-black on top and slightly paler underneath (Hallett 1978; Laerm et al. 2005b). Both mole species use their tail for fat storage; therefore, tail width varies with season and condition.

Status

Both species are of special concern in South Carolina. The state rank for the hairy-tailed mole is unknown (S?). The star-nose mole is ranked S3? or uncommon (mostly unknown). Both species have a global rank of secure (NatureServe 2004). The hairy-tailed mole is common in Pennsylvania (Merritt 1987) and appears to be secure in Virginia, Kentucky and North Carolina but is considered as vulnerable in Tennessee and critically imperiled in Georgia (Lamer et al.

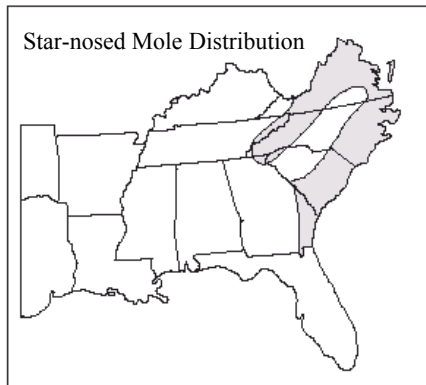
2005b). The star-nosed mole, ranked as uncommon in South Carolina, is imperiled in Georgia and Tennessee and is considered secure in North Carolina and Virginia (Laerm et al. 2005a).

POPULATION SIZE AND DISTRIBUTION

There are no population estimates available in the southern end of the range (southern Appalachians) for either the hairy-tailed or star-nosed moles. Laerm et al. (2005a, 2005b) reports both species as “uncommon” and the hairy-tailed mole as “rarely reported in appropriate habitat.”

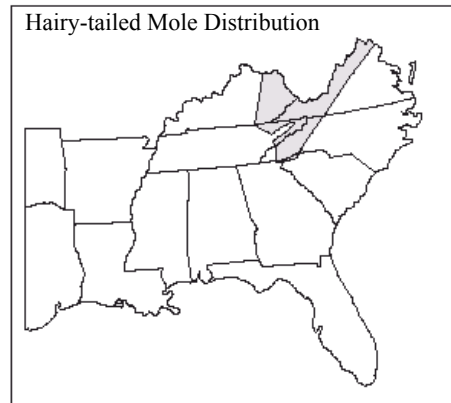
The hairy-tailed mole is restricted to the high elevation mountains of South Carolina within the southern Appalachian ecoregion. The range for hairy-tailed moles extends from the mountains in South Carolina northward into southern Maine and extreme southern Canada (Hallett 1978).

The star-nosed mole extends both into South Carolina’s mountains and the outer and inner coastal plains and sandhills ecoregions.



There appears to be a gap in the distribution of star-nosed moles in the piedmont of South Carolina and most of the piedmont of North Carolina (Beane 1995).

The North American distribution for the star-nosed mole extends from Canada, down to and across New England and the Great Lakes states, southward along the Appalachians into Georgia and South Carolina. Additionally, it is found coastally through Georgia and extreme northern Florida (Peterson and Yates 1980).



HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Both the star-nosed and hairy-tailed moles are found in the southern Appalachian Mountains. Within that ecoregion, they show some overlap in habitat; both species use mesic mixed forest, mesic deciduous hardwood and bottomland or floodplain forests. The latter habitat is extremely uncommon in the mountain ecoregion in South Carolina (Griffith et al. 2002).

Hairy-tailed moles are usually found in areas with elevations above 427 m (1400 feet). Habitats for this species include fields and pastures, deciduous (including dry deciduous) needle-leaved evergreen forest and mixed evergreen-hardwood forest. Often the habitat includes loose, easily drained and excavated soil with cover. Soils are not typically wet or of high clay content. In the southern Appalachians, associated species that can occur in the same habitats as the hairy-tailed mole include several other South Carolina species of concern: the southern red-backed vole (*Clethrionomys gapperi*), woodland jumping mouse (*Napaeozapus insignis*), star-nosed mole (*Condylura cristata*) and masked shrew (*Sorex cinereus*).

Star-nosed moles in the southern Appalachian ecoregion tend to be found in wetter sites than hairy-tailed moles, often found in sites such as swamps, marshes and bogs. Star-nosed moles are the most aquatic of our moles and construct tunnels that sometimes lead into water (Webster et al. 1985). Forested floodplains, forested and early successional bottomland, mesic hardwood sites and streamside areas typify habitats used by this species in the mountains. Additionally, star-nosed moles are found in sites with dense leaf litter.

The coastal and sandhills habitats for star-nosed moles include pocosins, wetlands, saturated bottomlands and long-leaf pine habitat. Neither forest age nor successional stage has been reported as a critical factor determining habitat suitability for the star-nosed mole (Laerm et al. 2005a).

Both the star-nosed mole and the hairy-tailed mole burrow and will create both underground tunnels and surface tunnels. Nests are constructed underground. All moles are vulnerable to inundation; therefore, nests are built above the typical high water level.

CHALLENGES

Scientists agree that additional surveys for star-nosed moles and hairy-tailed moles are necessary to better understand the distribution and abundance of these species. Additionally, in order to better understand the association with wet soils preferred by star-nosed moles, soil requirements should also be investigated for this species.

Cats, dogs, owls, foxes and snakes can all prey upon both species. Presumably, coyotes will also use star-nosed moles and hairy-tailed moles as a food source. Currently, none of these predators are reported to be major threats to the species' survival (Hallett 1978, Peterson and Yates 1980). Increased predation from cats and dogs is expected as residential development increases.

Increases in eradication from humans that view the species as nuisances can be expected. However, landscaping techniques exist that may reduce problems that result due to mole activity. One of these techniques is to limit the use of mulch. Mulch favors water retention, which, in turn, attracts soil invertebrates, the food source for moles. By removing the habitat of these invertebrates, the area becomes inhospitable to moles. Exclusion techniques, such as mole fences or underground barriers, may also limit mole damage (Henderson 1994).

As the urban interface grows, increased impacts from development will occur. Development impacts can be measured by quantifying creation of impermeable surfaces, such as roads, buildings and parking lots (Laerm et al. 2005a). Direct loss of habitat is a threat, as are changes in hydrology associated with development. Laerm et al. (2005a) suggest that activities that permanently saturate the soil in sites occupied by star-nosed moles and hairy-tailed moles are detrimental. Neither the hairy-tailed nor star-nosed mole seems to be sensitive to seral stage; however, effects of timber harvests on localized, temporal water levels could cause nests to be flooded with ground water.

The recent range expansion of the nine-banded armadillo into the South Carolina coastal plains may represent a threat to the star-nosed mole by competition for food resources. Predation by feral hogs may also present a threat to moles throughout their range.

CONSERVATION ACCOMPLISHMENTS

In South Carolina, the Andrew Pickens Ranger District of the Sumter National Forest, several mountain Heritage Preserves, Jocassee Gorges, several state parks and some tracts owned or held in easement by various land trusts contain habitat for star-nosed moles and hairy-tailed moles. For example, over 30,000 acres of mountain land is under conservation easement held by The Nature Conservancy. None of those properties were purchased specifically to protect either the star-nosed or hairy-tailed moles; however, both benefit from these acquisitions and the protection offered for their habitat.

The South Carolina Department of Natural Resources (SCDNR) is in the process of creating new geology and soils maps for the northwestern corner of South Carolina. These new maps may prove useful in determining limiting factors for moles in the mountains of South Carolina.

CONSERVATION RECOMMENDATIONS

- Discourage the construction of ponds in known star-nosed mole and hairy-tailed mole habitat and prevent increases in storm water run-off associated with development in all habitats.
- Re-examine current South Carolina state rankings for these mole species as required under the Nongame and Endangered Species Conservation Act, in Chapter 15 under Title 50 of the Code of Law of South Carolina.
- Conduct ecoregion-wide surveys for distribution and density of both the star-nosed mole and the hairy-tailed mole in order to better understand their conservation status. Survey techniques should be standardized throughout the southeast so that results and data are readily comparable. All capture data should be made available to the most current statewide Heritage Trust database. That information should also be shared with neighboring states.
- Complete a thorough identification of mountain bogs and seeps and their interface with upland sites to prioritize site surveys for the star-nosed mole and the hairy-tailed mole.
- Investigate specific limiting factors associated with habitats for both the star-nosed mole and the hairy-tailed mole.
- Investigate the effects of timber harvest on temporal water table levels and associated impacts to star-nosed mole distribution.
- Educate landowners and other members of the public about the ecological role and benefits of star-nosed moles and hairy-tailed moles.

MEASURES OF SUCCESS

As research and management needs are identified, projects should be proposed and prioritized by those with the greatest conservation applicability. Surveys and density estimates in the southern

region should provide some population estimations, which will be used to more accurately rank the species and prioritize future management needs.

LITERATURE CITED

- Beane, J.C. 1995. New distributional records for the star-nosed mole, *Condylura cristata* (Insectivora: Talpidae), in North Carolina, with comments on its occurrence in the piedmont region. *Brimleyana*. 22:77-86.
- Griffith, G.E., J.M. Omernik, J.A. Comstock, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina color poster with map, description, text, summary tables, and photographs. Reston, Virginia. Geological Survey (scale 1:1,500 000).
- Hallett, J.G. 1978. *Parascalops breweri*. *Mammalian Species*. 98:1-4.
- Henderson, F.R. 1994. Moles. *In: Prevention and Control of Wildlife Damage*. United States Department of Agriculture University of Nebraska Cooperative Extension, USDA APHIS-ADC, and the Great Plains Agricultural Council. Pp D-51-D58.
- Laerm, J., B.R. Chapman and W.M. Ford. 2005a. In Press. Star-nosed Mole. Pp. 49-52. *In: The Land Manager's Guide to Mammals of the South*, M.K. Trani and B.R. Chapman, editors. The Nature Conservancy.
- Laerm, J., W.M. Ford and B.R. Chapman. 2005b. In Press. Hairy-tailed Mole. Pp. 53-55. *In: The Land Manager's Guide to Mammals of the South*, M. K. Trani and B. R. Chapman, editors. The Nature Conservancy.
- Merritt, J.F. 1987. *Guide to the Mammals of Pennsylvania*. University of Pittsburgh Press for The Carnegie Museum of Natural History. Pittsburgh, Pennsylvania. 408 pp.
- NatureServe. 2004. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.0. NatureServe, Arlington, VA. <http://www.natureserve.org/explorer>.
- Peterson, K.E. and T.L. Yates. 1980. *Condylura cristata*. *Mammalian Species*. 129:1-4.
- Webster, W.D., J.F. Parnell and W.C. Biggs, Jr. 1985. *Mammals of the Carolinas, Virginia, and Maryland*. The University of North Carolina Press. Chapel Hill, North Carolina. 255 pp.