Additional Records of the Pygmy Shrew, *Sorex hoyi winnemana* Preble (Insectivora: Soricidae), in Western North Carolina

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ABSTRACT—Additional records of the pygmy shrew, *Sorex hoyi winnemana* Preble, are reported from 14 localities in 7 counties of western North Carolina. Results of recent surveys in adjacent regions of Tennessee and Georgia indicate that the species is widely distributed in the extreme southern Appalachian Mountains, including North Carolina, but is nowhere abundant.

The pygmy shrew, *Sorex hoyi winnemana*, has been regarded as one of the rarest mammals in the southeastern United States. In 1980 (see Diersing 1980, Handley et al. 1980), there were only 17 records known from southern Illinois east to Maryland and south throughout the Appalachian highlands to the Carolinas and Georgia. However, more recently, considerable information on the distribution, abundance, and habitat associations of this species has become available from Indiana (Caldwell et al. 1982, Cudmore and Whitaker 1984), Virginia (Handley et al. 1980, Pagels 1987, Pagels et al. 1992, Mitchell et al. 1993), Kentucky (Caldwell 1980, Caldwell and Bryan 1982), Tennessee (Kennedy et al. 1979, Kennedy and Harvey 1980, Tims et al. 1989, Harvey et al. 1991, Harvey et al. 1992, Feldhamer et al. 1993), South Carolina (Mengak et al. 1987), and Georgia (Wharton 1968). This information indicates that this subspecies can be found over a wider range of habitats and geographic area than previously known. Although nowhere abundant, it may be common where it occurs.

The first North Carolina records of *Sorex hoyi* were of two individuals collected by A. H. Howell and reported by Jackson (1928) from Bent Creek Experimental Forest in Pisgah National Forest, Buncombe County. Webster (1987) indicated that the Buncombe County specimens were erroneously reported from Transylvania County by Smith et al. (1960).

Diersing (1980), and Lee et al. (1982). However, a single specimen was subsequently collected in Transylvania County, at Cedar Mountain, and reported by Mengak et al. (1987). Additionally, Hoffmeister (1968) reported a single specimen from Newfound Gap, Swain County. Thus, until recently the species was represented by only four specimens from North Carolina.

In August 1993 E. v. d. Berghe (Appalachian Environmental Research Center, Frostburg, Maryland) submitted to J. L. collections of shrews that were made in North Carolina as incidental captures in surveys for carabid beetles. Included in these collections were two *Sorex hoyi* from McDowell County and an additional specimen from Graham County. Subsequently, we obtained a record of an additional specimen from M. Steele (Wilkes University, Wilkes Barre, Pennsylvania), who recovered *S. hoyi* from Mount Mitchell, Avery County, in pitfall studies for soricid parasites.

In this volume, Padgett and Rose (1994) report on significant new records of *S. hoyi* from the Dismal Swamp area in the extreme northeastern portion of North Carolina. Because the species is listed as special concern in North Carolina by the North Carolina Wildlife Resources Commission (see also Webster 1987), additional information on its distribution is needed. We report on new records of this species and the results of preliminary surveys to document additional records in western North Carolina.

METHODS

To document the occurrence of *S. hoyi* in regions from which it had not previously been reported, we established pitfall traplines at eleven sites in Clay, Cherokee, Jackson, and Macon counties in extreme western North Carolina from December 1993 through January 1994. Additionally, we established 15 pitfall trap lines at Coweeta Hydrological Laboratory along an altitudinal gradient from 710 m to 1,525 m from April through May 1994.

Traplines consisted of twenty, 32-ounce plastic cups (11-cm lip diameter, 14-cm depth) placed flush with or below the surface of the ground and adjacent to rotting logs, stumps, rocks, or other forest floor debris. Pitfalls were placed approximately 10-m apart along a linear transect and were set in a diversity of typical southern Appalachian forest habitats and checked biweekly. Because the species is protected in North Carolina, we were required to discontinue trapping after the second record of *S. hoyi* was obtained at a site.

RESULTS AND DISCUSSION

Our survey of 13,200 trap nights yielded 10 records of *Sorex hoyi*: one each from Cherokee, Clay, and Jackson counties and seven from Macon County. Five of the Macon County records were obtained at Coweeta Hydrological Laboratory. The western North Carolina sites ranged in elevation from 700 m to 1,524 m in a variety of moderate to mesic hardwood to mixed hardwood-pine sites. *Sorex hoyi* was taken in a heath bald dominated by rhododendron (*Rhododendron maximum*); cove hardwood communities dominated by yellow poplar (*Liriodendron tulipifera*), northern red oak (*Quercus rubra*), white oak (*Q. alba*), and buckeye (*Aesculus octandra*); moderately xeric sites dominated by white oak, northern red oak, hickory (*Carya* spp.), chestnut oak (*Q. prinus*), scarlet oak (*Q. coccinea*), and white pine (*Pinus strobus*); and streamside communities dominated by eastern hemlock (*Tsuga canadensis*) and rhododendron. Standard body measurements for the 13 new North Carolina specimens available to us are as follows: total body length ($\bar{x}$ = 68.7 mm, range = 65.0–73.5 mm), tail length ($\bar{x}$ = 26.2 mm, range = 24.0–28.4), and hind foot length ($\bar{x}$ = 8.0, range = 7.0–8.5 mm).

The few historical collection records of this species from western North Carolina probably do not necessarily reflect its rarity in the area but rather inappropriate collecting methodology. In the past 10–12 years significant information regarding this species has become available, largely through pitfall trapping, which has been shown to be the most (if not the only) effective method of collecting insectivores (Handley and Kalko 1993). Trapping efforts by Harvey et al. (1991) in the southern districts (Monroe and Polk counties) and Harvey et al. (1992) in the northern districts (Unicoi, Johnson, and Carter counties) of the Cherokee National Forest, Tennessee, have indicated *S. hoyi* to be widely distributed but nowhere abundant. Harvey et al. (1991) reported 16 captures in 226,054 pitfall trap nights in a diversity of forest habitats in the southern portions of the Cherokee National Forest ranging in elevation from 396 m to 1,122 m. Harvey et al. (1992) report 13 captures in 389,995 pitfall trap nights in a similar diversity of forest habitats in the northern portions of the Cherokee National Forest ranging in elevation from 695 m to 1,524 m. Similarly, in 67,500 pitfall trap nights we have recorded 72 *S. hoyi* from 42 localities throughout the entire Blue Ridge Province of Georgia where the species is widely distributed in a variety of forest habitat types, including clearcuts, early and mid-successional forest stages, as well as mature stands in streamside, xeric, and mesic communities at elevations ranging from 700 m to 1,372 m. In Georgia, it is nowhere abundant, but is widely distributed.

COLLECTION RECORDS

Records of *Sorex hoyi* from western North Carolina using acronyms for the museum collections in which the specimens are housed follow Yates et al. (1987).

Avery Co.: Mount Mitchell (1, M. Steele Collection). *Buncombe Co.*: Bent Creek Experimental Station, Pisgah National Forest (2, USNM). *Cherokee Co.*: Nancy Gap (2, UGAMNH). Clay Co.: 3.0 mi. E. Fires Creek Recreation Area (1, UGAMNH). *Graham Co.*: 15 mi. NW Robbinsville, Joyce Kilmer Memorial Forest (1, UGAMNH). *Jackson Co.*: 4.5 mi. S Cashiers (1, UGAMNH). *Macon Co.* 3.0 mi. W. Highlands (1, UGAMNH), 0.5 mi. E. Winding Stair Gap on U.S. 64 (1, UGAMNH); Albert Mt., Coweeta Hydrological Laboratory (1 UGAMNH); Cold Spring Gap, Coweeta Hydrological Laboratory (1 UGAMNH); Cold Spring Cove, Coweeta Hydrological Laboratory (1 UGAMNH); Lick Branch, Coweeta Hydrological Laboratory (2 UGAMNH). *McDowell Co.*: Balsam Gap, along Blue Ridge Parkway at mile marker 357 (1, UGAMNH); Glassmine Falls, along Blue Ridge Parkway at mile marker 362 (1, UGAMNH). *Swain Co.*: Newfound Gap (1, UIMNH). *Transylvania Co.*: Cedar Mountain (1, CUVC).

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