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Distribution of the Southeastern Shrew (*Sorex longirostris longirostris*) in Arkansas

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Abstract

The southeastern shrew (*Sorex longirostris longirostris*) is considered uncommon and, due to a lack of knowledge, a Species of Greatest Conservation Need in Arkansas. Also, eastern Arkansas may represent a gap in the species' distribution. Therefore, we evaluated persistence at previous capture sites, surveyed additional counties, quantified microhabitat at our capture locations, and compiled occurrences. Since Sealander and Heidt's (1990) *Arkansas Mammals* detailed its occurrence, additional captures by Huston and Nelson (1994), Showen (2006), and this study document new counties (Pope and Searcy) and a new ecoregion (Arkansas Valley). Number of specimens in Arkansas has increased to 17 in 11 counties within the Ozark Highlands, Boston Mountains, Ouachita Mountains, and Arkansas Valley Ecoregions. Our efforts to assess a potential distribution gap within the Mississippi Alluvial Plain produced only specimens of other shrew species; therefore, possible factors affecting connectivity across the Mississippi Alluvial Plain and river basin are discussed. Given sparse records in Arkansas, uncommon and Species of Greatest Conservation Need designations are warranted for the southeastern shrew.

Introduction

Sorex longirostris longirostris (southeastern shrew) is uncommon and, due to a lack of knowledge, a Species of Greatest Conservation Need in Arkansas (Anderson 2006). Information is especially lacking west of the Mississippi River (French 1980) and twenty years have passed since *Arkansas Mammals* (Sealander and Heidt 1990) summarized occurrences.

Native to the southeastern United States (French 1980), *S. l. longirostris* reaches its western limit in Arkansas, Missouri and eastern Oklahoma (Sealander 1960, 1977, 1981, Brown 1961, Graham 1976, Taylor and Wilkinson 1988, Garland and Heidt 1989). However, captures in Arkansas have been confined to the Ouachita and Boston Mountains and Ozark Highlands of western and northern Arkansas

(Sealander and Heidt 1990, Woods et al. 2004). While many have hypothesized occurrence (Sealander 1960, 1977, French 1980, Garland and Heidt 1989, Heidt et al. 1996), there are no records from the Mississippi Alluvial Plain of eastern Arkansas, creating a gap in the species' recorded distribution (Figure 1 Inset). We evaluated persistence at previous capture sites, surveyed additional counties including the upper Mississippi Alluvial Plain, and compiled occurrences.

Methods

From March 2007 to August 2009 we operated pitfalls, small folding aluminum (SFA) Sherman traps, large folding aluminum (LFA) Sherman traps, and snap-traps. Pitfalls (1L plastic buckets) were placed 3-7m apart in series with 15cm aluminum roof flashing as drift-fencing or set in grids, along deadfall or under low level vegetation without fencing. Sherman and snap-traps were baited with combinations of peanut butter, rolled oats, crushed dry cat food and minced sardines. Traps were checked daily. Capture and handling conformed to appropriate guidelines (Gannon and Sikes 2007, University of Arkansas at Little Rock [UALR] IACUC # R-07-04). Microhabitat variables (Dueser and Shugart Jr. 1978), including volume and decay stage (1-4) of coarse woody debris (CWD; Cromer et al. 2007), were quantified within a 10m x 10m plot centered on capture locations. Specimens were deposited in the UALR Vertebrate Museum.

Results

Capture efforts resulted in 17,983 trapnights at 329 locations with 2 captures and a new county record (Searcy County) for *S. l. longirostris* (Figure 1). These specimens were 2 non-lactating adult females with no embryos trapped in an SFA Sherman baited with peanut butter and dry cat food and an LFA baited with peanut butter and rolled oats. Efforts at previous capture sites (4472 [25%] trapnights) resulted in 10 *Blarina spp.*, whereas efforts in the upper Mississippi Alluvial Plain (3640 [20%] trapnights) resulted in 8 *Blarina carolinensis* and 5 *Cryototis parva*.

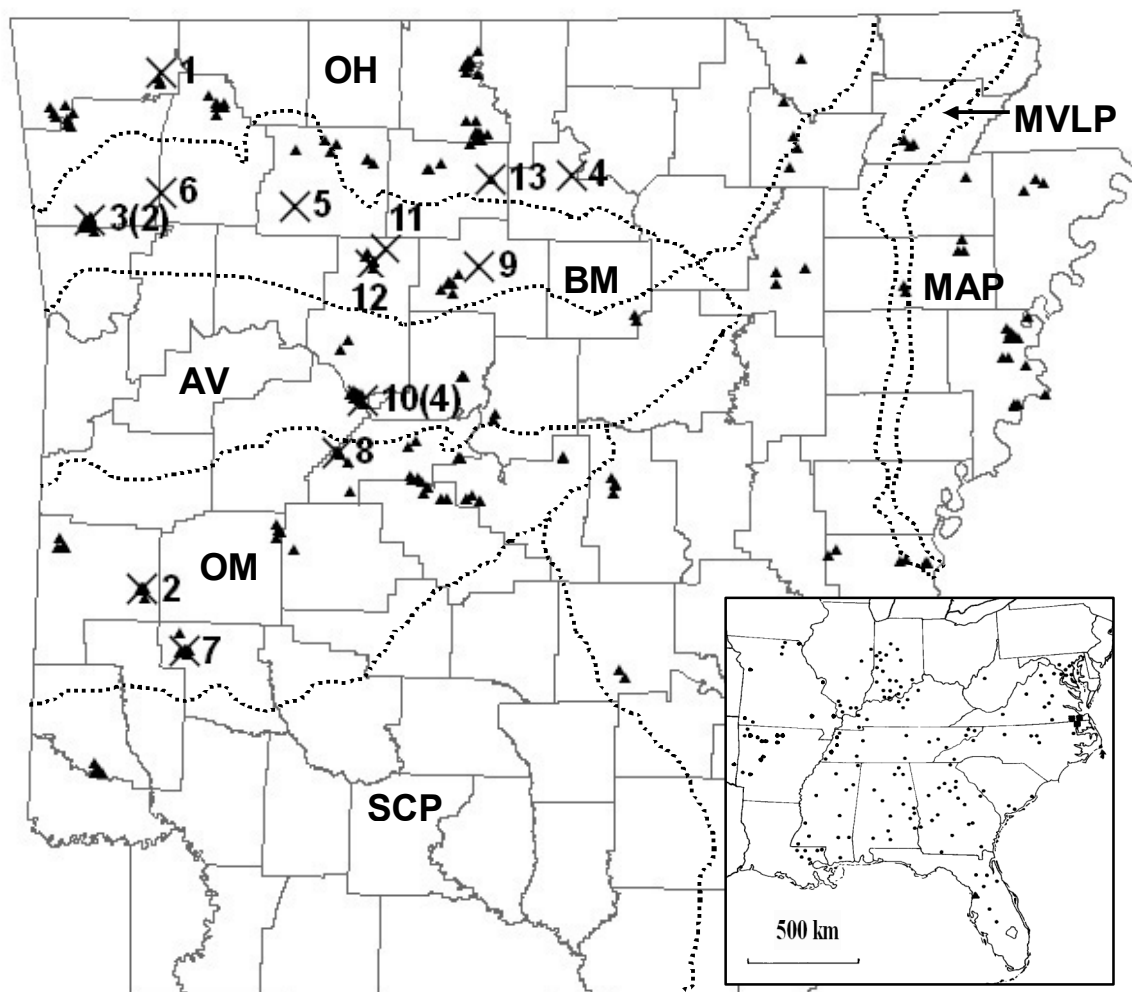


Figure 1: *Sorex longirostris longirostris* in Arkansas (numbered Xs correspond to references below) and trapping locations (triangles) for this study. Parenthetical numbers indicate multiple specimens from a location. Ecoregions (Woods et al. 2004) are delineated by dashed lines (OH: Ozark Highlands, BM: Boston Mountains, AV: Arkansas Valley, OM: Ouachita Mountains, SCP: South Central Plains, MVLP: Mississippi Valley Loess Plains, MAP: Mississippi Alluvial Plain). Inset (redrawn and updated from French 1980) depicts species geographic distribution. 1) Sealander JA 1960; 2) Graham GL 1976; 3) Sealander JA 1977; 4) Sealander JA 1981; 5) Sealander JA and GA Heidt 1990; 6) Sealander JA and GA Heidt 1990; 7) Garland DA and GA Heidt 1989; 8) Garland DA and GA Heidt 1989; 9) Garland DA and GA Heidt 1989 (inadvertently omitted in Sealander JA and GA Heidt 1990); 10) Huston RM and TA Nelson 1994; 11) Showen LL 2006; 12) Present study (UALRVC5733); 13) Present study (UALRVC5734)

Specimen UALRVC5733 (Pope County) occurred in a pecan (*Carya*)-oak (*Quercus*)-pine (*Pinus*) overstory valley with low-level blueberry (*Vaccinium*), elm (*Ulmus*), grape (*Vitis*), sweetgum (*Liquidamber*), catbrier (*Smilax*), honeysuckle (*Lonicera*), and sassafras (*Sassafras*), 35m from water. Specimen UALRVC5734 (Searcy County) occurred in an oak-hickory (*Carya*) overstory ridge with oak seedlings, 150m from water. At the 2 *S. l. longirostris* capture sites, mean CWD volume was 26984.90cm³ (13cm x 200cm log equivalent) and CWD decomposition scored 2.75 (2.5-3.0). Mean leaf litter depth was

2.55cm (2.5-2.6cm) with 97.68% (99.55-95.8%) coverage.

Discussion

The southeastern shrew can be found in early successional to mature second-growth forest and from dry upland hardwoods and grass fields to hardwood forests near small streams and bordering swamps, marshes, or rivers (Hamilton and Whitaker 1979, French 1980, Caldwell and Bryon 1982, Elliot and Root 2006). Foraging most often occurs under leaf

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litter (French 1980) that, with intermediately decayed CWD, provides cover for *S. l. longirostris* and habitat for invertebrate prey. The species is also associated with a heavy ground cover of grasses, sedges, rushes, blackberry and, honeysuckle (French 1980, Webster et al. 1985). For Arkansas, previous captures are described to be in overstory maple, hickory and oak with low-level blackberry, witch-hazel, sumac, sassafras, redbud, honeysuckle and overstory species seedlings (Graham 1976, Sealander 1977, Garland and Heidt 1989). Habitat for our specimens is consistent with previous Arkansas captures, although additional captures with quantified microhabitat characteristics are necessary to suggest a preferred type in Arkansas.

Studies carried out elsewhere in their distribution have suggested that *S. l. longirostris* can be rare (Lowery 1974, Brown 1978). Furthermore, when allopatric, *Sorex cinereus* and *S. l. fisheri* occur in mesic lowlands and river floodplains, whereas *S. l. longirostris* occurs in xeric upland forests and outside floodplain boundaries (Gentry et al. 1971, French 1984, Rose et al. 1987, Parmley and Harley 1995, Ford et al. 2001). Although *S. l. longirostris* occurs on the upland Bluff Hills of the Mississippi Valley Loess Plains on the east side of the Mississippi River in Tennessee (Heidt et al. 1996, Tennessee Wildlife Resources Agency 2005), the west side of the river in Arkansas is the more mesic lowland Mississippi Alluvial Plain. For Arkansas, this suggests the possibility of an uncommon occurrence of *S. l. longirostris* in more mesic areas such as the Mississippi Alluvial Plain where we only captured *B. carolinensis* and *C. parva*.

Management that develops and maintains forest openings creating diversity of habitats and microhabitats would have a positive effect on *S. l. longirostris*. We suggest subsequent shrew collection efforts use a high density of traps that remain operational for as long as possible. Pitfalls without fencing, making use of naturally occurring CWD and vines, are more time-efficient and potentially more effective where fencing can not be made flush with or buried into a rocky substrate. Sherman traps, when set sensitively, can capture small shrews and should be employed. In addition, solicitations for owl roosts and captures by domestic cats should be sought. Future studies could examine this potentially disjunct population using genetic sequencing and shrew analyses of population dynamics.

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