

Annotated Checklist of the Mammals at the Edward J. Meeman Biological Station

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Abstract—An annotated checklist of the living mammals found to occur at the Edward J. Meeman Biological Station (Station) in Shelby County, Tennessee, is presented. Species recorded were derived from field collections, reports in the literature, and observations reported by investigators and personnel at the Station. Overall, 8 orders, 17 families, and 45 species are reported. Information relating to distribution, habitat, and abundance (common, uncommon, or unknown) is presented for each species. The investigation provides new insight as to the level of mammalian species richness expected to occur at individual sites in western Tennessee.

Introduction

Kennedy (1991) and Kennedy et al. (2012) reported annotated checklists of mammals occurring in western Tennessee and Tennessee, respectively, and provided citations for previous works that have contributed to the understanding of species richness (the number of species in an area; Feltham et al., 2015) in the state. However, Kennedy et al. (2012) noted that, generally, the mammalian fauna of Tennessee needs additional study.

Several investigations have advanced the understanding of mammalian biodiversity in western Tennessee (e.g., Goodpaster and Hoffmeister, 1952; Beasley and Severinghaus, 1973; Severinghaus and Beasley, 1973; Graves and Harvey, 1974; Kennedy et al., 1984; Kennedy, 1991; LaMountain, 2007; Dennison, 2014). However, with the exception of studies at a few sites (e.g., Reelfoot Lake and vicinity in Obion and Lake counties, Calhoun, 1941; Natchez Trace State Park in Decatur and Henderson counties, Franklin et al., 2003; Shelby Farms Park in Shelby County, Wolcott et al., 2012), there has been little published information concerning overall species richness at local sites. Orians and Groom (2006) pointed out that, if efforts to preserve Earth's biodiversity are to be successful, they must be based on accurate information about where species are found and why they are there. They emphasized the need for studies of species richness at different spatial scales.

Because the Edward J. Meeman Biological Station (Station) includes a portion of the Third Chickasaw Bluff that joins two major physiographic regions (Mississippi River Alluvial Valley and West Tennessee Coastal Plain; Miller, 1974) in the state, it makes an interesting site for studies relating to species richness. The purpose of the present investigation was to provide an annotated checklist of the species richness of mammals occurring at the Station. The study should provide new insight as to the biodiversity of local regions within western Tennessee. Such information will be helpful in developing future management and conservation programs for the region.

Study Area

The Station encompasses two sites (Meeman; Brunswick) but functions as one field station. The Meeman site (approximately 252 ha) is located about 17 km north of the City of Memphis (35.362027, 90.018185), and the Brunswick site (approximately 149 ha) is located in the Brunswick community (near the City of Bartlett; 35.250205, 89.800086). Both sites are in Shelby County, Tennessee, separated by approximately 13 km. The Meeman site (adjacent to the Meeman-Shelby Forest State Park/Shelby Forest Wildlife Management Area) is characterized by gently sloping hills, grassy fields, and bottomland and upland forest. A portion of the Third Chickasaw Bluff and the Mississippi River Alluvial Plain occurs on this site at the western edge of the property about 3 km east of the Mississippi River. Young-bottomland forest and wetlands that includes an oxbow lake and beaver lodges occur at the Brunswick site, which is adjacent to the Loosahatchie River. The region around both sites includes scattered single-family housing on relatively small acreage. Hunting is illegal on the sites but occurs on the Shelby Forest Wildlife Management Area and private lands adjacent to the Station.

Materials and Methods

Common and scientific names in the checklist follow those used by Wilson and Reeder (2005). In each account, we provide a brief understanding of the distribution of the species at the Station. The study draws from an array of annual data gathering, which began with the start of the Station in 1967. Information is primarily from specific research projects conducted by faculty, graduate students, and undergraduate students at The University of Memphis, Memphis, Tennessee (UM). The Station has been the location for research for a number of theses and dissertations (focused on various species of mammals) by graduate students (e.g., Elrod, 1992; Ladine, 1997; Maris, 1998; Vecchio, 2011; Wolcott, 2011; Grow, 2015). Additionally, it has been the site for fieldwork by numerous students at UM in courses such as Mammalogy, Field Techniques in Vertebrate Zoology, and Undergraduate Re-

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search. Techniques employed in previous mammalian surveys at the Station have included live-trapping with Sherman (Elrod, 1992; Gilley, 2002) and Tomahawk live traps (Moore and Kennedy, 1985; Ladine, 1997) and utilization of pitfall traps (Grow, 2015), mist nets (Graves and Harvey, 1974; Gilley, 2002), trail cameras (Jacobson et al., 1997), and scent stations (Leberg and Kennedy, 1987). Additionally, surveys using handheld spotlights as well as general observations by students and personnel of the Station have been employed to record the presence of mammalian species at the site. Overall, this work is based on approximately 40 years of field collections and observations at the Meeman site and 20 years of collections and observations at the Brunswick site. The Meeman site has been more intensely sampled than the Brunswick site.

In the species accounts, M refers to the known occurrence of the taxon at the Meeman site, B refers to the known occurrence at the Brunswick site, and M/B refers to known occurrence at both sites. Due to only minimal sampling for some species at the Brunswick site, absence of a species does not necessarily mean that the species does not occur on the area. Likely, it reflects that the occurrence of the species has not yet been documented for the site. Voucher specimens of species are available in the mammal collections within the Department of Biological Sciences at The University of Memphis and the Sam Noble Museum of Natural History at the University of Oklahoma (Norman, Oklahoma). Reference to old barn or barn in the list of species refers to a livestock barn (at least 48 years old; no livestock kept in the barn since at least 1967) with a hay loft, granary, animal stalls, and large central hallway; the barn is located in the southcentral part of the Meeman site and known to be home to several species of mammals.

Results: List of Species

ORDER DIDELPHIMORPHIA—Pouched Mammals

Family Didelphidae (Opossums)

Didelphis virginiana (Virginia opossum). Station-wide; all habitats; has been the subject of over 20 years of study (natural history) on the Meeman site using mark/recapture procedures. Common, M/B.

ORDER SORICOMORPHA—Insectivores

Family Soricidae (Shrews)

Sorex longirostris (Southeastern shrew). Station-wide; occurs in several habitats but was most often found in habitats associated with heavy ground cover; while widespread on both sites, not abundant at any single location; most captures in pitfall traps, but occasional captures in Sherman live traps. Uncommon, M/B.

Blarina carolinensis (Southern short-tailed shrew). Station-wide; occurs in diverse terrestrial habitats; most common around decaying logs and stumps in forested habitat; most captures in pitfall traps but occasional captures in Sherman live traps; the species has been the subject of genetic studies at the Station and has demonstrated high levels of chromosomal polymorphism (Elrod et al., 1996). Common, M/B.

Cryptotis parva (North American least shrew). Station-wide in distribution but found only in early successional habitat; most common in upland fields; most captures in pitfall traps but

occasional captures in Sherman live traps. Common, M/B.

Family Talpidae (Moles)

Scalopus aquaticus (Eastern mole). Station-wide; prefers moist, loamy, or sandy soils; presence often noted by dirt pushed through vertical tunnels onto the surface of the ground or by ridges in the soil caused by tunneling under the sod. Common, M/B.

ORDER CHIROPTERA—Bats

Family Vespertilionidae (Vespertilionid Bats)

Myotis austroriparius (Southeastern myotis). Widely distributed on Meeman site; captured primarily in mist nets placed near or over water during summer months; occasional specimens observed in an old barn at the Meeman site during the summer months; known to use hollow trees and man-made structures in areas where there are no caves. Uncommon, M; unknown, B.

Perimyotis subflavus (Tri-colored bat). Widely distributed on Meeman site; captured in mist nets placed over streams and ponds in summer months; occasionally observed in an old barn; known to utilize trees and buildings as roosts in the region. Common, M; unknown, B.

Eptesicus fuscus (Big brown bat). Widely distributed on Meeman site; captured over streams and ponds in mist nets; occasionally observed in an old barn; roosts in man-made structures and trees are well known. Common, M; unknown, B.

Lasiurus borealis (Eastern red bat). Widely distributed on Meeman site; captured most often in mist nets over streams and ponds but has been collected in forested flyways and flyways created by location of buildings and habitat patches; the most frequently captured bat on the Station. Common, M; unknown, B.

Lasiurus cinereus (Hoary bat). Distribution on the sites uncertain; only a few specimens have been observed; captures at Payne's Pond near an old barn at the Meeman site; a forest species. Uncommon, M; unknown, B.

Nycticeius humeralis (Evening bat). Widely distributed on Meeman site; captured most frequently in mist nets over streams and ponds; primarily a forest species; a few specimens captured in a harp trap in June-July 2015 when the trap was placed under a covered, open-air structure of the Field Research Laboratory at the Meeman site. Common, M; unknown, B.

Corynorhinus rafinesquii (Rafinesque's big-eared bat). Distribution on the Station appears to be primarily centered around an old barn and Payne's Pond; the old barn serves as a small nursery site for the species, while Payne's Pond serves as a foraging location; summer capture of the species around Payne's Pond has not been unusual; known to favor riparian and forested habitats. Uncommon, M; unknown, B.

ORDER CINGULATA—Strange-jointed Mammals

Family Dasypodidae (Armadillos)

Dasypus novemcinctus (Nine-banded armadillo). Station-wide; occurrence sparse; prefers forested habitat; only a few individuals captured and only a few observed on the sites over several years of live-trapping. Uncommon, M/B.

ORDER LAGOMORPHA—Hare-shaped Mammals

Family Leporidae (Hares and Rabbits)

Sylvilagus floridanus (Eastern cottontail). Station-wide; occurs in fields and forest-field edge; due to the abundant forested habitat on the Station and lack of early successional habitats, eastern cottontails not often observed. Uncommon, M/B.

Sylvilagus aquaticus (Swamp rabbit). At the Meeman site, known only from the western edge in bottomland associated with the Mississippi River floodplain; not often observed at the Meeman site; at the Brunswick site, known to occur in wetlands and along the edges of waterways. Uncommon, M/B.

ORDER RODENTIA—Gnawing Mammals

Family Scuriidae (Squirrels)

Tamias striatus (Eastern chipmunk). Station-wide; occurs in forested habitat as well as in habitats associated with man-made structures (e.g., buildings and walkways); prefers timbered borderland; frequently captured in Sherman live traps in studies dealing with small mammals. Common, M; uncommon, B.

Marmota monax (Woodchuck). Station-wide; occurs along forest bordered by open land as well as along fencerows, stream banks, and other areas with ample vegetation; abundance sparse throughout; only occasionally observed or captured on the sites. Uncommon, M/B.

Sciurus carolinensis (Eastern gray squirrel). Station-wide; occurs in forested habitat; observed frequently by Station personnel and visitors to the sites; known to prefer dense hardwoods. Common, M/B.

Sciurus niger (Eastern fox squirrel). Station-wide; occurs in forested habitat but observed less frequently than the eastern gray squirrel; appears to favor mixed hardwood forests association. Uncommon, M/B.

Glaucomys volans (Southern flying squirrel). Not well known on the Station; likely, the distribution includes the forested habitat associated with the sites; prefers dense stands of timber in association with water; a few have been captured in Sherman live traps in forest-field edge at the Meeman site. Uncommon, M; unknown, B.

Family Castoridae (Beavers)

Castor canadensis (American beaver). Distribution limited to streams, ponds, and marshes; most common in wetlands of the Brunswick site, but beaver and their lodges have been observed at Payne's Pond at the Meeman site as well; known to prefer ponds, lakes, marshes, backwater, streams, and other aquatic habitats; largest rodent on the Station. Uncommon, M; common (in preferred habitat), B.

Family Cricetidae (Cricetids)

Oryzomys palustris (Marsh oryzomys). Station-wide; however, distribution generally limited to the marshes, wet meadows, and associated habitats throughout the Station. Common (in preferred habitat), M/B.

Reithrodontomys humulus (Eastern harvest mouse). Station-wide; known from early successional habitats that includes meadows, old fields, fencerows, and brier thickets; widespread but not abundant at either site. Uncommon, M/B.

Peromyscus maniculatus (North American deer mouse). Station-wide; known from early successional (open) habitats (e.g., meadows, pastures, and fencerows); capture frequency was generally less than for other deer mice on the sites. Uncommon, M/B.

Peromyscus leucopus (White-footed deer mouse). Station-wide; known to prefer wooded areas but occurs in a wide range of habitats; most common of the deer mice at the Station. Common, M/B.

Peromyscus gossypinus (Cotton deer mouse). Station-wide; occurs in moist, timbered areas; known to prefer wet river bottoms and associated habitats; capture frequency greatest in the Mississippi River floodplain of the Station. Common (in preferred habitat), M/B.

Ochrotomys nuttalli (Golden mouse). Station-wide; captures in a variety of habitats associated with forest edge, a complex of vines, moist thickets, and thick understory; known to also prefer borders of broom-sedge fields and other early-successional habitats; generally, captures greatest at forest edges. Uncommon, M/B.

Sigmodon hispidus (Hispid cotton rat). Station-wide; occurs in early-successional habitat (e.g., grassy fields, field and roadside edges, and edges of cultivated fields); capture frequency greatest in broom-sedge fields; however, given the lack of old-field habitat at the Station, abundance of hispid cotton rats is not as high as that of white-footed deer mice. Common (in preferred habitat), M/B.

Neotoma floridana (Eastern woodrat). Distribution uncertain; however, known from the Meeman site; one occurrence was in an abandoned (small) building that was later torn down; known to prefer timbered regions where they build large nests. Uncommon, M; unknown, B.

Microtus ochrogaster (Prairie vole). Distribution uncertain; has been captured in old-field habitat but does not occur in all old-field or early-successional habitats; preferred habitat includes an array of early-successional habitats (e.g., grasslands, fallow fields, and fencerows). Uncommon, M/B.

Microtus pinetorum (Woodland vole). Station-wide; occurs in a variety of habitats that includes woodlands, fields, and edges. Common, M/B.

Ondatra zibethicus (Common muskrat). Known distribution limited to Payne's Pond at the Meeman site and wetlands at the Brunswick site. Uncommon, M/B.

Family Muridae (Murids)

Rattus norvegicus (Brown rat). Known distribution limited to an old barn and storage facilities at the Meeman site; habitat includes structures associated with human dwellings. Uncommon, M; unknown, B.

Mus musculus (House mouse). Station-wide; habitat includes an old barn, human dwellings, and edge and field habitats. Common (in preferred habitat), M/B.

Family Dipodidae (Jumping Mice)

Zapus hudsonius (Meadow jumping mouse). Widely distributed on the Meeman site; habitat includes weedy fields and forest-field edge. Uncommon, M; unknown, B.

ORDER CARNIVORA—Flesh-eating Mammals

Family Canidae (Dogs, Foxes, and Allies)

Canis lupus familiaris (Domestic dog). Station-wide; domestic dogs known throughout the Station; no known resident feral dogs; dogs have been an issue in mark/recapture studies of medium-sized predators (primarily in harassment of captured animals). Uncommon, M/B.

Canis latrans (Coyote). Station-wide; all habitats. Common, M/B.

Vulpus vulpus (Red fox). Widely distributed on Meeman site; all habitats. Uncommon, M; unknown, B.

Urocyon cinereoargenteus (Gray fox). Widely distributed on Meeman site; all habitats. Uncommon, M; unknown, B.

Family Procyonidae (Raccoons)

Procyon lotor (Raccoon). Station-wide; all habitats; Meeman has been the site of a long-term (>20 years) study of the natural history of raccoons. Common, M/B.

Family Mustelidae (Weasels and Allies)

Lontra canadensis (North American river otter). Known only from Payne's Pond (Meeman site). Uncommon, M; unknown, B.

Family Mephitidae (Skunks)

Mephitis mephitis (Striped skunk). Station-wide; all habitats. Uncommon, M/B.

Family Felidae (Cats)

Felis catus (Domestic cat). Station-wide; all habitats; as for domestic dogs, have been known from throughout the Station; currently, no resident feral cats on the sites; domestic cats have been taken in mark/recapture studies of medium-sized mammalian predators at the Meeman site. Common, M/B.

Lynx rufus (Bobcat). Station-wide; all habitats; known from sightings, tracks, and mark/recapture studies. Uncommon, M/B.

ORDER ARTIODACTYLA—Even-toed Hoofed Mammals

Family Cervidae (Deer)

Odocoileus virginianus (White-tailed deer). Station-wide; all habitats; known from tracks, sightings, and photographs from trail-cameras. Common, M/B.

Discussion

We documented 8 orders, 17 families, and 45 species of mammals at the Station. This compares similarly to previous reports of mammalian species richness at local sites in the region. For example, it approximates the 8 orders, 17 families, and 54 species documented in western Tennessee (Kennedy, 1991) and is similar to 6 orders, 13 families, and 19 species of medium-sized and large-sized mammals at Shelby Farms Park (Wolcott et al., 2012). All of the orders, families, and species known to occur at Shelby Farms Park (Wolcott et al., 2012) were documented at the Station. Overall, the mammalian biodiversity at the Station is high relative to that found in the region.

Given reported sightings of wild hogs (*Sus scrofa*) and American black bears (*Ursus americanus*) in the vicinity of the Station and unverified reports of cougars (*Puma concolor*) in the region, additional taxa may be added to the species richness at the Station in the future. At present, additional study is needed at various spatial scales to better understand patterns of biodiversity in Tennessee and adjoining regions.

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