

THE MAMMALS OF NORTHEASTERN TENNESSEE

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ABSTRACT

Data from field studies of mammals involving over 15,000 trap nights during the period from September, 1967 through January, 1973 are presented and discussed. An annotated list of mammals from the Tennessee counties of Carter, Johnson, Sullivan, Unicoi and Washington is presented. Included in the list are 55 species with standard measurements given for 388 individuals. Nine species are reported from the region for the first time; several new county records are given. A tabular summary of extant species of the region is provided along with suggestions for further research on the mammals of this unique region.

INTRODUCTION

Kellogg (1939) first summarized the relevant information concerning Tennessee mammals; he included results of trapping at Roan Mountain and Shady Valley in northeastern Tennessee. Since Kellogg's work, only a few additional studies of mammalian distributions in the state have been undertaken. Howell and Conaway (1952), Conaway and Howell (1953) and Goodpasture and Hoffmeister (1952) trapped in several counties of the Cumberland Plateau region and parts of Carter (Roan Mountain) and Johnson (Shady Valley) Counties in northeastern Tennessee. Recent studies of mammals in the Great Smoky Mountains National Park by Linzey and Linzey (1968 and 1971) have updated those of Komarek and Komarek (1938).

Tuttle (1964a, 1964b, 1964c, 1968) published a series of notes on certain Tennessee mammals; these include data from field studies on Roan Mountain. Phillips and Richmond (1971) examined small mammal distributions on the islands in Boone and Watauga Lakes. Nagel (1972) provided additional information concerning the least weasel in Tennessee. The objective of this study is

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twofold: to present a general account of the mammals of northeastern Tennessee and to update knowledge about the mammals of that area.

REGIONAL DESCRIPTION

The study area (Fig. 1) consists of Carter, Johnson, Sullivan, Unicoi, and Washington Counties and includes approximately 1,594 square miles. We define northeastern Tennessee to include parts of the southern sections of the Ridge and Valley and Blue Ridge physiographic provinces (Fenneman, 1938). The area is within the Southern Appalachians described by Hayes (1896) and recently defined by Holt (1970) and lies within a rectangle defined approximately by the coordinates 35°56' to 36°38' N and 81°38' to 82°43' W.

Northeastern Tennessee represents a complex geomorphology, drained by the Holston, Nolichucky, and Watauga Rivers and their tributaries. All of Unicoi and Johnson Counties, the southeastern edge of Washington County, the eastern edge of Sullivan County, and all but the northwestern corner of Carter County lie within the Unaka Range of mountains of the Blue Ridge Province (Fenneman, 1938). This range includes the ridges of Cherokee, Buffalo, Holston, and Iron Mountains and the higher peaks of Big Bald Mountain (5516'), Unaka Mountain (5180'), and Roan Mountain (6285'), the highest peak in the area. Shady Valley (2800'), a unique, large, high mountain valley, lying between Holston and Iron Mountains in Johnson County, is also included within the Unaka Range. The remainders of Sullivan and Washington Counties are in the Ridge and Valley Province with the northeastern tip of Bays Mountain (2159') near Kingsport and the Beaver Creek Knobs and White Top Knobs (2000') southwest of Bristol representing the prominent features of relief in that region. Since 1948, the activities of the Tennessee Valley Authority have created three major artificial reservoirs in the area: Boone, South Holston, and Watauga Lakes on the Holston and Watauga Rivers (Fig. 1).

The study area lies within the Oak-Chestnut Forest Region of eastern North America (Braun, 1967). The higher peaks of Unaka and Roan Mountains support stands of red spruce (*Picea rubens*) and Fraser's fir (*Abies fraseri*, only on Roan Mountain). Activities of man have nearly eliminated red spruce and native cran-

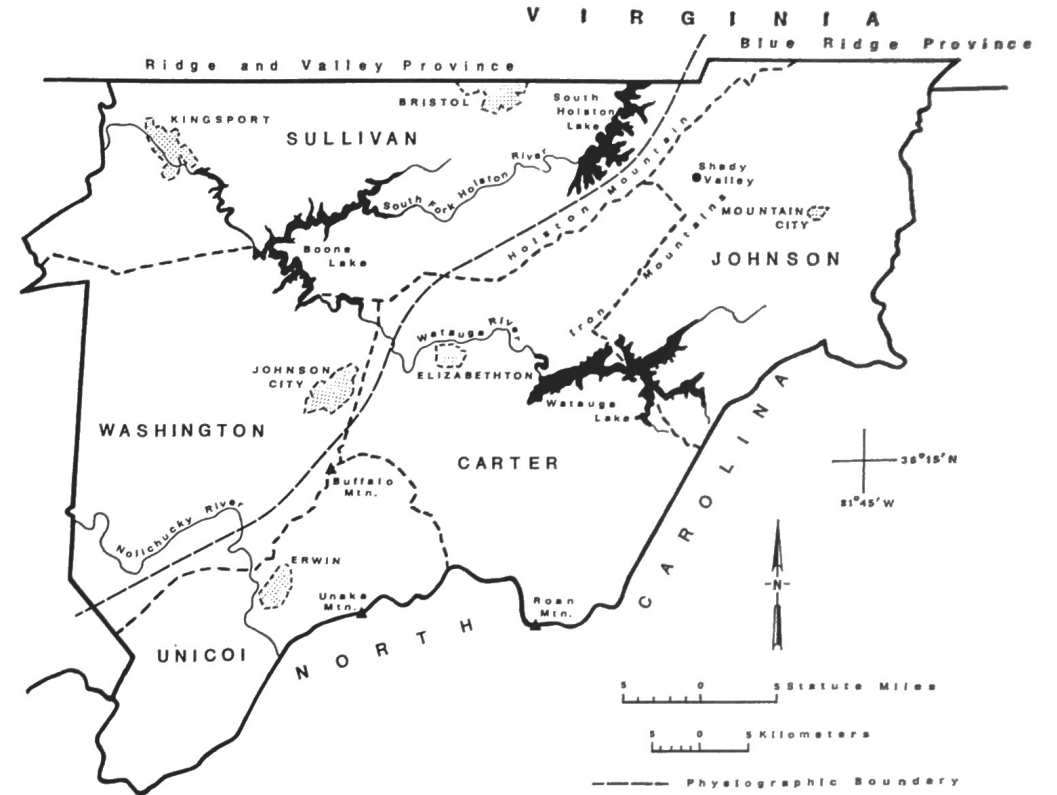


FIG. 1: Northeastern Tennessee* as defined in this manuscript

*Map prepared from the following maps of the Eastern United States 1:250,000 series, published by the United States Geological Survey: Sheet NI 17-1 Knoxville, Sheet NJ 17-10 Johnson City, Sheet NJ 17-11 Winston-Salem.

with a unique flora and fauna of both northern and southern affinities. No doubt, its geological history and present extremes of geographical relief have contributed significantly to the evolution of that situation as it now exists.

METHODS AND MATERIALS

Data were obtained in field studies from September, 1967 through January, 1973. Specimens were obtained by trapping in a variety of habitats; mammal remains from barn owl pellets were also recorded.

The types of traps used included standard mouse snap-traps, "Museum Special" snap-traps, homemade live-traps, "Sherman" live-traps, and 16-ounce beverage cans sunken into the ground. Baits used successfully were peanut butter and sardines and mixtures of peanut butter with various combinations of oatmeal, cornmeal, bacon grease, anise oil, and walnut extract. Over 15,000 trap nights were accumulated during the study. Some specimens were preserved in either 10 percent formalin or AFA (a mixture of ethanol, formalin, and acetic acid); others were prepared as museum study skins. Most specimens were deposited in the mammal collection of the Biology Department at East Tennessee State University, Johnson City, Tennessee.

In the following annotated list, the systematic order and

nomenclature of Hall (1965) are followed unless otherwise noted. Standard measurements in millimeters for total length, tail length, and hind foot length are reported in that order. For several specimens additional measurements of ear length, length of tragus (Tr), and body weight (in grams) are given. Where appropriate, standard measurements are presented as arithmetic means with the range of values for each character indicated in parenthesis. Certain data in the annotated list were adopted from a Master's Thesis by Giles (1969). We do not feel that the data are sufficiently complete to warrant sub-specific designations for any of the species listed.

ANNOTATED LIST

Didelphis marsupialis. Opossum. Common throughout the area; populations decrease at higher elevations and in the more rugged wilderness areas.

1 Male: 602-254-58
2 Females: 526.5(512-541) — 223.0(216-230) — 47.0(45-49)

Sorex cinereus. Masked Shrew. Taken only from the higher elevations of Unaka Mountain and Roan Mountain.

4 Males: 108.0(95-113) — 42.2(39-45) — 14.2(11-18)
2 Females: 108.5(107-110) — 41.5(41-42) — 14.2(14-14.5)

Sorex longirostris. Southeastern Shrew. First record from northeastern Tennessee; all specimens are from lower elevations.

1 Female: 84-31-10-6 = 2.8 gm.; collected by Charles R. Smith along Buffalo Creek, 0.5 mi. SW of Milligan College P.O., Carter County, 8 February 1970.

1 Female: 79-28-10-6 = 2.8 gm.; collected by Brent Rowell (prepared by C. R. Smith) 0.5 mi. SW of Holston Dam, 1600', Sullivan County, 15 March 1970.

1 Female: 78-30-10-6 = 2.1 gm.; collected by Jerry Nagel along Cash Hollow Road north of Johnson City, Washington County, 28 January 1971.

The status of this species in the area is uncertain. At best it is rare or certainly very difficult to trap, although can traps have been employed as described by Tuttle (1964a). Two of the above specimens were taken in a "Museum Special" snap-trap, the other in a "Sherman" live-trap.

Sorex fumeus. Smoky Shrew. Apparently the most widely distributed of the genus in the area; specimens are from the Hoss Cove area (1800') of Buffalo Mountain, and from Roan Mountain and Shady Valley.

4 Females: 110.4(105-115) — 43.6(41-49) — 14.4(14-14.5)
1 Male: 115-50-14

Sorex dispar. Long-tailed Shrew. Rare and locally distributed; only from talus slopes on Roan Mountain. Repeated efforts to capture this species from the extensive talus slopes of Unaka Mountain brought no results.

5 Males: 127.6(125-130) — 59.8(57-62) — 14.8(14-15)
2 Females: 125.5(123-128) — 57.5(57-58) — 15.0(15)

Blarina brevicauda. Short-tailed Shrew. Common at all elevations.

33 Males: 103.7(68-123) — 21.3(18-28) — 13.2(8-15)
18 Females: 105.2(80-118) — 21.8(18-24) — 12.5(9-15)

In view of recent work by Genoways and Choate (1972) and Choate (1972) and comments by Handley (1971), this species might be worthy of closer examination in northeastern Tennessee. Our data suggested a high degree of variability in size within this species but did not lend itself to the necessary detailed analysis to isolate the sources of that variability.

Cryptotis parva. Least Shrew. The first record for northeastern Tennessee; apparently widely distributed at low elevations; common in thick grassfields with abundant ground litter, but generally absent in areas subject to seasonal flooding and in areas where a recent history of cattle grazing or hay mowing has resulted in a lack of accumulated grass litter.

5 Males: 65.8(51-76) — 16.4(15-18) — 9.2(8-11)
3 Females: 69.7(67-72) — 12.7(10-14) — 10.3(10-11)

Parascalops breweri. Hairy-tailed Mole. One skull from a collection of Barn Owl pellets from Shady Valley, Johnson County, and the following specimen:

1 Male: 155-28-19; collected by Ann Hut from Steel Creek Park, Bristol, Sullivan County.

Scalopus aquaticus. Eastern Mole. Common in lawns throughout the area.

2 Males: 155.0(153-157) — 23.0(22-24) — 21.0(20-22)
2 sex undetermined: 147.0(132-162) — 19.0(18-20) — 19.5(18-21)

Condylura cristata. Star-nosed Mole. One skull from a collection of Barn Owl pellets from Shady Valley, Johnson County. Previously reported from the same area by Kellogg (1939).

Myotis lucifugus. Little Brown Myotis. Status uncertain; specimen from an unnamed cave in Sullivan County, 6 November 1971.

1 Male: 75-32-5-12-6Tr

Myotis keenii. Keen's Myotis. Status uncertain; specimen from a cave in Washington County, 21 January 1971.

1 Male: 73-31-8-17-9Tr

Lasiorycteris noctivagans. Silver-haired Bat. Status uncertain.

1 Male: 90-39-10-17-5Tr

Pipistrellus subflavus. Eastern Pipistrelle. Specimens from caves in Washington and Carter Counties:

6 Males: 77.7(74-82) — 35.0(31-40) — 10.5(9-15) — 11.7(9-17) — 5.5(4-7)Tr

3 Females: 81.7(77-85) — 39.7(37-42) — 9.3(9-10) — 11.5(11-12) — 5.5(5-6)Tr

Commonly found hibernating in crevices in caves during the winter; numbers decline in local caves during the summer.

Eptesicus fuscus. Big Brown Bat. The following specimens are from caves in Washington and Carter Counties:

4 Males: 110.0(105-118) — 42.3(34-48) — 10.0(9-11) — 17.0(15-19) — 8.0(6-9)Tr

3 Females: 105.3(102-109) — 39.7(36-46) — 10.5(10-11) — 15.7(14-17) — 7.5(7-8)Tr

The comments for *Pipistrellus* also apply to this species.

Nycterus (Lasiurus) borealis. Red Bat. Status uncertain.

1 Male: 91-44-9-13-6Tr: Sullivan County, 20 October 1971.

1 sex undetermined: 100-42-6-11; Carter County, 24 October 1971.

On 1 March 1971, Nagel observed a specimen foraging behind his house in Johnson City, Washington County.

Sylvilagus floridanus. Eastern Cottontail. A popular small game mammal occurring throughout the area. At higher elevations it may be replaced by *Sylvilagus transitionalis*.

1 Male: 400-55-97

1 Female: 396-41-97

Sylvilagus transitionalis. New England Cottontail. Status uncertain. Probably confined to higher elevations of the area, but its relationships with *Sylvilagus floridanus* are unknown. Hall and Kelson (1959) list a marginal record of this species from Roan Mountain, Mitchell County, North Carolina and Conaway and Howell (1953) report a Johnson County specimen. The specimen reported here was taken at 4800' on Unaka Mountain on 13 May 1969.

1 Female: 367-42-63 (6 embryos)

1 skull only: found dead-on-road at 4500', Unaka Mountain, Unicoi County, 30 June 1971.

Tamias striatus. Eastern Chipmunk. Locally abundant (e.g., Mountain Home, Johnson City) throughout the area.

2 Males: 215.0(198-232) — 72.0(65-79) — 31(30-32)

5 Females: 214.2(190-248) — 71.8(52-85) — 31.8(30-34)

Marmota monax. Woodchuck. Distributed throughout the area in farming areas, old fields, and along roadsides.

Sciurus carolinensis. Gray Squirrel. Locally abundant throughout the area, in urban as well as rural situations.

1 Female: 530-250-66

Sciurus niger. Fox Squirrel. Apparently present in small numbers with scattered colonies throughout the area. The largest population is in the Bays Mountain area extending into Sullivan County.

Tamiasciurus hudsonicus. Red Squirrel. Common at higher elevations. Animals were observed on Unaka and Roan Mountains and in Shady Valley.

1 Male: 317-140-44; Unaka Mountain, Unicoi County, 20 November 1969.

Glaucomys volans. Southern Flying Squirrel. Two females from Washington County and one male from 4200' on Roan Mountain, Carter County.

2 Females: 237.0(233-241) — 98.0(95-101) — 28.5(28-29)

1 Male: 210-90-25-14

Glaucomys sabrinus. Northern Flying Squirrel. Status uncertain; reported only from Roan Mountain in Carter County (Kellogg 1939).

Castor canadensis. Beaver. Essentially extirpated except possibly in the upper parts of Laurel Fork Creek in Carter County. There are sporadic reports from local residents of activity in parts of Johnson, Sullivan and Washington Counties.

Reithrodontomys humulis. Eastern Harvest Mouse. First record for northeastern Tennessee based on the presence of 12 skulls in a collection of Barn Owl pellets collected between 15 December 1967 and 19 April 1968 at Johnson City, Washington County. Subsequent collecting produced ten specimens, all from Washington County:

6 Males: 114.8(103-130) — 53.3(43-68) — 15.5(12-20)

4 Females: 107.3(102-113) — 50.5(48-54) — 14.5(14-15)

Peromyscus maniculatus. Deer Mouse. Relatively abundant; specimens were collected at higher elevations on Unaka and Roan Mountains.

35 Males: 165.3(142-181) — 81.8(62-94) — 20.4(18-22)

38 Females: 169.7(150-188) — 82.9(68-96) — 20.5(18-22)

Peromyscus leucopus. White-footed Mouse. Abundant; occurred at generally lower elevations than *Peromyscus maniculatus*. Large numbers were collected at 2700-2800' on Buffalo Mountain in Washington County and from lower elevations in Carter County.

34 Males: 156.2(141-172) — 68.2(58-75) — 20.5(18-22)

30 Females: 159.1(140-176) — 67.2(60-85) — 20.4(15-22)

In view of taxonomic complexities (King, 1968), the genus *Peromyscus* deserves careful study and examination in northeastern Tennessee before the relationships of the two species occurring there are fully known.

Ochrotomys nuttalli. Golden Mouse. Locally distributed at lower elevations (up to 2800') throughout the area. Usually associated with dense thickets of honeysuckle (*Lonicera japonica*).

5 Males: 159.3(146-180) — 74.4(67-90) — 19.3(18-21)

6 Females: 166.3(149-181) — 77.2(65-88) — 19.3(19-20)

Sigmodon hispidus. Hispid Cotton Rat. Rare and locally distributed at lower elevations in Washington, Carter, and Sullivan Counties.

3 Males: 228.0(186-258) — 82.0(43-71) — 29.0(28-30)

8 Females: 223.0(195-244) — 85.4(75-95) — 29.4(27-32)

Neotoma floridana. Eastern Wood Rat. Status uncertain. Previously reported only from Carter and Johnson Counties (Conaway and Howell, 1953); one specimen from along the Nolichucky River, near Erwin, Unicoi County, is reported here.

1 Male: 397-175-39

Clethrionomys gapperi. Gapper's Red-backed Mouse. Relatively common at higher elevations (down to about 2200' at Rock Creek Campground, Unicoi County).

11 Males: 145.3(136-160) — 39.2(35.5-45) — 19.9(19-21)
10 Females: 142.4(128-162) — 39.0(32-47.5) — 19.7(19-21)

Microtus pennsylvanicus. Meadow Vole. Common in suitable habitat throughout the area. Previously reported only from Carter and Johnson Counties.

10 Males: 155.0(144-165) — 35.5(31-40) — 21.5(21-23)

14 Females: 150.6(133-164) — 36.7(31-44) — 21.3(20-22)

Microtus pinetorum. Woodland Vole. Locally distributed throughout the area at lower elevations. Richmond and Phillips (1971) reported this species from several islands in Boone Lake and Watauga Lake.

11 Males: 110.0(97.5-121) — 16.8(12-21.5) — 16.4(15-17.5)

10 Females: 115.5(106.5-132) — 18.7(16-22.5) — 16.5(15-17.5)

Ondatra zibethicus. Muskrat. Common in ponds and streams at lower elevations throughout the area. Frequently a pest in earthen dams and stream banks.

1 Female: 381-187-32

Synaptomys cooperi. Southern Bog Lemming. Rare and locally distributed, usually at higher elevations. Reported here for the first time from Sullivan County. Other reports are from Carter County (Tuttle, 1968) and Johnson County (Conaway and Howell, 1953).

1 sex undetermined: 105-20-19; collected near South Holston Dam, Sullivan County (1600'), 4 April 1969.

Rattus rattus. Black Rat. Status uncertain, but apparently rare in the area. Reported here for the first time from northeastern Tennessee. A specimen trapped at 4800' on Unaka Mountain, Unicoi County, is unusual for that elevation and away from human habitation. Others were taken near human habitations in Washington County.

2 Males: 360.0(350-370) — 162.0(160-164) — 40.5(40-41)

1 Female: 412-77-41

Rattus norvegicus. Norway Rat. Common throughout the area in the vicinity of human habitation.

3 Males: 319.3(308-342) — 146.0(143.5-151) — 34.0(32-38)

1 Female: 351-150-31

Mus musculus. House Mouse. Common throughout the area in the vicinity of human habitation.

2 Males: 149.0(145-153) — 72.5(69-76) — 17.8(17.5-18)

6 Females: 154.2(150-160) — 72.2(70-76) — 18.3(17-19)

Common in the immediate vicinity of buildings and in grass fields. Most abundant in fields lacking the heavy grass litter favored by *Reithrodontomys*. In fields which have a good population of *Reithrodontomys* the house mouse is generally scarce. This interaction deserves further investigation.

Zapus hudsonius. Meadow Jumping Mouse. From Barn Owl pellets collected in Shady Valley, Johnson County, and one specimen from Unaka Mountain, Unicoi County. This is the third report of this species in East Tennessee (see Linzey and Linzey, 1966 and Krutzsch, 1954).

Napaeozapus insignis. Woodland Jumping Mouse. Reported here for the first time from northeastern Tennessee. One specimen each from Buffalo Mountain, Washington County and Unaka Mountain, Unicoi County. The rest from Roan Mountain, Carter County.

5 Males: 220.0(210-227) — 137.0(125-142) — 30.6(30-32)

3 Females: 224.7(210-237) — 141.0(135-146) — 30.0(30)

Vulpes vulpes. Red Fox. Occurs throughout the area in small numbers. Generally prefers ranges with more open area than the following species.

Urocyon cinereoargenteus. Gray Fox. Occurs throughout the area in relatively greater abundance than *Vulpes vulpes*, and prefers areas of scattered brush and open timber.

Rabies control projects in Carter, Johnson, Sullivan, and Washington Counties in the late 1960's drastically reduced Red

and Gray Fox populations. It is generally accepted that following such control, increased food supply causes an influx of foxes from surrounding areas, accompanied by increased breeding vigor and litter survival. Therefore, the effect of control is usually short-lived.

Ursus americanus. Black Bear. This species has never been wholly extinct in the mountainous parts of the area. Due to stocking by the Tennessee Game and Fish Commission during the 1950's and 1960's and increased protection efforts, it is now common in Unicoi County, fairly common in Carter and Johnson Counties and southern Washington County, and they are sighted in parts of Sullivan County annually. Currently, populations of 40 and 20 bears are estimated for Unicoi County and Carter County, respectively.

Procyon lotor. Raccoon. Occurs throughout the area in small numbers. Evidence most often seen in the form of tracks along stream banks in the area.

Non-native Red Fox and Raccoon are continually released in the area by fox and raccoon hunters in an attempt to increase populations of those species. Density limits, food supply, and overzealous hunters soon aid in returning populations to normal after such introductions.

Mustela nivalis. Weasel. Since Tuttle (1968) first reported this species from the state, additional specimens have been collected from lower elevations in Sullivan, Washington, and Unicoi Counties.

3 Males: 181.3(172-192) — 30.3(28-33) — 22(21-23) — 11.3(10-12)

The specimens from Sullivan and Unicoi Counties were collected on 13 March 1972, and 20 January 1973, respectively, and show no indication of a white winter pelage. This confirms the observation by Nagel (1972) that individuals of this species fail to develop a white pelage in the southern Appalachians.

Mustela frenata. Long-tailed Weasel. The current status and distribution of this species in northeastern Tennessee is poorly known. Previously reported by Kellogg (1939) from Carter and Johnson Counties.

Mustela vison. Mink. Fairly common in less developed areas along the Nolichucky, Holston, and Watauga Rivers and along wooded streams.

Spilogale putorius. Spotted Skunk. This species is rare in the area and generally more numerous at elevations over 4000'. We can add only one record to those of Kellogg (1939) and Conaway and Howell (1953). Two specimens were collected in the spring of 1970 at 4200' on Unaka Mountain, Unicoi County. No information on measurements or sex is available.

Mephitis mephitis. Striped Skunk. Although no specimen was collected, evidence from road kills and personal observations (including sightings on Round Bald and Roan Mountain) indicates that this species is common throughout the area.

Felis concolor. Mountain Lion. Presumed to be extirpated; however, a number of recent (1970) authenticated reports from southwestern Virginia have led to its establishment as a protected species in that state (Coffey 1971 and pers. comm.). Yambert has received reports of sightings he believes authentic from Greene County in East Tennessee and there are additional reports of the species from western North Carolina. The eastern subspecies (*Felis concolor couguar*) has been classified recently as a rare and endangered species by the Department of the Interior, largely as a result of the Virginia sightings (Earl B. Baysinger, pers. comm.). At present there are no recent authenticated reports of this species in northeastern Tennessee although its occurrence is very likely in the more remote mountainous regions of the area.

Lynx rufus. Bobcat. We have noted evidence of this species throughout the isolated mountainous areas of all five counties.

Sus scrofa. European Wild Pig. Kellogg (1939) documents the introduction of this species into western North Carolina and eastern Tennessee as occurring around 1920. In northeastern Tennessee, this introduced species has been stocked privately since the 1960's in the vicinity of the Washington, Greene, and Unicoi County junction and in Carter County near the Laurel Fork Wildlife Management Area. They have raised litters and six animals were removed as "pests" from the Clark's Creek area of Washington County by the Tennessee Game and Fish Commission in the spring of 1971.

Recent studies of the chromosome morphology of this species from the Tellico Wildlife Management Area of southeastern Tennessee have yielded some interesting results which may also apply to populations of the wild pig in northeastern Tennessee (see McFee, et al., 1966; Rary, et al., 1968. McFee and Banner, 1969).

Odocoileus virginianus. White-tailed Deer. Reports from area natives indicate that this species was released in the late 1930's in the vicinity of the Johnson County-Virginia line in a cooperative project with the Civilian Conservation Corps. Further stocking in 1945 by the Kettlefoot Conservation Club, followed by releases of North Carolina and Wisconsin deer in Johnson, Carter, Unicoi, and Washington Counties by the Tennessee Game and Fish Commission in the late 1940's and early 1950's have established huntable deer populations in each of those counties. Recently, numerous sightings have been made in farm areas of Washington and Sullivan Counties. (The nomenclature of this species follows the decision of the Committee on Nomenclature of the American Society of Mammalogists, 1960.)

DISCUSSION

Bats of the family Vespertilionidae constitute the least abundant mammal group (Table 1). This situation probably reflects a paucity of study of this specific group rather than their absence from the area. Further work is necessary to determine the status of these bats in northeastern Tennessee.

Several species, although not reported from the area, might occur there. The Rice Rat, *Oryzomys palustris*, has been reported near the Great Smoky Mountains National Park (Linzey and Linzey, 1968). That species may exist in the lower elevations of the study area where *Sigmodon hispidus*, also of southern affinity, occurs. Certain species of more northern affinities have been reported from mountains north and south of the five-county area. Among these are *Sorex palustris*, *Microsorex hoyi*, *Lepus americanus*, and *Microtus chrotorrhinus*. Suitable habitats for these species apparently exist in the mountainous regions along the Tennessee-North Carolina border. Much of Johnson County, including the mountainous terrain in the northeastern corner, remains unexplored by any mammalogist.

Finally, the relationships of a number of related species deserve further investigation to ascertain their status in the area. Foremost among these species pairs are *Sylvilagus floridanus—transitionalis*, *Glaucomys volans—sabinus*, and *Peromyscus maniculatus—leucopus*. A study of the fox squirrel, *Sciurus niger*, also would be of considerable interest and value.

TABLE 1: List of mammals and the counties from which they have been reported in northeastern Tennessee

Species	Carter	Johnson	Sullivan	Unicoi	Washington
<i>Didelphis marsupialis</i>	1,2,5	1,2,5	1,5	1,5	1,5
<i>Sorex cinereus</i>	1,2,3,5	0	0	5	0
<i>Sorex longirostris</i>	5	0	5	0	5
<i>Sorex fumeus</i>	2,3,5	2,5	0	5	5
<i>Sorex dispar</i>	2,3,5	0	0	0	0
<i>Blarina brevicauda</i>	1,2,3,5	1,2,5	5	5	4,5
<i>Cryptotis parva</i>	5	0	0	0	4,5
<i>Parascalops breweri</i>	3	1,2,5	5	0	5
<i>Scalopus aquaticus</i>	5	5	5	5	5
<i>Condylura cristata</i>	3	1,5	0	0	0
<i>Myotis lucifugus</i>	2	0	5	0	0
<i>Myotis keenii</i>	0	0	0	0	5
<i>Lasionycteris noctivagans</i>	0	2	5	0	0
<i>Pipistrellus subflavus</i>	2,5	0	0	0	5
<i>Eptesicus fuscus</i>	5	2	0	0	5
<i>Nycteris (Lasiurus) borealis</i>	5	0	5	0	5
<i>Sylvilagus floridanus</i>	1,5	1,5	1,5	5	5
<i>Sylvilagus transitionalis</i>	0	2	0	5	0
<i>Tamias striatus</i>	2,3,5	1,2,5	5	5	5
<i>Marmota monax</i>	1,5	5	5	5	5
<i>Sciurus carolinensis</i>	2,5	1,2,5	5	5	5
<i>Sciurus niger</i>	2,5	2,5	5	5	5
<i>Tamiasciurus hudsonicus</i>	1,2,5	1,5	0	5	0
<i>Glaucomys volans</i>	1,5	2	0	0	5
<i>Glaucomys sabinus</i>	1,5	0	0	0	0
<i>Castor canadensis</i>	5	2,5	5	0	5
<i>Reithrodontomys humulis</i>	0	0	0	0	4,5
<i>Peromyscus maniculatus</i>	1,2,3,5	1,2,5	1,5	4	0
<i>Peromyscus leucopus</i>	1,2,5	1,2	5	5	5
<i>Ochrotomys nuttalli</i>	1,5	1,2,5	5	5	5
<i>Sigmodon hispidus</i>	5	0	5	0	5
<i>Neotoma floridana</i>	2	2	0	5	0
<i>Clethrionomys gapperi</i>	1,2,3,5	1,2,5	5	5	0
<i>Microtus pennsylvanicus</i>	1,2	2	5	5	4,5
<i>Microtus pinetorum</i>	1	2	5	5	5
<i>Ondatra zibethicus</i>	1,5	2,5	5	5	5
<i>Synaptomys cooperi</i>	2,3	2	5	0	0
<i>Rattus rattus</i>	0	0	0	5	5
<i>Rattus norvegicus</i>	1,5	1,2,5	1,5	1,5	1,5
<i>Mus musculus</i>	1,5	1,2,5	1,5	1,5	1,4,5
<i>Zapus hudsonius</i>	6	5	0	5	0
<i>Napaeozapus insignis</i>	5	0	0	5	5
<i>Vulpes vulpes</i>	2,5	2,5	5	5	5
<i>Urocyon cinereoargenteus</i>	2,5	2,5	5	5	5
<i>Ursus americanus</i>	2,5	5	5	5	5
<i>Procyon lotor</i>	5	5	5	5	5
<i>Mustela nivalis</i>	3	0	5	5	4,5
<i>Mustela frenata</i>	1,2	1	0	0	0
<i>Mustela vison</i>	1	0	0	0	0
<i>Spilogale putorius</i>	0	2	1	5	0

<i>Mephitis mephitis</i>	5	2,5	5	5	5
<i>Felis concolor</i>	0	0	0	0	0
<i>Lynx rufus</i>	1,2,5	2,5	5	5	5
<i>Sus scrofa</i>	0	0	0	5	5
<i>Odocoileus virginianus</i>	2,5	2,5	5	5	5

0—not reported; 1—Kellogg (1939); 2—Conaway and Howell (1953); 3—Tuttle (1964 a, b, c or 1968); 4—Nagel (1972); 5—this study; 6—Kruttsch (1954).

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LITERATURE CITED

- American Society of Mammalogists. 1960. Report of the Committee on Nomenclature. *J. Mammal.* 41(4):537-539.
- Barclay, F. H. 1957. The natural vegetation of Johnson County, Tennessee: past and present. Ph.D. Dissertation. University of Tennessee, Knoxville. 147 p.
- Braun, E. L. 1967. Deciduous forests of eastern North America. Hafner, New York. 596 p.
- Brown, D. M. 1941. The vegetation of Roan Mountain: A phytosociological and successional study. *Ecol. Monogr.* 11(1):61-97.
- Choate, J. R. 1972. Variation within and among populations of the short-tailed shrew in Connecticut. *J. Mammal.* 53(1):116-128.
- Coffey, W. 1971. Outdoors. *Bristol Herald Courier*, 7 March 1971:8c.
- Conaway, C. H. and J. C. Howell. 1953. Observations on the mammals of Johnson and Carter Counties, Tennessee, and Avery County, North Carolina. *J. Tenn. Acad. Sci.* 28(1):53-61.
- _____ and D. W. Pfitzer. 1952. *Sorex palustris* and *Sorex dispar* from the Great Smoky Mountains National Park. *J. Mammal.* 33(1):106-108.
- Fenneman, N. M. 1938. Physiography of eastern United States. McGraw-Hill, New York. 714 p.
- Genoways, H. H. and J. R. Choate. 1972. A multivariate analysis of systematic relationships among populations of the short-tailed shrew (genus *Blarina*) in Nebraska. *Syst. Zool.* 21(1):106-116.
- Giles, J. M. 1969. Small mammals of Washington and Unicoi Counties, Tennessee. M.S. Thesis. East Tennessee State University, Johnson City. 57 p.
- Goodpasture, W. W. and D. F. Hoffmeister. 1952. Notes on the mammals of western Tennessee. *J. Mammal.* 33(3):362-371.
- Hall, E. R. 1965. Names of species of North American mammals north of Mexico. Misc. Publ. No. 43, Univ. Kansas Mus. Nat. Hist. pp. 1-16.
- _____ and K. R. Kelson. 1959. The mammals of North America, 2 vol. Ronald Press, New York. 1083 p.
- Handley, C. O., Jr. 1971. Appalachian mammalian geography—Recent Epoch. Pages 263-303 in P. C. Holt, Ed. The distributional history of the biota of the southern Appalachians, Part III: Vertebrates. Res. Div. Monogr. 4, Virginia Polytechnic Institute and State University, Blacksburg. 306 p.
- Hayes, C. W. 1896. The southern Appalachians. Pages 305-336 in National Geographic Society, The Physiography of the United States. American Book Co., New York. 345 p.
- Holt, P. C. 1970. Preface. Pages iii-iv in P. C. Holt, ed. The distributional history of the biota of the southern Appalachians, Part II: Flora. Res. Div. Monogr. 2, Virginia Polytechnic Institute and State University, Blacksburg. 414 p.
- Howell, J. C. and C. H. Conaway. 1952. Observations on the mammals of the Cumberland Mountains of Tennessee. *J. Tenn. Acad. Sci.* 27(2):153-158.
- James, R. L. 1955. Some botanical notes from northeast Tennessee. *Castanea.* 20(3):77-103.
- Kellogg, R. 1939. Annotated list of Tennessee mammals. *Proc. U.S. Nat. Mus.* 86(3051):245-303.
- King, J. A. (Ed.) 1968. Biology of *Peromyscus* (Rodentia). Spec. Publ. 2, Amer. Soc. Mammal. 594 p.
- Komarek, E. V. and R. Komarek. 1938. Mammals of the Great Smoky Mountains. *Bull. Chicago Acad. Sci.* 5(6):137-162.
- Kruttsch, P. H. 1954. North American jumping mice (genus *Zapus*). *Publ. Mus. Nat. Hist. Univ. Kansas* 7(4):349-472.
- Linzey, A. V. and D. W. Linzey. 1971. Mammals of the Great Smoky Mountains National Park. University of Tennessee Press, Knoxville. 114 p.
- Linzey, D. W. and A. V. Linzey. 1966. A second record of the Meadow Jumping Mouse in eastern Tennessee. *J. Mammal.* 47(1):123.
- _____. 1968. Mammals of the Great Smoky Mountains National Park. *J. Elisha Mitchell Sci. Soc.* 84(3):384-414.
- McFee, A. F., M. W. Banner and J. M. Rary. 1966. Variation in chromosome number among European Wild Pigs. *Cytogenetics* 5(1):75-81.
- _____ and M. W. Banner. 1969. Inheritance of chromosome number in pigs. *J. Reprod. Fert.* 18(1):9-14.
- Nagel, J. W. 1972. Observations of the second record of the least weasel in Tennessee. *Amer. Midl. Natur.* 87(2):553.
- Phillips, L. and M. Richmond. 1971. The distribution of vertebrates on the islands of Boone and Watauga Lakes. *J. Tenn. Acad. Sci.* 46(4):124-129.
- Rary, J. M., V. G. Henry, G. M. Matschke and R. L. Murphree. 1968. The cytogenetics of swine in the Tellico Management Area, Tennessee. *J. Hered.* 59(3):201-204.
- Smith, C. R. and R. W. Pearman. 1971. A survey of the Pteridophytes of northeastern Tennessee. *Castanea.* 36(3):181-191.
- Tuttle, M. D. 1964a. Additional record of *Sorex longirostris* in Tennessee. *J. Mammal.* 45(1):146-147.
- _____. 1964b. *Myotis subulatus* in Tennessee. *J. Mammal.* 45(1):148-149.
- _____. 1964c. Observations of *Sorex cinereus*. *J. Mammal.* 45(1):148.
- _____. 1968. First Tennessee record of *Mustela nivalis*. *J. Mammal.* 49(1):133.
- Whittaker, R. H. 1956. Vegetation of the Great Smoky Mountains. *Ecol. Monogr.* 26(1):1-80.