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## **Late Prehistoric and Protohistoric Large Mammal Zoogeography of Virginia**

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# LATE PREHISTORIC AND PROTOHISTORIC LARGE MAMMAL ZOOGEOGRAPHY OF VIRGINIA

Robert K. Rose<sup>1</sup>

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## ABSTRACT

Evidence derived from 18 late prehistoric (middle and late Woodland Period) archeological sites, from several early historical accounts, and from the current understanding of the distribution of Virginia mammals indicates that the large mammal fauna of the Commonwealth has not changed substantially within the past 4,000 yrs. Some species (e.g., bison, elk, timber wolf, and mountain lion) have been extirpated since the settlement of Virginia by Europeans; some previously extirpated species (e.g., porcupine, coyote, and beaver) have been naturally or artificially reintroduced during the historical period, and others (e.g., woodchuck and red fox) probably have expanded their distributions as a result of changing land-use patterns in the Commonwealth.

<sup>1</sup>Department of Biological Sciences, Old Dominion University, Norfolk, Virginia 23508.

## INTRODUCTION

The purpose of this paper is to evaluate the distribution of the land mammals of Virginia, especially the large mammals, that were present during the late prehistoric and protohistoric periods and to compare them with today's Virginia mammals. The late prehistoric component of Virginia's faunal history, arbitrarily defined as that representing the 2,000 years before European settlement, corresponds approximately with the middle and late Woodland Period. The information on the mammals of this period comes from excavated archeological sites that have been dated either by <sup>14</sup>C methods or by distinguishing pottery or other artifacts associated with the sites or strata. The protohistoric (hereafter called "early historical") record is reconstructed from the writings of early Virginia settlers, explorers, or travelers. Early writings date from slightly before A.D. 1600 and extend into the 18th Century; the later accounts are from the western sections of the Commonwealth, where European

settlement occurred much later than it did on the Coastal Plain. The record of modern Virginia mammals comes from a number of sources: two books on the distribution of Virginia mammals (Bailey, 1946; Handley and Patton, 1947), other compilations (Hamilton and Whitaker, 1979; Hall, 1981), recent literature of mammalogy, and correspondence and conversations with other mammalogists within the Commonwealth.

### LARGE MAMMALS

The mammals that were present for the 2,000 years before European settlement were the survivors of the late Pleistocene and early Holocene extinctions that occurred in the region. Information about these extinctions is to be found in other chapters within this volume, especially the papers by Eshelman and Grady, and by McDonald. Other viewpoints on the late Quaternary dynamics of the mammalian faunas of eastern North America are provided by Guilday (1971), Handley (1971), and by the recent excellent book *Pleistocene Mammals of North America* (Kurten and Anderson, 1980). The main point from these reviews is that the large mammal fauna of late Quaternary Virginia suffered extensive extinctions and, as a result, few species of large mammals survived to the late prehistoric period.

When applied to mammals, any definitions of "large" and "small" will have difficulty with universal acceptance. Kurten and Anderson (1980, p. xiv) distinguish between micromammals (orders Insectivora, Chiroptera, Rodentia, and Lagomorpha) and macromammals (orders Edentata, Carnivora, Artiodactyla, Perissodactyla, and Proboscidea). By this system small carnivores such as the weasels, which may weigh as little as 0.1 pounds (50 grams), are macromammals. A more common approach is to define an arbitrary body weight, for example 11 pounds (5 kg) (Snyder, 1978), to differentiate large from small mammals. With this method, many of the small carnivores become small mammals, and some rodents (e.g., beaver, *Castor canadensis*, and woodchuck, *Marmota monax*) become large mammals. Using the body weight criterion, there are only eight species of large mammals in Virginia today, including woodchuck, beaver, red fox (*Vulpes vulpes*), black bear (*Ursus americanus*), raccoon (*Procyon lotor*), river otter (*Lutra canadensis*), bobcat (*Felis rufus*), and white-tailed deer (*Odocoileus virginianus*). The gray fox (*Urocyon cinereoargenteus*), which weighs slightly less than 11 pounds (5 kg), the Virginia opossum

(*Didelphis virginiana*), and the coyote (*Canis latrans*), which has reappeared within the past five years in two western counties (J. Pagels, pers. comm.), might be included by some authors. However defined, the list of large mammals in Virginia is short. In this paper, I have operationally defined "large mammals" as those that were sufficiently large both to be used as food by the Woodland Period Indians and to be observed and recorded in the early historical record. With this method, mammals of squirrel size and larger are included in the study sample.

### THE LATE PREHISTORIC RECORD

The best direct information for the 2,000 years before settlement has been derived from the excavations of archeological sites of the Woodland Period. Although there are some difficulties with the use of these records, this is a fruitful and expanding area of research. Since 1968, information from archeological sites has provided a fair estimate of the mammals that were present at the time the sites were occupied. However, several of the papers reviewed here indicate that only a fraction of the faunal remains recovered from the sites had been evaluated. Thus, the information, although accumulating rapidly, is still fragmentary in terms of its utility in reconstructing the distributions of the mammals of the late prehistoric period.

One of the difficulties with the mammal record as determined from archeological sites is that mammal remains tended to be preserved either in caves (which are restricted to western Virginia) or in shell middens in the Piedmont or Coastal Plain regions. Elsewhere, acid soils generally have destroyed the evidence that mammals were present. Consequently, there is an uneven mammal record within the Commonwealth, with several excellent sites in the Valley and Ridge region, some information from sites in the Coastal Plain, and almost nothing from the Piedmont region (Figure). Although mammals living near caves or streams may be overly represented, we are more concerned with knowing what mammals were present during the 2,000 years before settlement than in knowing where they lived. Finally, archeological sites contain samples of mammals biased in favor of large mammals that were taken as food and then preserved in garbage pits, middens, or graves. This bias is not a problem here because we are primarily interested in the larger mammals of the Commonwealth.

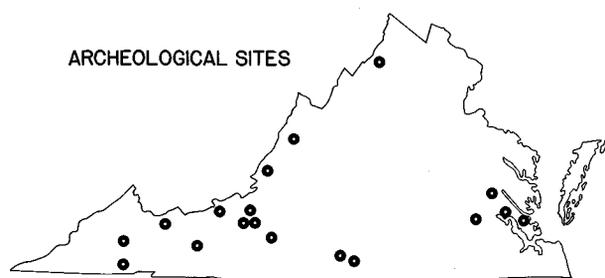


Figure. Location of the 11 montane, 3 piedmont, and 4 coastal plain late prehistoric archeological sites that have been reviewed in this study.

The mammals of the late prehistoric period were similar to those present today (Table 1); each can be assigned clearly to an extant species. The mammals that were collected at several archeological sites included the Virginia opossum, eastern cottontail (*Sylvilagus floridanus*), seven species of rodents (including tree squirrels and beaver), four canids, one bear, one raccoon, three mustelids, two felids, and two cervids, for a total of 22 species. In addition to the species that were present at many sites, several other species including mole, white-footed mouse (*Peromyscus leucopus*), rice rat (*Oryzomys palustris*), meadow vole (*Microtus pennsylvanicus*), porcupine (*Erethizon dorsatum*), spotted skunk (*Spilogale putorius*), and long-tailed weasel (*Mustela frenata*), were recorded at one or two sites. (The "mole" is probably the eastern mole, *Scalopus aquaticus*, the mole with the widest distribution in Virginia today.)

The white-tailed deer is the most common mammal at these sites. This is not surprising because deer probably were abundant throughout Virginia, and because of their large size, each successful hunt provided much food. Conspicuously absent from Table 1 is the American bison, *Bison bison*, although there is one bison tooth known from nearby Currituck County, North Carolina dated about 2,610 yrs B. P. (Painter, 1978). According to early historical accounts, the bison, or American buffalo, was common throughout much of Virginia, except for the Coastal Plain. One explanation for the absence of bison from archeological sites is that montane caves and Coastal Plain shell middens were far removed from places where bison were common. Another explanation is that bison would be too large to carry back to the Indian villages. Consequently, the carcass could have been dismembered at the kill site, and the usable parts carried back to the

village as was often done with deer (Holland, 1979). Under these conditions, it is unlikely that large numbers of bones would be returned to the village and to its garbage pits. Elk (*Cervus elephas*), which are intermediate in size between white-tailed deer and bison, were present at half of the 18 sites that were evaluated in this paper (Table 1).

Beavers and woodchucks were found at most of the 18 sites; both are large and easy to hunt because of their fidelity to lodges and burrows near forest edges, respectively. Foxes, raccoons, and gray squirrels were also common. The flying squirrel (probably southern flying squirrel, *Glaucomys volans*) is a species that might be, but has not been, found at archeological sites. Despite the fact that these squirrels are nocturnal, there are several reports of their presence in the early historical accounts.

In Table 1, the faunas from archeological sites have been grouped according to geographic location, starting in the southwest and moving northward and eastward. The faunas were grouped from west to east in an effort to uncover unusual distributional patterns, but none was revealed. A few species, such as the woodrat (*Neotoma floridana*), today are restricted to the western part of the Commonwealth and they might be assumed to have been similarly restricted during prehistoric times. However, such a pattern of distribution cannot be detected with certainty in this small sample of 18 archeological faunas.

In some studies, notably Benthall's (1979) from Dougherty's Cave in Russell County and Barber's (1981) study of Maycocks Point Shell Midden in Prince George County, good information is available for long time periods. Dougherty's Cave was a stratified site, with the lower layers dating from the middle Archaic Cedar Creek Period (Benthall, 1979). Barber (1981) commented that neither the mammals eaten nor their proportions changed in the <sup>14</sup>C-dated layers at the Maycocks Point location; the maximum established age difference between the layers was about 500 years. These studies reinforce the observation that no readily apparent changes in the mammalian fauna within the past 4,000 years have been revealed from the study of archeological sites.

In sum, the archeological record indicates that between 22 and 29 species have been preserved at one or more sites. White-tailed deer predominate almost everywhere, but the Woodland Period Indians collected mammals of all sizes and

Table 1. Species of mammals recorded at late prehistoric archeological sites in Virginia. "X" indicates presence, "O" indicates a conspicuous absence, and "?" refers to a specimen referable to one taxon but possibly a congener. For scientific names, refer to Table 3.

	Opossum	Cottontail	Chipmunk	Gray squirrel	Fox squirrel	Flying squirrel	Woodchuck	Beaver	Muskrat	Woodrat	Wolf	Dog	Gray fox	Red fox	Black bear	Raccoon	Mink	Skunk	Otter	Mountain lion	Bobcat	White-tailed deer	Elk	Bison
<b>Appalachian Highlands</b>																								
Benthall 1979	X	X	X	X			X	X	X	X					X	X			X			X	X	
MacCord 1981			X	X	X				X				X		X								X	
MacCord & Buchanan 1980				X			X	X	X		X	X	X		X	X	X		X	X	X	X	X	X
Funk 1976					X		X	X			?	X												
MacCord 1972		X	X	X			X	X	X	X		X	X		X	X		X	X	X			X	
Barber & Barody 1977		X					X	X					X		X	X				X		X	X	
Buchanan 1980		X	X				X						X		X							X	X	
MacCord 1976	X	X		X			X	X					X									X	X	
Johnson 1979				X				X					X		X							X	X	
MacCord 1973a			X	X			X	X			?	X	X		X	X		X	X	X	X	X	X	X
MacCord 1973b		X					X	X					X		X								X	
<b>Piedmont</b>																								
Waselkov 1977	X	X		X	X		X	X	X	X		X	X		X	X		X				X	X	X
Stevens 1979	X								X			X		X									X	
Egloff & others 1980	X	X		X	X		X	X	X		X	X				O	X		X				X	
<b>Coastal Plain</b>																								
Barber 1981	X			X	X		X	X	X			X	X	X	X	X				X	X	X	X	X
Owen 1969	X	X		X			X	X	X			X	X		X		X					X		
Barber 1978	X	X		X			X	X	X						X								X	
Geier & Barber 1983	X	X					X	X				X			X								X	

of most kinds, even some that might be considered too small to eat.

#### THE EARLY HISTORICAL RECORD

The written accounts of early settlers in the New World would seem to be excellent sources of information about the contemporary fauna because they describe species actually seen by the observers. However, there are several shortcomings with this information.

(1) Although some of the early settlers were educated in England and some even knew the English biota fairly well, the 16th- and 17th-Century natural philosophers were trained more in Aristotelian principles than in the need for careful observation and description. In fact, "natural history" did not begin in England until the publication of White's *Natural History of Selbourne* in 1789. William Strachey's 1612 manuscript, published under the title *Historie of Travell in Virginia Britania*, is regarded as one of

the best historical sources of this period. Quotes from his (and other) writings will indicate the qualitative nature of the information in the early historical record:

"The Beaver there is as big as an ordinary water dog but his legs exceeding short, his forefeet like a dog's, his hinder like a swan's, his tail somewhat like the form of a racket, bare without hairs, which to eat the Savages esteem a great delicate."

(2) Much of what the early observers described was based upon comparison with mammals of their experience in England. Consequently, our white-tailed deer is described variously as being similar to red, roe, or fallow deer, our rabbits to their hares, and so on. Furthermore, some American mammals, such as opossum and raccoon, had no counterparts in England or Europe. These were often called by their Indian names and described as being similar to rats or monkeys, respectively. The descriptions sometimes were very crude, as seen in another Strachey quote:

"There is a beast they call Aroughcoune, much like a badger, tailed like a fox, and of a mingle black and grayish color, and which useth to live on trees as squirrels do, excellent meat, we kill often of them, the greatest number yet we obtain by trade." Strachey is describing a raccoon.

(3) The writer often relied on second-hand information or hearsay. This is seen in many accounts, such as those of Reverend John Clayton, educated at Oxford University and well known for his scientific investigations before coming to America for two years to serve as Rector to James City Parish from 1684-1686. "Elke, I have heard of them beyond the inhabitants . . .", indicating that elk were absent from the Coastal Plain (Berkeley and Berkeley, 1965). Second-hand accounts are not surprising from a rector, who would have had little reason to travel far and wide, but who would likely be in contact with many people who did travel. We have to rely on the good judgment of the rector to sift fact from fiction, and to record the best information possible. Accounts are most accurate and most believable when the observations are made by the writer.

(4) The early historical accounts are largely from the Coastal Plain, where the earliest settlements occurred. Journeys to the south and west brought back information about the wildlife there, but this information usually became secondhand for the writer of the accounts.

(5) None of the early historical accounts was written by a woodsman.

(6) For a variety of reasons, hyperbole or faulty

metaphors seem to be common features of many early historical accounts. Comments on the size, ferociousness, and numbers of mammals, especially large mammals, are often exaggerated.

"They have diverse beasts fit for provision, the chief are deer, both red and fallow, great store in the country towards the heads of the rivers, though not so many amongst the rivers; in our island about Jamestown are some few, nothing differing from ours in England but that of some of them the antlers of their horns are not so many, our people have seen 200, 100, and 50 in a herd," (Strachey, 1612). Clayton's statement that the "Rachooone, I take it to be a species of a monkie" (Berkeley and Berkeley, 1965) hardly instills confidence in the modern reader that Clayton was a trained scientist of his time. After two years in America, Clayton returned to England and spent the next 40 years of his life as a major and influential spokesman in establishing a picture of the New World in European minds.

With these seemingly casual, vague, and flimsy accounts as the norm, it is remarkable that some wildlife accounts did indicate that careful observations had been made. For example, several writers commented on flying squirrels, small nocturnal rodents that are difficult to observe. Clayton (Berkeley and Berkeley, 1965) reported seeing two kinds of bats, "one a large sort with long ears," and "the other much like the English something larger I think, very common." He must have observed the big-eared bats in the genus *Plecotus*.

The early historical accounts indicate that the mammals first observed by settlers in the 17th Century, and even a century later, did not differ substantially from the faunal lists based on evidence from late prehistoric archeological sites (Table 2). Compared to Table 1, there are some differences; for example, the woodrat, woodchuck, porcupine, and red fox were not reported in historical accounts. Today, the woodrat is restricted to the western part of Virginia and its absence in early historical accounts is not unexpected. However, the woodchuck was present at most archeological sites from the western half of Virginia, but is absent from the eastern sites and from the early historical accounts. The woodchuck would have been easy to observe because it is large, active during the day, prefers forest edges and clearings (even near buildings), and digs large and noticeable holes in the ground. I conclude that the woodchuck was not present in eastern Virginia during the time of the early settlements, but that it has moved eastward in

Table 2. Species of mammals recorded in early historical accounts in Virginia. "X" indicates presence and "?" refers to a specimen referable to one taxon but possibly a congener. For scientific names, refer to Table 3.

	Opossum	Cottontail	Chipmunk	Gray squirrel	Fox squirrel	Flying squirrel	Woodchuck	Beaver	Muskrat	Woodrat	Wolf	Dog	Gray fox	Red fox	Black bear	Raccoon	Mink	Skunk	Otter	Mountain lion	Bobcat	White-tailed deer	Elk	Bison
Clayton 1684 (Berkeley and Berkeley 1965)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hariot 1588			X	X							X	X							X	X	X	X		
Smith 1612 (Arber 1967)	X	X		X	X	X		X	X				X		X	X	X	X						X
Beverley 1705 (Dunbar 1964)																								X
Argall 1613 (Barbour 1972)																								X
Byrd 1728 (Boyd 1929)					X			X							X	X				X	X	X		X
Banister 1678 (Ewan and Ewan 1970)		X	X	X	X	X		X	X				X		X				X		X	X		
Strachey 1612	X	X		X	X			X	X		?	X	X		X	X	X	X	X	X	X	X		X
17th Century (Bruce 1927)	X	X						X			X	X		X	X				X	X		X		

association with the clearing of the land for agriculture. In fact, even today populations do not occur east of Williamsburg. The porcupine probably was common in western Virginia, and it is unclear why the presence of this easily seen and distinctive mammal was not recorded in an early account. The red fox, also missing from these historical accounts, is another species that requires clearings or openings, and its distribution too may have expanded rapidly with the spread of agriculture.

The presence of elk was reported only once in the early historical accounts, and this was the hearsay comment by Clayton. Either elk were not common in the Coastal Plain, or else they were considered to be one of the deer that are similar to "red, roe, or fallow deer." (It is possible that elk were mistakenly called red deer, and white-tailed deer were called fallow deer.) In the absence of careful description, we cannot be sure which explanation is more likely. Elk were present in most archeological sites in the western part

of Virginia, and also at Waselkov's (1977) site in Franklin county and Barber's (1981) site in Prince George County. The latter site is located in the Coastal Plain, but the elk remains were found in Barber's Zone 4, which was dated A.D. 245±90 yrs. Handley and Patton (1947) state that the last specimen of elk was killed in January 1855 by Colonel Joseph Tuley of Clarke County.

Bison were reported in some of the early historical accounts (Table 2). Handley and Patton (1947) contend that "when the settlers first came, the bison . . . was quite common throughout the State, at least down to the edge of the Coastal Plain." Dunbar (1964) believed that the 45 place names involving "buffalo" are helpful in finding the former distribution of the bison in Virginia; none was located well into the Coastal Plain. Barbour (1972) reported a June 1613 letter from Captain Samuel Argall that described seeing "a great store of cattle (bison)" grazing along the banks of the Rappahannock River "about 65 leagues" from the Chesapeake Bay. This location

was probably close to the Fall Line between the Piedmont and the Coastal Plain. According to Handley and Patton (1947), the last bison was killed in Virginia in the 1790's.

Other extirpations recorded by Handley and Patton (1947) include the fisher, *Martes pennanti* (probably in the 1890's), pine marten, *Martes americana* (probably in the 1830's or 1840's), porcupine (1899), timber wolf, *Canis lupus* (1912), mountain lion, *Felis concolor* (which were hunted in the 1880's), beaver (about 1910), and white-tailed deer in 44 western and central counties (about 1905). Some of these species, notably the white-tailed deer and beaver, have been reestablished and are doing well today throughout the Commonwealth under the protection of regulated hunting and trapping.

### MODERN MAMMALS OF VIRGINIA

The current mammalian fauna of Virginia is similar to that which was present 400 years ago when the early European settlements were established, minus the extirpations mentioned above. There have been a few additions, including Old World murid rodents (Norway rat, *Rattus norvegicus*, and house mouse, *Mus musculus*), the hispid cotton rat, *Sigmodon hispidus*, which has moved northward and eastward during historical times and was first recorded in Virginia in 1940, and the South American nutria, *Myocastor coypus*, which has moved into the southeastern corner of Virginia after escaping from domestication in Louisiana during the 1930's. As discussed above, it is likely that the woodchuck, and especially the red fox, have expanded their distributions substantially since the onset of European settlement. Some other species have been introduced, such as the Sika deer (*Cervus nippon*) and horse (*Equus caballus*) on Assateague Island and the black-tailed jackrabbit (*Lepus californicus*) on Cobb Island, but these are considered to be localized exotics and not part of the local fauna. Table 3 lists the modern mammals of Virginia arranged according to their probable distribution within the Commonwealth.

In conclusion, the mammals of late prehistoric, early historical, and today's Virginia are similar. In fact, the mammalian fauna does not seem to have changed much during the past 4,000 years. This picture of constancy during this period is consistent with the findings of Delcourt and Delcourt (this volume) that neither the climate nor the vegetation of Virginia has changed substantially during the last 4,000-5,000 years. Each

Table 3. Virginia mammals and their likely distributions within the Commonwealth, taken from Hall (1981), *The Mammals of North America* and Hamilton and Whitaker (1979) *Mammals of Eastern North America*, using the nomenclature of Jones, Carter, and Genoways (1979).

Distribution is statewide for:

- Didelphis virginiana*, Virginia opossum
- Sorex longirostris*, southeastern shrew (absent in mtns?)
- Microsorex hoyi*, pygmy shrew
- Blarina brevicauda*, short-tailed shrew
- Cryptotis parva*, least shrew
- Scalopus aquaticus*, eastern mole
- Condylura cristata*, star-nosed mole
- Myotis lucifugus*, little brown bat
- Myotis keenii*, Keen's myotis
- Lasionycteris noctivagans*, silver-haired bat
- Pipistrellus subflavus*, eastern pipistrelle
- Eptesicus fuscus*, big brown bat
- Lasiurus borealis*, red bat
- Lasiurus cinereus*, hoary bat
- Nycticeius humeralis*, evening bat (east of mtns?)
- Plecotus rafinesquii*, Rafinesque's big-eared bat
- Sylvilagus floridanus*, eastern cottontail
- Tamias striatus*, eastern chipmunk (except southern Va.?)
- Marmota monax*, woodchuck (except Southeastern Va.)
- Sciurus carolinensis*, gray squirrel
- Tamiasciurus hudsonicus*, red squirrel (except Coastal Plain and southern Piedmont)
- Glaucomys volans*, southern flying squirrel
- Castor canadensis*, beaver (extirpated, reestablished)
- Reithrodontomys humulis*, eastern harvest mouse
- Peromyscus leucopus*, white-footed mouse
- Ochrotomys nuttalli*, golden mouse (except northern Va.)
- Microtus pennsylvanicus*, meadow vole
- Microtus pinetorum*, woodland vole
- Ondatra zibethicus*, muskrat
- Rattus norvegicus*, Norway rat (introduced from Europe)
- Mus musculus*, house mouse (introduced from Europe)
- Zapus hudsonius*, meadow jumping mouse
- Canis lupus*, gray wolf (extirpated)
- Vulpes vulpes*, red fox (except extreme SE Va.?)
- Urocyon cinereoargenteus*, gray fox
- Procyon lotor*, raccoon
- Mustela frenata*, long-tailed weasel
- Mustela vison*, mink

*Mephitis mephitis*, striped skunk (except extreme SE Va.?)

*Lutra canadensis*, river otter (now east of mtns.)

*Felis concolor*, mountain lion (probably extirpated)

*Felis rufus*, bobcat

*Cervus elephas*, wapiti (or elk) (extirpated)

*Odocoileus virginianus*, white-tailed deer

*Bison bison*, bison ("buffalo"), except SE Va. (extirpated)

Distribution in Appalachian highlands for:

*Sorex cinereus*, masked shrew

*Sorex palustris*, water shrew

*Sorex fumeus*, smoky shrew

*Sorex dispar*, long-tailed or rock shrew

*Parascalops breweri*, hairy-tailed mole

*Myotis grisescens*, gray myotis

*Myotis velifer*, cave myotis

*Myotis sodalis*, Indiana or social myotis

*Plecotus townsendii*, Townsend's big-eared bat

*Sylvilagus transitionalis*, New England cottontail

*Lepus americanus*, snowshoe hare (endangered)

*Sciurus niger*, fox squirrel

*Glaucomys sabrinus*, northern flying squirrel (endangered)

*Peromyscus maniculatus*, deer mouse (N. Va.)

*Neotoma floridana*, eastern woodrat (N. Va.)

*Clethrionomys gapperi*, southern red-backed vole

*Microtus chrotorrhinus*, rock vole (status undetermined)

*Napaeozapus insignis*, woodland jumping mouse

*Erethizon dorsatum*, porcupine (extirpated)

*Canis latrans*, coyote (extirpated, recent immigrant)

*Martes americana*, marten (extirpated)

*Martes pennanti*, fisher (extirpated, recent immigrant)

*Mustela nivalis*, least weasel

*Spilogale putorius*, eastern spotted skunk

Distribution in southern Piedmont and Coastal Plain for:

*Blarina carolinensis*, southern short-tailed shrew

*Oryzomys palustris*, marsh rice rat

*Sigmodon hispidus*, hispid cotton rat

Distribution in southeastern Virginia for:

*Lasiurus seminolus*, Seminole bat

*Lasiurus intermedius*, northern yellow bat

*Sylvilagus palustris*, march rabbit (Tidewater only)

*Peromyscus gossypinus*, cotton mouse (Tidewater only)

*Myocaster coypus*, nutria, introduced from South America, southern Va. only

Distribution in Appalachian highlands and southeastern Virginia only for:

*Synaptomys cooperi*, southern bog lemming

*Ursus americanus*, black bear

species present in the archeological record is readily assignable as a Virginia mammal known from the historical period, although that species might now be extinct in Virginia (e.g., the timber wolf). As more and more archeological sites are excavated, the former distribution and status of some species is certain to become better known. Although some species have been extirpated from Virginia since European settlement began and others have expanded their distributions within Virginia in response to changing land-use patterns, the mammalian fauna appears to have remained remarkably static during the past four millennia.

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