

The Land Manager's Guide to Mammals of the South

Edited by

Margaret K. Trani, W. Mark Ford, and Brian R. Chapman

2007

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One hundred and one mammal species are described that occur in the southern United States. Narrative accounts provide a comprehensive overview of relevant taxonomy, conservation status, distribution, life history, and guidelines for management. Mammal associations within 17 terrestrial and five aquatic communities are presented in the form of habitat relationship matrices. Dichotomous keys for identifying each species are provided using pelage, body measurements, and cranial characteristics. The guide is designed to provide land managers with the ecological information necessary for assessing the influence of management and environmental change.

This volume is the third publication in the Land Manager's Guide series and serves as the companion guide to earlier texts on birds, reptiles, and amphibians in the South.

Keywords: Mammals; habitat relationships; land management; conservation; southern United States

Cover: (Clockwise starting from upper left) Northern river otter (*Lontra canadensis*), smoky shrew (*Sorex fumeus*), red fox (*Vulpes vulpes*), eastern chipmunk (*Tamias striatus*), Seminole bat (*Lasiurus seminolus*), and Virginia opossum (*Didelphis virginiana*). Photo credits: (James F. Parnell).

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Preface

This volume is the third publication in the Land Manager's Guide series. It serves as the companion to *The Land Manager's Guide to the Birds of the South* by Paul Hamel (1992) and *The Land Manager's Guide to the Amphibians and Reptiles of the South* authored by Lawrence Wilson (1995).

The 101 mammal species that occur in the southern United States are described herein. Narrative accounts provide a comprehensive overview of relevant taxonomy, conservation status, distribution, life history, and guidelines for management. Mammal associations within 17 terrestrial and five aquatic communities are presented through habitat relationship matrices. Although the book is not a field identification guide, dichotomous keys for identifying each species using pelage, body measurements, and cranial characteristics are included. This guide also is designed to provide land managers with the ecological information necessary for assessing the influence of management and environmental change on individual mammal species.

The information contained in the text represents the best efforts of the account authors to synthesize the published literature, current theory, and field research of the region. Many species have not been studied with respect to the influence of management activity or habitat alteration. Insights are into where knowledge is insufficient and numerous topics are identified that warrant additional research. We hope that the information contained in this text fosters better understanding and appreciation of mammals in the South.

The challenges facing species in the 21st century are numerous. Fragmentation and loss of habitat remain the primary cause of endangerment. Forests, grasslands, and wetlands have been and continue to be converted to urban, industrial, and agricultural uses at a rapid pace in the region. Other environmental pressures such as pollutants and contaminants, commercial exploitation, fire suppression, and river and stream modification also threaten mammals in the southern United States. It is hoped that this guide will serve as a useful stewardship tool for those charged with the conservation and management of mammals and their habitats; as such the guide is dedicated to the tireless and often unrecognized efforts of the region's resource professionals.

Margaret K. Trani (Griep), W. Mark Ford, and Brian R. Chapman, editors.

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Many individuals contributed to the development of this book. We are especially grateful to Karolyn Darrow for preparing all of the skull illustrations with assistance from Joshua Laerm and Linda Gordon. Ghisela Gresham provided assistance with early derivations of selected range maps. Electronic versions of each species maps were created by Ron Underwood. We thank Ampaporn Mattox, Haven Cook, Paris Griep, Nikole Castleberry, and Crystal Nance for research and editorial assistance.

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Finally, we dedicate this work to the late Joshua Laerm, a co-author on many of the accounts. As he was known to many wildlife professionals throughout the South, the “Good Doctor” was one of the original co-authors for the book. His untimely death not only slowed the progress of this work, but it left an empty niche in the hearts of his many students and colleagues that worked with him over the years.

Contributors

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Virginia Opossum

Didelphis virginiana (Kerr, 1792)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

For many years, North American opossums were regarded as members of a single species, *Didelphis marsupialis* (Hershkovitz 1951). Gardner (1973) reviewed the systematics of North American *Didelphis* and defined two North American species. The species occurring in the United States was described as the Virginia opossum (*D. virginiana*), whereas the southern opossum inhabiting Central and South America was classified as *D. marsupialis*. The Virginia opossum is represented by four subspecies; two occur in the South (*D. v. pigra* and *D. v. virginiana*). McManus (1974) and Gardner (1982) review the literature.

DISTINGUISHING CHARACTERISTICS

The Virginia opossum is a robust-bodied, cat-sized mammal with a pointed snout, naked leathery ears, short legs, and a long, scaly prehensile tail. The medial digit on the hind foot is opposable and clawless. Measurements are: total length, 513–900 mm; tail, 220–380 mm; hind foot, 38–85 mm; ear, 40–60 mm; weight, 0.9–5.9 kg. Males are larger than females and a marsupium develops in pregnant females after breeding. There are two color phases: gray and black. The dorsal pelage is characterized by long dense fur that is white at the base and dark brown to black at the tip and interspersed with long guard hairs that are either white-tipped or black-tipped contributing to a grizzled appearance. The venter is darker. The head is white to pale gray and the ears are black with white tips. The lower legs and feet are black, but the toes are white. *Didelphis virginiana* is the only North American mammal with five pairs of upper incisors and 50 teeth. The dental formula is: I 5/4, C 1/1, P 3/3, M 4/4 = 50 (Figure 1).

CONSERVATION STATUS

The Virginia opossum has a global rank of Secure (NatureServe 2007). The species is also considered Secure in those states where it occurs within the region, except for Arkansas, where it is Apparently Secure. It is unranked in Florida. Game laws protecting the opossum vary by state; there can be open seasons for hunting or trapping.

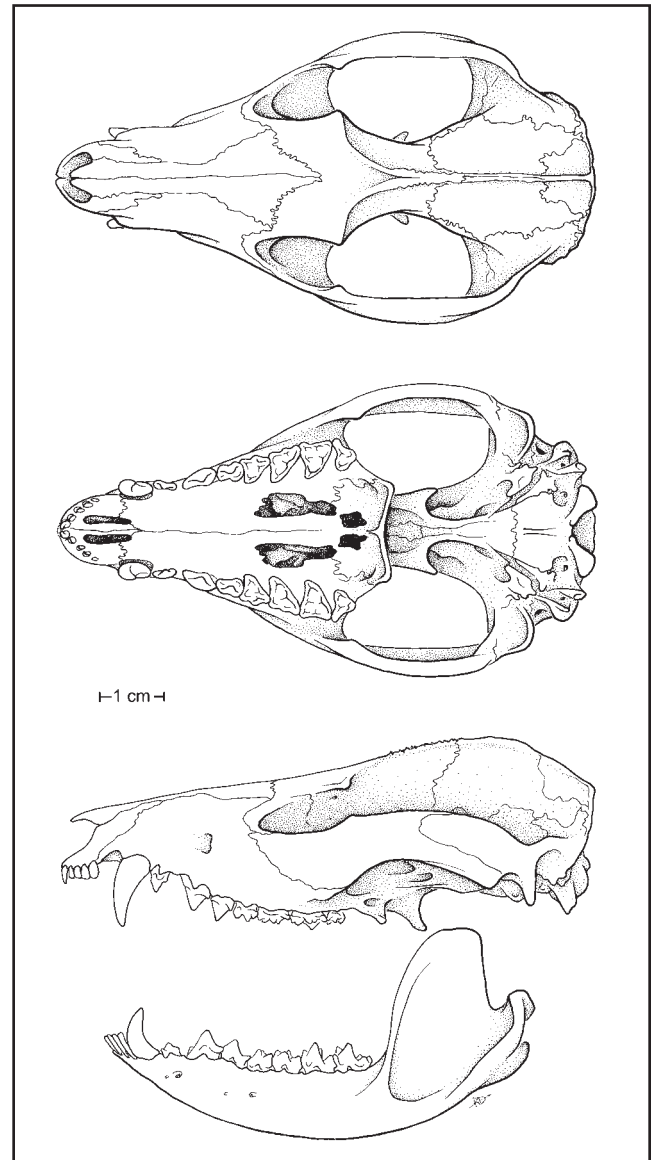


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Didelphis virginiana* from Talbot County, Maryland (USNM 560501, female).

DISTRIBUTION

The species is ubiquitous in the southern United States (Figure 2). It occurs throughout Virginia (Bailey 1946, Stout and Sonenshine 1974, Webster et al. 1985, Pagels et al. 1992, Linzey 1998), North Carolina (Lee et al. 1982, Webster et al. 1985, Handley 1992, Clark et al.

Northern Short-tailed Shrew

Blarina brevicauda (Say, 1823)

Joshua Laerm, W. Mark Ford and Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Until recently, the short-tailed shrew (*Blarina brevicauda*) was the only recognized species in the genus *Blarina*. Revision of the *Blarina brevicauda* complex resulted in recognition of three species: the northern short-tailed shrew (*B. brevicauda*), the southern short-tailed shrew (*B. carolinensis*), and Elliot's short-tailed shrew (*B. hylophaga*; Genoways and Choate 1972, Tate et al. 1980, French 1981, George et al. 1981, George et al. 1982, Moncrief et al. 1982, Braun and Kennedy 1983, Jones et al. 1984, George et al. 1986). Twelve northern short-tailed shrew subspecies currently are recognized. Six of the subspecies, *B. b. churchi*, *B. b. kirtlandi*, *B. b. knoxjonesi*, *B. b. talpoides*, and *B. b. telmalestes* occur in the South (George et al. 1986, Webster 1996). Populations of *Blarina* in Florida, referred by some as *B. b. shermani*, are now regarded as subspecies of *B. carolinensis*. The literature on the northern short-tailed shrew was reviewed by George et al. (1986).

DISTINGUISHING CHARACTERISTICS

The northern short-tailed shrew is a large, short-tailed soricid and is the largest of the three *Blarina* species. Specimens vary in size throughout the range with larger forms occurring in the Appalachians and smaller forms occurring in the Piedmont and Interior Low Plateau. Measurements are: total length, 95–135 mm; tail, 13–32 mm; hind foot, 8–18 mm; weight, 20–30 g. The northern short-tailed shrew has small ears that are concealed in the pelage, minute eyes, and a long and pointed snout. The pelage color is variable, ranging from grayish brown to slate black dorsally and only slightly paler below. Specimens of *B. brevicauda* may be confused with the southern short-tailed shrew or Elliott's short-tailed shrew. Whereas distinction often can be made on the basis of distribution, in areas of near parapatry morphometric or genetic comparisons must be made (Tate et al. 1980, French 1981, George et al. 1981, George et al. 1982, Braun and Kennedy 1983). The dental formula of the northern short-tailed shrew is: I 3/1, C 1/1, P 3/1, M 3/3 = 32 (Figure 1). See keys for additional details.

CONSERVATION STATUS

The northern short-tailed shrew has a global rank of Secure (NatureServe 2007). The species is also

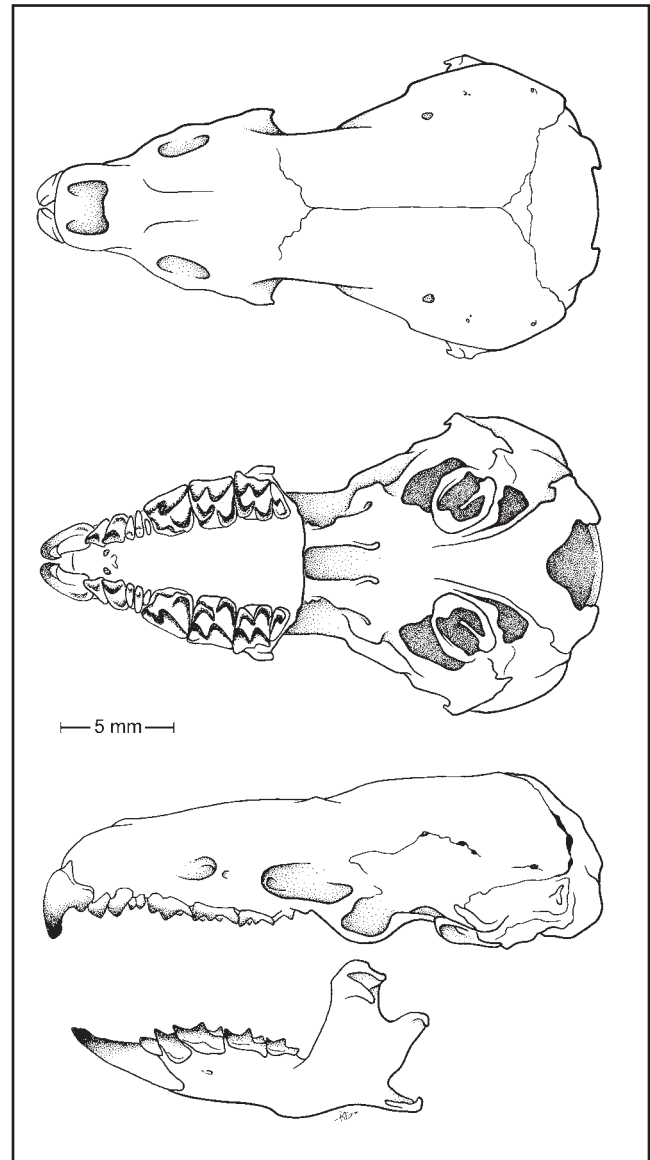


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Blarina brevicauda* from Macon County, North Carolina (USNM 291774, female).

considered Secure in those states where it occurs within the South. It is unranked in South Carolina.

DISTRIBUTION

The northern short-tailed shrew is distributed throughout south-central and southeast Canada

Southern Short-tailed Shrew

Blarina carolinensis (Bachman, 1837)

Joshua Laerm, W. Mark Ford, Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Revision of the northern short-tailed shrew (*Blarina brevicauda*) complex resulted in the recognition of the southern short-tailed shrew (*B. carolinensis*) as a distinct species on the basis of morphological and karyological differences (Genoways and Choate 1972, Tate et al. 1980, French 1981, George et al. 1982, Braun and Kennedy 1983). Four subspecies, *B. c. carolinensis*, *B. c. minima*, *B. c. peninsulae*, and *B. c. shermani*, currently are recognized, but the taxonomic status is problematic. Hutterer (1993) incorrectly lists *B. c. minima* as a subspecies of Elliot's short-tailed shrew (*B. hylophaga*; see Easterla 1968, Lowery 1974, Schmidly 1983, Sealander and Heidt 1990). The taxonomy of the populations in lower peninsular Florida that are referred to *B. c. peninsulae* is uncertain (Layne 1992). George et al. (1982) recognized two distinct chromosomal groups of short-tailed shrews in Florida: *B. c. carolinensis* to the north and *B. c. peninsulae* in the south. The karyotype of *B. c. peninsulae* is sufficiently different from the northern short-tailed shrew (*B. brevicauda*) and southern short-tailed shrew to suggest that *B. c. peninsulae* may be a distinct species (Jones et al. 1984, George et al. 1986, Layne 1992). A population of short-tailed shrews known only from their type locality at Fort Myers, Florida, was described by Hamilton (1955) as *B. b. shermani*. Although this taxon was referred to *B. carolinensis* by George et al. (1982) and Layne (1992), the United States Fish and Wildlife Service (1991) referred them to *B. brevicauda*. Confusion regarding the status of *B. c. peninsulae* adds to the uncertain relationship of *B. c. shermani*, as *B. c. shermani* may be a subspecies of either *B. brevicauda* or *B. carolinensis* and it might be synonymous with *B. c. peninsulae* (Layne 1992). We follow Layne (1992) in the use of *B. c. shermani*. Furthermore, there is no consensus about the subspecific affinities of *B. carolinensis* in southern and eastern Arkansas, eastern Texas, and southeastern Oklahoma. Traditional maps (Hall 1981) suggest that two subspecies, *B. c. carolinensis* and *B. c. minima*, occur in that area. The status of the populations referable to *B. c. carolinensis* in southeastern Arkansas, southeastern Oklahoma, and eastern Texas is uncertain. They may represent isolates of *B. c. carolinensis*, intergrades between Elliot's short-tailed shrew (*B. hylophaga*) and *B. carolinensis*, or populations that should be referred to *B. c. minima*. The literature on the southern short-tailed shrew was reviewed by McCay (2001).

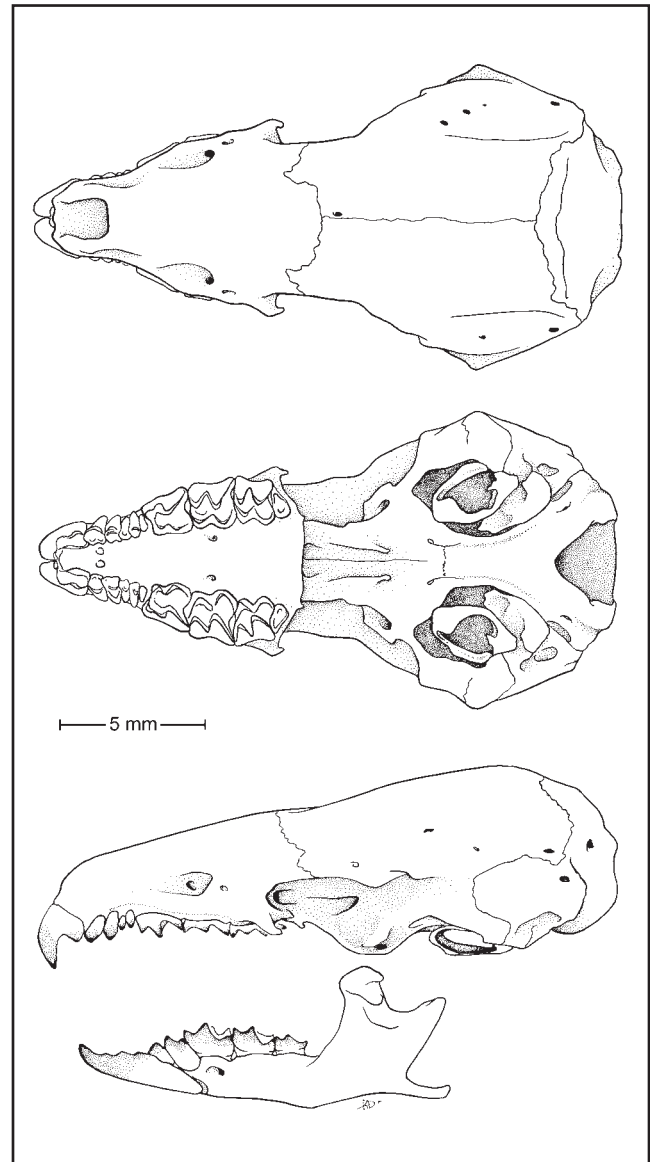


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Blarina carolinensis* from Charleston County, North Carolina (USNM 574241, male).

DISTINGUISHING CHARACTERISTICS

The southern short-tailed shrew is a large, short-tailed soricid and is the smallest of the three *Blarina* species in the region. Measurements are: total length, 79–123 mm; tail, 14–27 mm; hind foot, 10–17 mm; weight 8–15 g. The southern short-tailed shrew has small ears that

Elliot's Short-tailed Shrew

Blarina hylophaga (Elliot, 1899)

Joshua Laerm, Brian R. Chapman, and W. Mark Ford

CONTENT AND TAXONOMIC COMMENTS

Elliot's short-tailed shrew (*Blarina hylophaga*) was described recently as distinct from the southern short-tailed shrew (*B. carolinensis*) and the northern short-tailed shrew (*B. brevicauda*) (Genoways and Choate 1972, George et al. 1981, George et al. 1982, Moncrief et al. 1982). Two subspecies are recognized. *Blarina h. plumbea*, described originally as *B. brevicauda plumbea* by Davis (1941) and referred to *B. carolinensis plumbea* by Schmidly and Brown (1979), is found only at its type locality at the Aransas National Wildlife Refuge, Aransas County, Texas (George et al. 1981, Schmidly 1983, Baumgardner et al. 1992). *Blarina h. hylophaga*, which is more widely distributed, is the only subspecies that occurs in the South.

DISTINGUISHING CHARACTERISTICS

Elliot's short-tailed shrew is intermediate in size between the other two *Blarina* species. Measurements are: total length, 103–120 mm; tail, 19–25 mm; hind foot, 12–16 mm; weight, 13–17 g. This species has small ears that are small and concealed in the pelage. The minute eyes are positioned in a long, pointed snout. The color of the pelage is similar to that of the southern short-tailed shrew, brownish gray to slate gray dorsally and only slightly paler below. Specimens of Elliot's short-tailed shrew may be confused with the southern short-tailed shrew to the south and east and with the northern short-tailed shrew to the north. Distinctions among the species sometimes can be made on the basis of distribution, but in areas of sympatry or parapatry, morphometric or genetic comparisons must be made (George et al. 1981, Moncrief et al. 1982). The dental formula of Elliot's short-tailed shrew is: I 3/1, C 1/1, P 3/1, M 3/3 = 32 (Figure 1). See keys for additional details.

CONSERVATION STATUS

Elliot's short-tailed shrew has a global rank of Secure (NatureServe 2007). It is Apparently Secure in Oklahoma and is unranked in Arkansas and Louisiana. However, it is classified as Critically Imperiled in Texas.

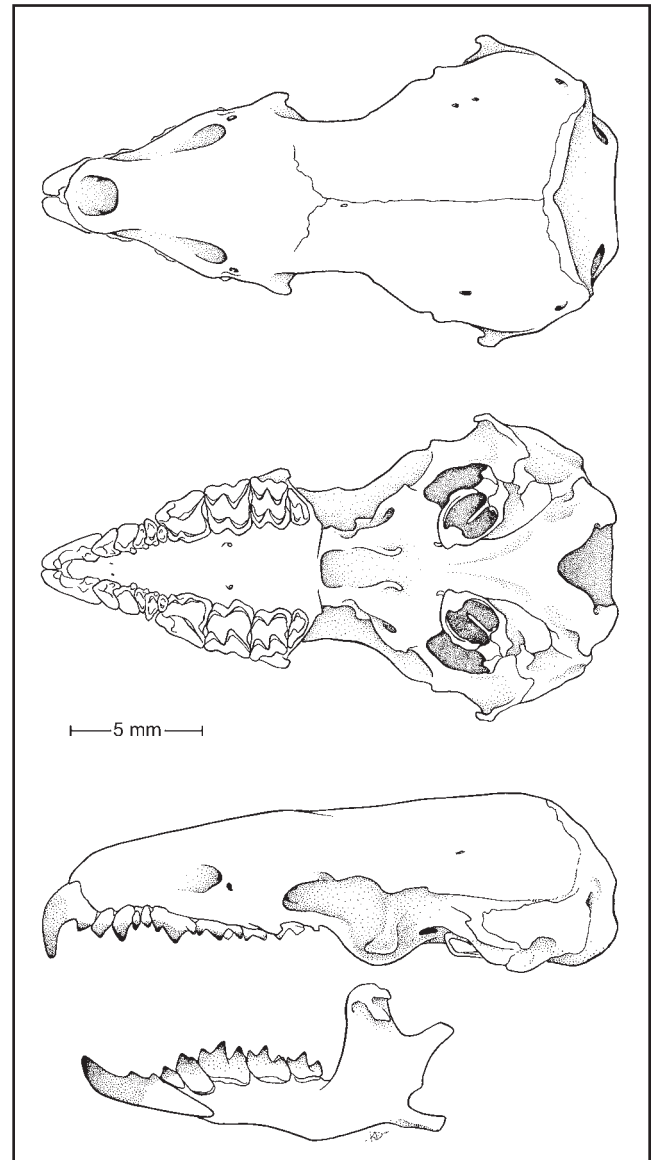


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Blarina hylophaga* from Jefferson County, Kansas (USNM 568207, female).

DISTRIBUTION

The distribution of Elliot's short-tailed shrew extends from east-central Colorado across southern Nebraska into southwestern Iowa and south into Texas and northwestern Arkansas (Jones et al. 1984). Figure 2 depicts the distribution of the short-tailed shrew in

Hairy-tailed Mole

Parascalops breweri (Bachman, 1842)

Joshua Laerm, W. Mark Ford, and Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

The hairy-tailed mole (*Parascalops breweri*) is a monotypic species. Literature on the hairy-tailed mole was reviewed by Hallett (1978).

DISTINGUISHING CHARACTERISTICS

The hairy-tailed mole has a robust body. Its measurements are: total length, 139–174 mm; tail, 23–36 mm; hind foot, 17–21 mm; weight, 40–65 g. The dense, soft pelage is gray to black dorsally, but slightly paler ventrally. The eyes are concealed in the pelage and the ears lack pinnae. The short tail (less than 25% of the body length) is fleshy, constricted at the base, and densely furred with coarse hairs. The forefeet are not webbed. The hairy-tailed mole is unlikely to be confused with the eastern mole (*Scalopus aquaticus*), which has a naked tail, or with the star-nosed mole (*Condylura cristata*), that has numerous fleshy rostral appendages. The dental formula of hairy-tailed mole is: I 3/3, C 1/1, P 4/4, M 3/3 = 44 (Figure 1). See keys for additional details.

CONSERVATION STATUS

The hairy-tailed mole has a global rank of Secure (NatureServe 2007). It is Secure in Virginia, and Apparently Secure in Kentucky and North Carolina. Tennessee classifies it as Vulnerable. It is Critically Imperiled in Georgia. It is currently unranked in South Carolina, where it has been monitored as a Species of Special Concern.

DISTRIBUTION

The hairy-tailed mole is distributed from Ontario and Quebec (van Zyll de Jong 1983, Burns 1983) throughout the northeastern United States and south throughout the Appalachian Mountains. The distribution of the mole in the South is depicted in Figure 2. Its geographical range includes the Southern Appalachian Mountains of Virginia (Odom 1944, Handley 1971, Pagels and Tate 1976, Handley 1992, Linzey 1998), Kentucky (Welter and Sollberger 1939, Wallace and Houp 1968, Barbour and Davis 1974, Fassler 1974, Meade 1992), Tennessee (Smith et al. 1974, Copeland 1981, Allsbrooks et al. 1983, Linzey 1995), North Carolina (Gordon and Bailey 1963, Johnston 1967, Lee et al. 1982, Webster et al. 1984, Linzey 1995),

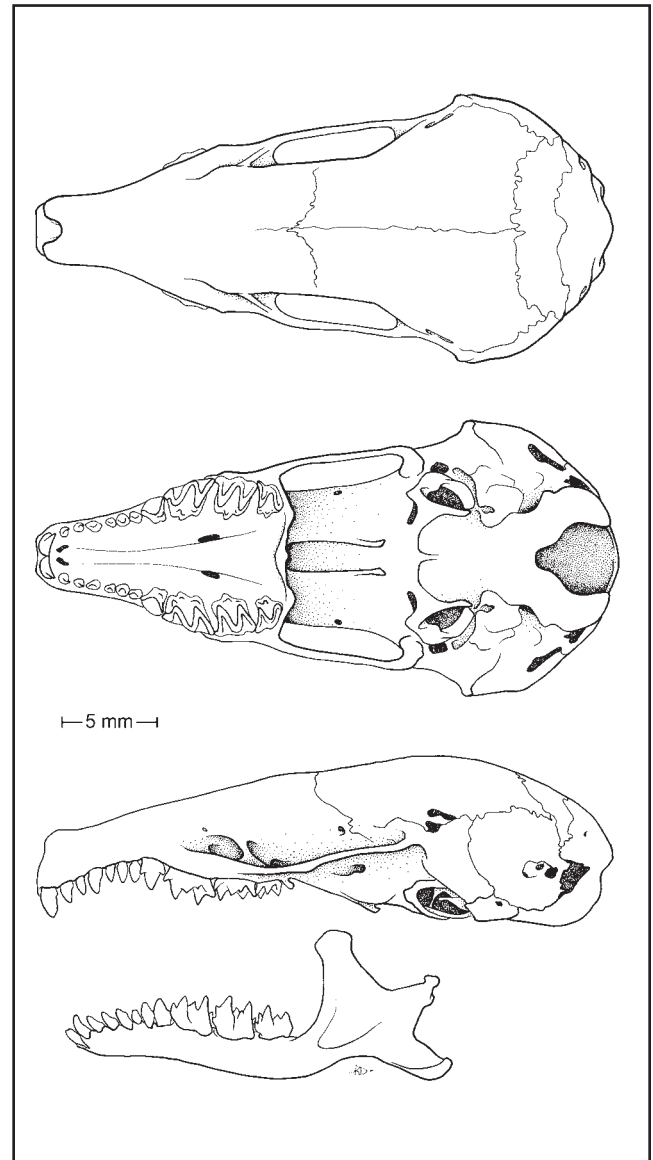


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Parascalops breweri* from Giles County, Virginia (USNM 364611, male).

South Carolina (Reese and Luckett 1979) and Georgia (Laerm 1992, Brown 1993).

ABUNDANCE STATUS

In the South, the hairy-tailed mole varies in its abundance where found. Average population density estimates reach 25–30/ha in New Hampshire (Eadie 1939)

Eastern Mole

Scalopus aquaticus (Linnaeus, 1758)

Joshua Laerm, Brian R. Chapman and W. Mark Ford

CONTENT AND TAXONOMIC COMMENTS

Sixteen subspecies of the eastern mole (*Scalopus aquaticus*) currently are recognized. Eleven subspecies occur in the region: *S. a. aereus*, *S. a. anastasiae*, *S. a. aquaticus*, *S. a. australis*, *S. a. bassi*, *S. a. howelli*, *S. a. machrinoides*, *S. a. machrinus*, *S. a. nanus*, *S. a. parvus*, and *S. a. porteri* (Yates and Schmidly 1977, Yates and Schmidly 1978, Hall 1981). Yates (1978) examined the taxonomic relationships of populations of the eastern mole and questioned the validity of several regional subspecies. However, the conclusions of Yates (1978) were not followed by Yates and Schmidly (1978) or Hall (1981). The taxonomic relationships of populations west of the Mississippi River were revised by Yates and Schmidly (1977), but the eastern subspecies have not been revised since Jackson (1914, 1915) and subsequent descriptions of new subspecies have not been made (Howell 1939, Schwartz 1952a). Yates and Schmidly (1978) reviewed the literature on the eastern mole.

DISTINGUISHING CHARACTERISTICS

The eastern mole is a medium-sized mole with a robust body. Measurements are: total length, 129–208 mm; tail, 18–38 mm; hind foot, 15–22 mm; weight 65–115 g. Body size decreases from northern to southern latitudes, and males typically are larger than females. Like other moles, the eastern mole lacks ear pinnae and the eyes are concealed by a thin layer of skin. The dense, silky pelage varies in color; individuals are silver-gray, brown, or black dorsally and slightly paler below. Piebald specimens with white spots, particularly on the head, sometimes are seen. The tail is short (less than 1/6 of the body length) and either lacks hair or is sparsely haired. The forefeet of the eastern mole are greatly enlarged and webbed. *Scalopus aquaticus* is unlikely to be confused with the star-nosed mole (*Condylura cristata*) because of the latter's fleshy appendages around the nose, or the hairy-tailed mole (*Parascalops breweri*) which has a longer, hairy tail. The dental formula of the eastern mole is: I 3/2, C 1/0, P 3/3, M 3/3 = 36 (Figure 1). See keys for additional details.

CONSERVATION STATUS

The eastern mole has a global rank of Secure (NatureServe 2007). The species is also considered

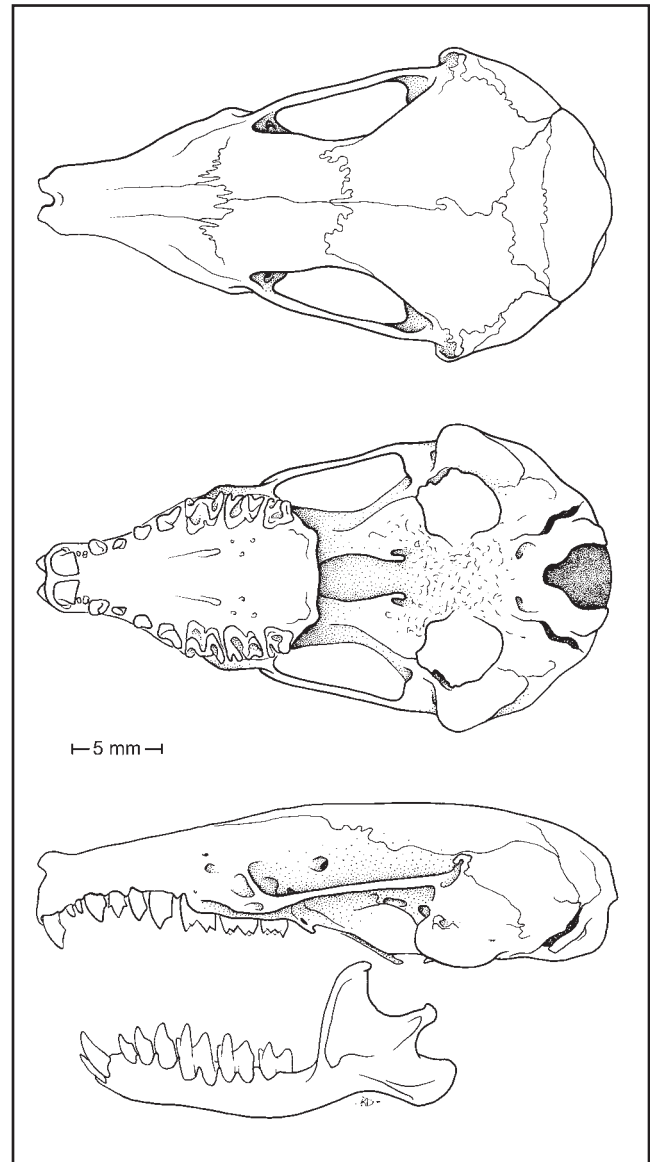


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Scalopus aquaticus* from Allegheny County, Maryland (USNM 506896, male).

Secure in those states where it occurs within the region except for Arkansas and Louisiana, where it is Apparently Secure. It is unranked in Florida and South Carolina.

Wagner's Bonneted Bat

Eumops glaucinus (Wagner, 1843)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Wagner's bonneted bat (*Eumops glaucinus*) originally was described as *Dysopes glaucinus* by Wagner (Koopman 1993). Allen (1932) described a new species, *Molossides floridanus*, on the basis of a fossil specimen from a Pleistocene deposit and this became the type specimen for the current subspecies when Koopman (1971) revised genus *Eumops*. Four subspecies are recognized; only *E. g. floridanus* occurs in the United States (Koopman 1971, Eger 1977, Hall 1981). This subspecies is often called the Florida mastiff bat (Owre 1978, Humphrey 1992).

DISTINGUISHING CHARACTERISTICS

Wagner's bonneted bat is a free-tailed bat with large ears. There are few published measurements for this species; the forearm length is known to average 57–66 mm (Barbour and Davis 1969). The glossy, thick pelage is usually black but individual hairs are sharply bicolor. The body hairs are white at the base, which sometimes makes the bat appear grayish. The ears of Wagner's bonneted bat are joined at the base where they meet above the face. The wings are long and narrow (wingspan approximately 470 mm) and the posterior half of the tail extends beyond the margin of the interfemoral membrane. The only other free-tailed bat in the region is the Brazilian free-tailed bat (*Tadarida brasiliensis*), a much smaller species. The forearm length of *T. brasiliensis* is less than 50 mm and its ears are not united at the base. The dental formula is I 1/2, C 1/1, P 2/2, M 3/3 = 30 (Figure 1).

CONSERVATION STATUS

Wagner's bonneted bat has a global rank of Secure (NatureServe 2007). It is Critically Imperiled in Florida.

DISTRIBUTION

Wagner's bonneted bat occurs in the West Indies, Central and South America, and the southern portion of the Florida peninsula (Barbour and Davis 1969, Hall 1981). Several records for the bat are from the Miami area (Barbour 1936, Eger 1977, Owre 1978). Most of the Florida specimen records date from 1955 to 1967 (Owre 1978). Belwood (1981) reported finding a small colony of *E. g. floridanus* near Punta Gorda, Charlotte County in 1979. This report, the first record

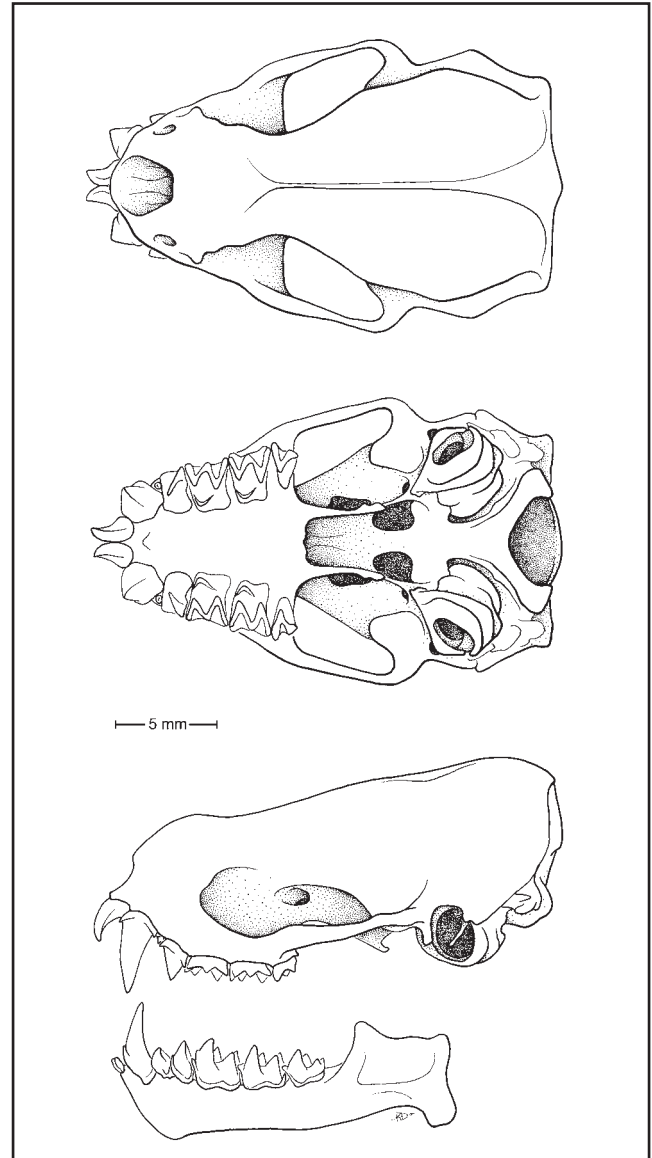


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Eumops glaucinus* from Jamaica (USNM 399618, gender unknown).

of the species in Florida since 1967, extended the known distributional range of the species 200 km westward and confirmed the existence of the species in the state (Figure 2). Robson et al. (1989) found an additional specimen of the Wagner's bonneted bat in Coral Gables in 1988.

Rafinesque's Big-eared Bat

Corynorhinus rafinesquii (Lesson, 1827)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) has a complex taxonomic history. The species originally was described as *Vespertilio megalotis* by Rafinesque (1818) based on specimens collected from the lower Ohio Valley. Lesson (1827 in Handley 1959) paraphrased the original description of the species and renamed it *Plecotus rafinesquii*. However, LeConte (1831 in Handley 1959) renamed the species to *P. macrotus*, which was used for several years. The bat also was described as *P. lecontii* by Cooper (1837) and *C. rafinesquii* by Allen (1916). In his revision of the genus, Handley (1959) noted that the name *V. megalotis* had been used for an African species prior to Rafinesque's description. Consequently, the original scientific name for Rafinesque's big-eared bat was rendered invalid. From the remaining available names, the name *P. rafinesquii* had priority (Handley 1959). Recently, Tumlison and Douglas (1992) evaluated the relationships of several genera of big-eared bats and concluded that the big-eared bats of the eastern United States should be assigned to *Corynorhinus*. For many years, various authors confused Rafinesque's and Townsend's big-eared bats (*C. townsendii*). Some of the literature using *C. (=Plecotus) rafinesquii* actually refers to *C. (=Plecotus) townsendii*, a species with a more western distribution. Although the geographic ranges of the two species overlap in portions of the Appalachian Highlands and Ozark Mountains, the two species have never been taken at the same locality. Two recognized subspecies of *C. rafinesquii* occur in the southern United States: *C. r. rafinesquii* inhabits an area west of the Appalachians and north of Alabama, Mississippi, and Louisiana; *C. r. macrotis* occurs in the Atlantic and Gulf Coast regions (Handley 1959, Hall 1981). Additional vernacular names that have been used for this species include eastern lump-nosed bat, eastern big-eared bat, eastern long-eared bat, and southeastern big-eared bat. A comprehensive review of the species is provided by Jones (1977).

DISTINGUISHING CHARACTERISTICS

Rafinesque's big-eared bat is a medium-sized, long-eared bat with two prominent fleshy lumps on the nose. Measurements are: total length, 95–105 mm; tail, 33–54 mm; hind foot, 8–13 mm; ear, 27–37 mm;

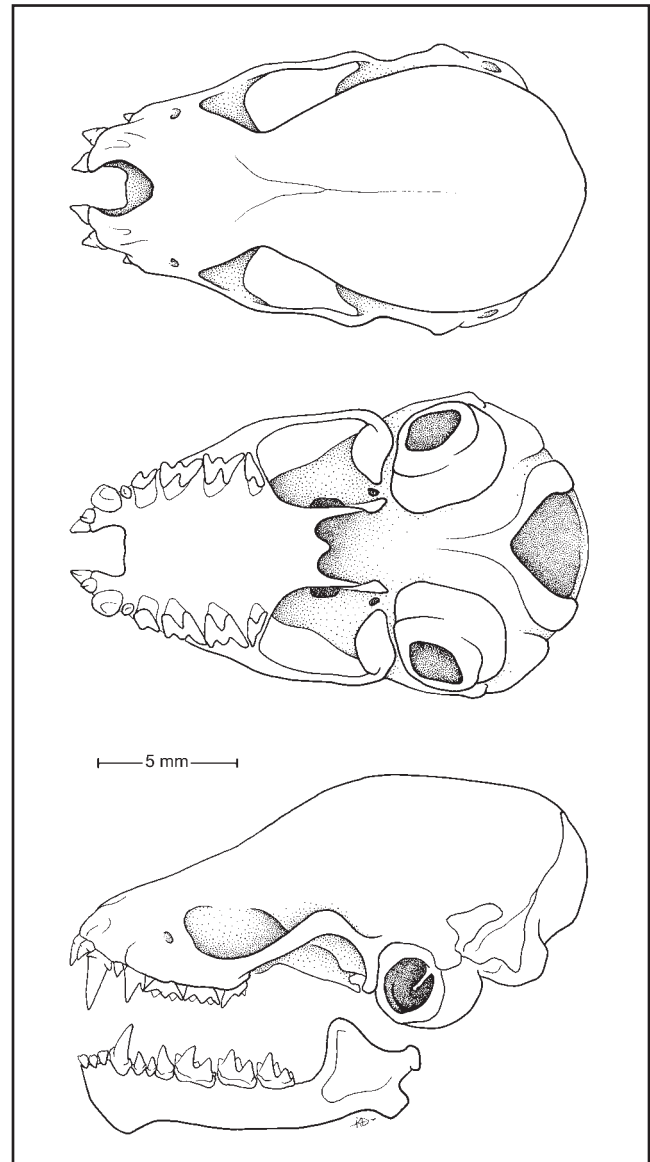


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Corynorhinus rafinesquii* from Marion Parrish, Louisiana (USNM 136100, gender unknown).

forearm, 38–44 mm; and weight, 6.0–9.5 g. The ears are joined at the base, taper to a narrow tip and are curled like a ram's horn when the bat is at rest or in a torpid state. Prominent lumps are present on each side of the muzzle and in front of the eyes. The pelage is grayish-brown or gray on the dorsum and white or

Gray Myotis

Myotis grisescens (Howell, 1909)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

The gray myotis (*Myotis grisescens*), is a monotypic species (Hall 1981) that is often referred to as the gray bat. The literature is reviewed by Decher and Choate (1995).

DISTINGUISHING CHARACTERISTICS

The gray myotis is the largest species of *Myotis* in the South. Measurements are: total length, 90–107 mm; tail, 32–47 mm; hind foot, 9–13 mm; ear, 12–16 mm; forearm, 40–46 mm; weight, 7–14 g. The dorsal pelage is grayish-brown and the hair shafts are uniformly gray from base to tip. The ventral pelage is whitish or pale buff and the hairs are darker at the base. During summer, individuals may appear russet-colored or cinnamon-brown dorsally. The reddish appearance results from exposure to ammonia fumes in the summer colony (Tuttle 1979a). The calcar is not keeled. The sagittal and lambdoidal crests on the skull are distinctive (Hall 1981, Decher and Choate 1995). The gray myotis may be confused with the southeastern myotis (*M. austroriparius*), little brown myotis (*M. lucifugus*), northern long-eared myotis (*M. septentrionalis*), and Indiana myotis (*M. sodalis*). It can be distinguished by the uniformly colored dorsal fur (in the other species, the base and the tip of dorsal hairs are in contrasting shades) and by the wing membrane, which attaches at the ankle of the foot rather than at the base of the toes (see Barbour and Davis 1969:63). The dental formula is I 2/3, C 1/1, P 3/3, M 3/3 = 38 (Figure 1).

CONSERVATION STATUS

The gray myotis has a global rank of Vulnerable (NatureServe 2007). It is Imperiled in Alabama, Arkansas, Kentucky, Oklahoma, and Tennessee and Critically Imperiled in Florida, Georgia, South Carolina, and Virginia. The U. S. Fish and Wildlife Service (U. S. Department of Interior 2007) list the gray myotis as Endangered. A recovery plan for the species has been published (Brady et al. 1982).

DISTRIBUTION

Myotis grisescens is limited to a relatively small geographic area in the eastern United States (Figure 2). During summer, it occurs from the Florida Panhandle

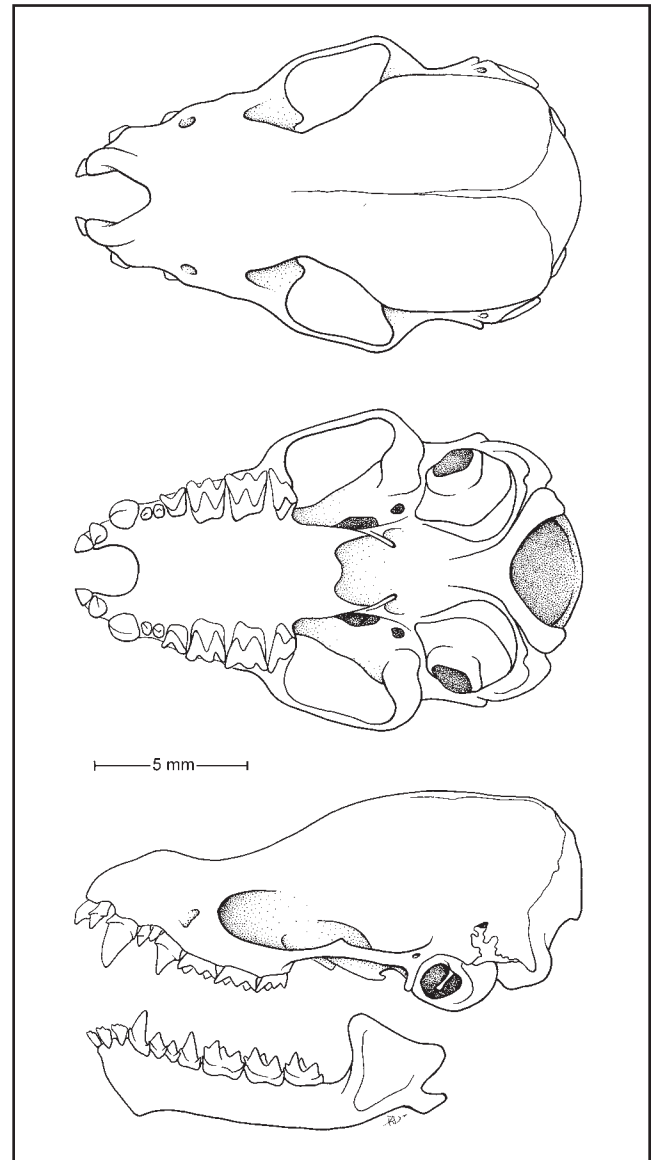


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Myotis grisescens* from Adair County, Kentucky (USNM 547689, female).

northward to Ohio, Indiana, and Illinois, and westward to southeastern Kansas and northeastern Oklahoma. In winter, its range is restricted; hibernacula are found in the limestone caves of Missouri, northern Arkansas, Tennessee, Alabama, and Kentucky. The gray myotis is known from the Appalachian Mountains in the southwestern tip of Virginia (Holsinger 1964, Handley 1991, 1992; Linzey 1998). The bat has been reported from western North Carolina

Nine-banded Armadillo

Dasypos novemcinctus (Linnaeus, 1758)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Seven subspecies of nine-banded armadillo (*Dasypos novemcinctus*) are recognized (Wetzel and Mondolfi 1979, Hall 1981). Only one, *D. n. mexicanus*, occurs in the United States (Hall 1981). Wetzel and Mondolfi (1979) and Wetzel (1985) review the taxonomy of the armadillo. The literature is summarized by Galbreath (1982), McBee and Baker (1982), and Montgomery (1985).

DISTINGUISHING CHARACTERISTICS

The nine-banded armadillo is the most unique mammal in the South. The dorsum is covered with an armored carapace consisting of bony plates that are fused to form a scapular shield, nine flexible bands at mid-body, a pelvic shield, and a bony head plate. Twelve bony rings enclose the tail. The remainder of the scantily haired body is covered by a leathery epidermis. Measurements are: total length, 600–800 mm; tail, 245–370 mm; hind foot, 75–107 mm; ear, 30–40 mm; weight, 3–8 kg. The back and sides are brownish-gray and the underside is light gray to yellowish. The toes have long, white claws. The skull is elongate and is characterized by a narrow, extended rostrum. Incisors and canines are absent. The peg-like cheek teeth vary in number from seven to nine on each side of the upper and lower jaws. The dental formula is: I 0/0, C 0/0, P 4–6/4–6, M 3/3 = 28–36 (Figure 1).

CONSERVATION STATUS

The nine-banded armadillo has a global rank of Secure (NatureServe 2007). It is Secure in Alabama, Louisiana, Mississippi, and Texas and Apparently Secure in Arkansas, Georgia and Oklahoma. It is Vulnerable in Tennessee. It is unranked in Florida and South Carolina. North Carolina has assigned it a conservation rank of Not Applicable (i.e., the species is not considered a suitable target for conservation).

DISTRIBUTION

Known only from southern Texas before the turn of the 20th century (Cope 1880, Bailey 1905), the armadillo rapidly expanded its range throughout the southern United States (Talmage and Buchanan 1954, Humphrey 1974, Galbreath 1982, McBee and Baker 1982). From its original range, the species spread

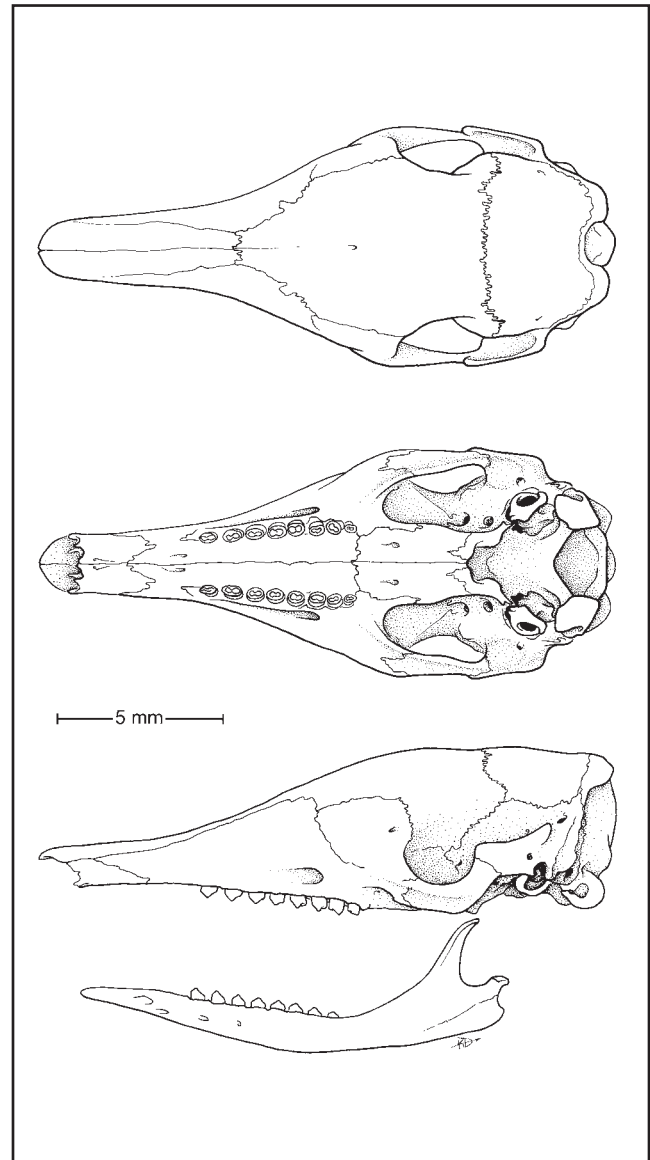


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Dasypos novemcinctus* from Wakulla County, Florida (USNM 527296, female).

northward throughout central and eastern Texas (Hollander et al. 1987, Jones and Jones 1992, Jones et al. 1993, Davis and Schmidly 1994) and Oklahoma (Gardner 1948, Caire et al. 1989). The species dispersed eastward throughout Louisiana (Lowery 1974), Arkansas (Sealander and Heidt 1990, Sikes et al. 1991), western Tennessee (Henning 1980,

Snowshoe Hare

Lepus americanus (Erxleben, 1777)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Fifteen subspecies of snowshoe hare (*Lepus americanus*) are recognized (Hall 1981, Bittner and Rongstad 1982). Only one subspecies, *L. a. virginianus*, occurs in the South. Populations in Virginia and adjacent areas of West Virginia were augmented by introductions of *L. a. struthopus*. These introductions generally were unsuccessful and there is no evidence that the native genotype was impacted (Brooks 1955, Handley 1979, 1991; Fies 1991). Literature on the species is reviewed by Bittner and Rongstad (1982); its status in the South is discussed by Handley (1979) and Fies (1991).

DISTINGUISHING CHARACTERISTICS

Snowshoe hares are large lagomorphs. Measurements are: total length, 360–520 mm; tail, 25–55 mm; hind foot, 112–150 mm; ear, 62–70 mm; weight, 1.0–2.3 kg. The pelage of the snowshoe hare varies by season. During summer, snowshoe hares are rusty brown above with a dark brown to black snout. The nostrils are edged in white, the chin and belly are white to grayish, the tail is white above and gray below, and the ears are tipped in black. The winter pelage is pure white except for black-tipped ears and a brownish wash on the feet. The interparietal bone is indistinct in all *Lepus* species, and is fused to the parietals. The dental formula is: I 2/1, C 0/0, P 3/2, M 3/3 = 28 (Figure 1). Snowshoe hares may be readily distinguished from sympatric eastern cottontails (*Sylvilagus floridanus*) and Appalachian cottontails (*S. obscurus*) on the basis of size. The cottontails are smaller, have larger and whiter tails, and the dorsal pelage of both is neither as white in winter or as rusty in summer.

CONSERVATION STATUS

The snowshoe hare has a global rank of Secure (NatureServe 2007). It is Critically Imperiled in Virginia and Presumed Extirpated in North Carolina. Snowshoe hares are a regulated game species with a hunting season in West Virginia.

DISTRIBUTION

Lepus americanus is distributed throughout the transcontinental coniferous forests of the Canadian Arctic from Alaska to Newfoundland south into the Rocky Mountains, extreme northern portions of the Great

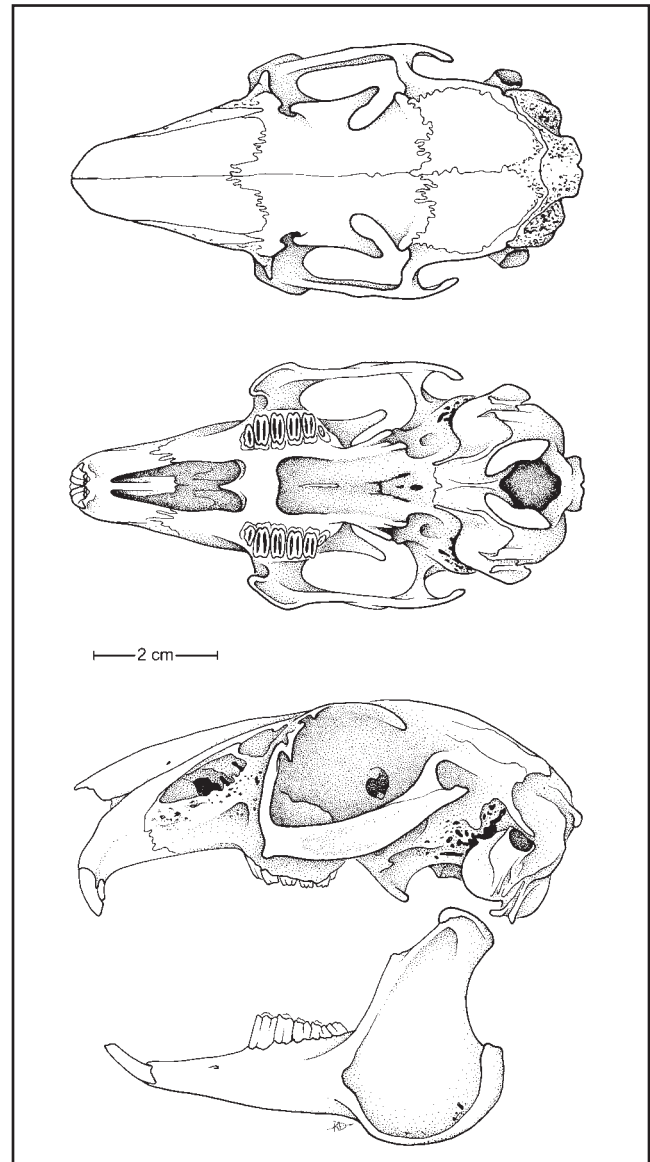


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Lepus americanus* from Sagadahoc County, Maine (USNM 507455, male).

Lakes, and New England south to Pennsylvania (Genoways 1985). The distribution of the snowshoe hare in the South is depicted in Figure 2. It is the only hare native to the eastern United States. It may have once ranged south through the higher portions of the Blue Ridge to Tennessee and North Carolina (Hall 1981, Bittner and Rongstad 1982, Linzey 1995), but

Black-tailed Jackrabbit

Lepus californicus (Gray, 1837)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Seventeen subspecies of black-tailed jackrabbit (*Lepus californicus*) are recognized (Hall 1981, Dunn et al. 1982). Two subspecies (*L. c. melanotis* and *L. c. merriami*) occur in the South. The literature on the black-tailed jackrabbit is reviewed by Dunn et al. (1982) and Best (1996).

DISTINGUISHING CHARACTERISTICS

Lepus californicus is the largest lagomorph in the region. Measurements are: total length, 465–630 mm; tail, 50–112 mm; hind foot, 112–145 mm; ear, 99–131 mm; weight, 1.5–3.5 kg. The dorsal pelage is gray or grayish brown and washed with black. The sides are grayish and the abdomen is white. The tail is black dorsally and white ventrally. The ears are tipped in black. The black-tailed jackrabbit occurs sympatrically with the eastern cottontail (*Sylvilagus floridanus*) and the swamp rabbit (*S. aquaticus*), from which it is readily distinguishable on the basis of its larger ears, hind feet, overall size, and black tail. The dental formula is: I 2/1, C 0/0, P 3/2, M 3/3 = 28 (Figure 1).

CONSERVATION STATUS

The black-tailed jackrabbit has a global rank of Secure (NatureServe 2007). It is Secure in Texas and Oklahoma, but Vulnerable in Arkansas. A conservation status rank of Not Applicable has been assigned by Florida and Virginia; the species is not a suitable target for conservation activities in those states.

DISTRIBUTION

The black-tailed jackrabbit is the most common jackrabbit in the western United States. It ranges from the Pacific Northwest east to the grasslands of South Dakota and south through western Missouri and Arkansas into Texas and Mexico (Hall 1981). The distribution of the jackrabbit in the South is depicted in Figure 2. Populations occur in the Ozark Highlands, Arkansas Valley, and Boston Mountains of northwestern Arkansas (Sealander and Heidt 1990). The species is common throughout western Oklahoma, but it is known from only a few records in the eastern and none from southeastern portion of the state (Caire et al. 1989). Schmidly (1983), Cleveland et al. (1984), and Davis and Schmidly (1994) report that the

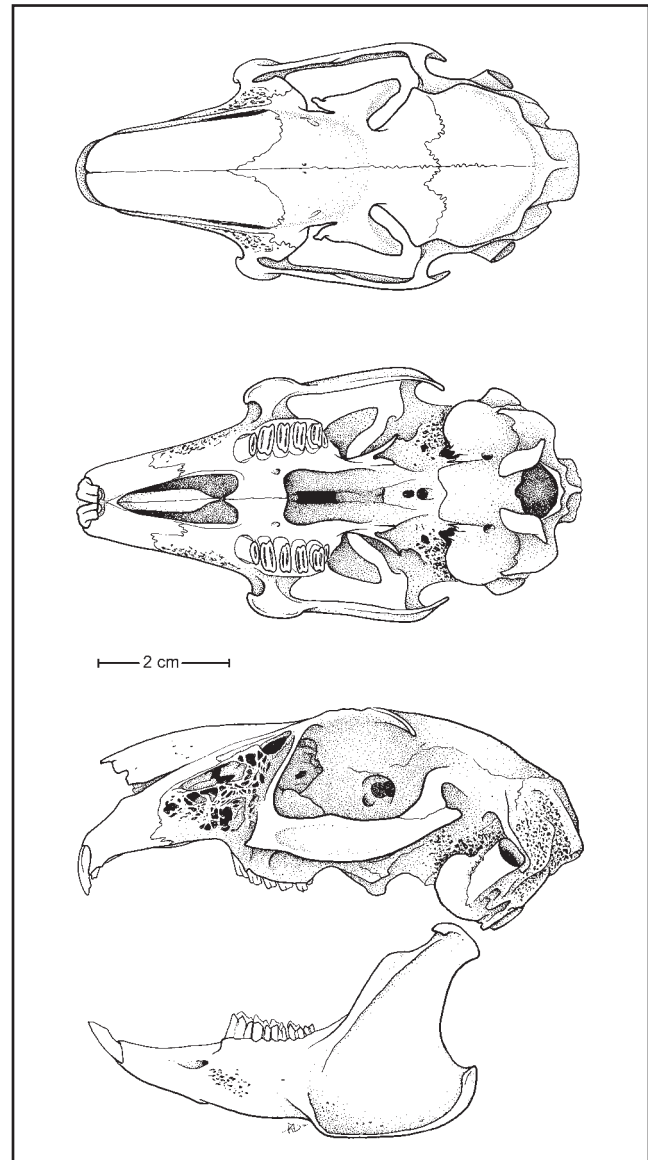


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Lepus californicus* from Crowley County, Colorado (USNM 564055, female).

species is characteristic of western Texas and coastal prairies. However, only disjunct populations of the species occur in eastern Texas, where some populations may be the result of translocations (McCarley 1959). Unsuccessful introductions have been made into southern Florida (Layne 1965, 1974), where the

Swamp Rabbit

Sylvilagus aquaticus (Bachman, 1837)

Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Two subspecies of the swamp rabbit (*Sylvilagus aquaticus*) are recognized by Hall (1981) and Chapman and Feldhamer (1981). Both subspecies, *S. a. aquaticus* and *S. a. littoralis*, occur in the South. Although we include it here, the validity of *S. a. littoralis*, restricted to the lower Coastal Plain of Mississippi, Louisiana, and Texas (Nelson 1909), was questioned by Lowery (1974) and the taxon was rejected by Schmidly (1983). Lowe (1958) and Jenkins and Provost (1964) suggested that *S. aquaticus* and the marsh rabbit (*S. palustris*) interbreed in portions of Georgia and South Carolina. In some parts of the region, swamp rabbits also are called “cane cutters.” Chapman and Feldhamer (1981) and Chapman et al. (1982) review the literature on the species.

DISTINGUISHING CHARACTERISTICS

The swamp rabbit is the largest of the *Sylvilagus* species. Measurements are: total length, 450–550 mm; tail, 50–74 mm; hind foot, 90–113 mm; ear, 60–80 mm; weight, 1.6–2.6 kg. The dorsal parts of the head and body of swamp rabbits are rusty brown to black. The nape is a dark cinnamon and the undersurface of the throat, abdomen, and tail is white. Swamp rabbits have a black spot between their ears. The basilar length of the skull is usually greater than 63 mm, larger than other *Sylvilagus*. The dental formula is: I 2/1, C 0/0, P 3/2, M 3/3 = 28 (Figure 1). Swamp rabbits may be confused with marsh rabbits, but the latter are usually distinguishable because of their smaller size, shorter ears, small slender feet, and grayish tail. Eastern cottontails (*S. floridanus*) also often occupy the same habitats as swamp rabbits. Eastern cottontails are smaller than swamp rabbits and lack the black spot between the ears (Bond et al. 2000).

CONSERVATION STATUS

The swamp rabbit has a global rank of Secure (NatureServe 2007). It is also Secure in Alabama, Georgia, Louisiana, Mississippi, and Texas. It is Apparently Secure in Tennessee, Vulnerable in Arkansas and Kentucky, and Imperiled in Oklahoma and South Carolina.

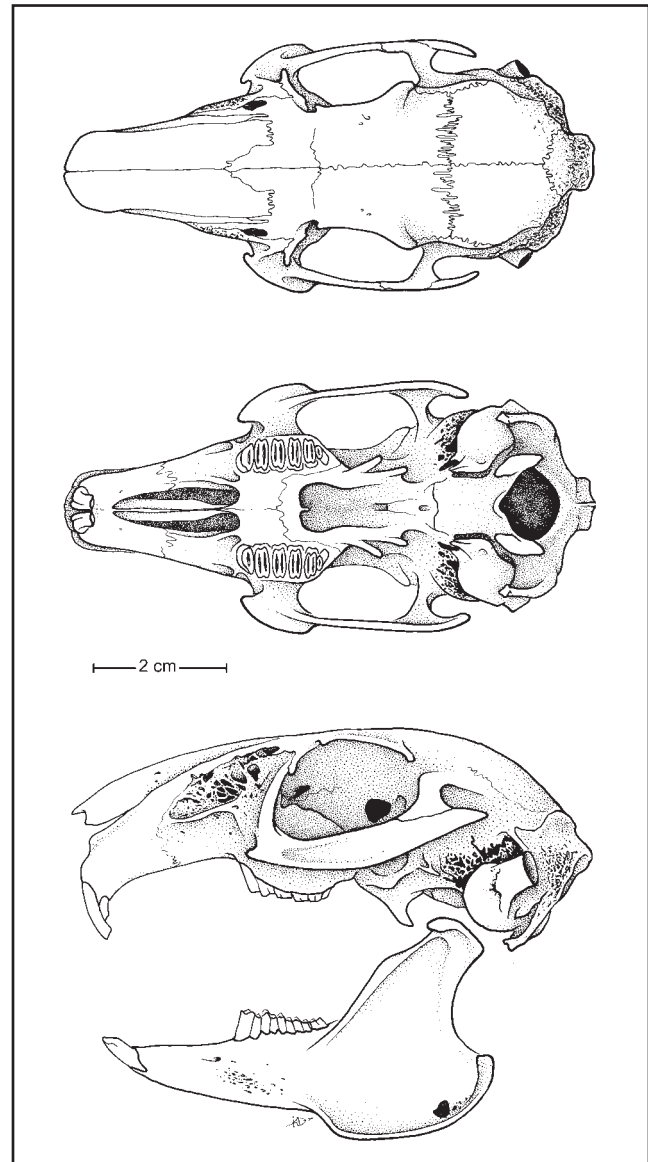


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Sylvilagus aquaticus* from Stoddard County, Missouri (USNM 349485, female).

DISTRIBUTION

The range of *S. aquaticus* is contiguous with that of the marsh rabbit to the south. It is known from a single record in the Blue Ridge Province of North Carolina

American Beaver

Castor canadensis (Kuhl, 1820)

Michael T. Mengak and Joshua Laerm

CONTENT AND TAXONOMIC COMMENTS

Twenty-four subspecies are recognized, four of which occur in the South: *C. c. carolinensis*, *C. c. canadensis*, *C. c. missouriensis*, and *C. c. texensis* (Jenkins and Busher 1979, Hall 1981, Baker and Hill 2003). The North American beaver is genetically, morphologically, and behaviorally distinct from the Eurasian beaver (*C. fiber*; Lavrov and Orlov 1973, Sieber et al. 1999). Hall (1981) identified *C. c. carolinensis* as the most widespread subspecies in the region. However, Whitaker and Hamilton (1998) found no evidence of primary isolation mechanisms and concluded that there was no need to recognize subspecies. Further, extirpation of regional populations due to historic over harvest and reintroduction may have altered gene pools such that subspecies distinctions are meaningless. An extensive array of literature is available (Yeager and Hay 1955, Hodgdon and Larson 1980), much of which is reviewed by Jenkins and Busher (1979), Novak (1987), and Baker and Hill (2003).

DISTINGUISHING CHARACTERISTICS

The beaver is the largest rodent in North America, characterized by a heavy, compact body, large dorso-ventrally flattened heavily scaled tail, and short legs with webbed hind feet. Measurements are: total length, 1,000–1,200 mm; tail, 230–325 mm; hind foot, 150–205 mm; ear, 23–31 mm; weight, 11–31 kg. Males are slightly larger than females. Dorsal pelage consists of soft, dense underfur and long, coarse guard hairs. Color ranges from chocolate brown to blond. The cranium is large, the infraorbital canals are slit-like, the frontals are without prominent postorbital processes, and there is a distinct depression in the basioccipital. The front surface of the incisors is orange. The dental formula is I 1/1, C 0/0, P 1/1, M 3/3 = 20 (Figure 1). See keys for details.

CONSERVATION STATUS

The American beaver has a global rank of Secure (NatureServe 2007). The species is also considered Secure in those states where it occurs within the region except for Arkansas and Oklahoma, where it is Apparently Secure. It is unranked in Florida and South Carolina. The American beaver is a protected furbearer with regulated harvests in most states of the South.

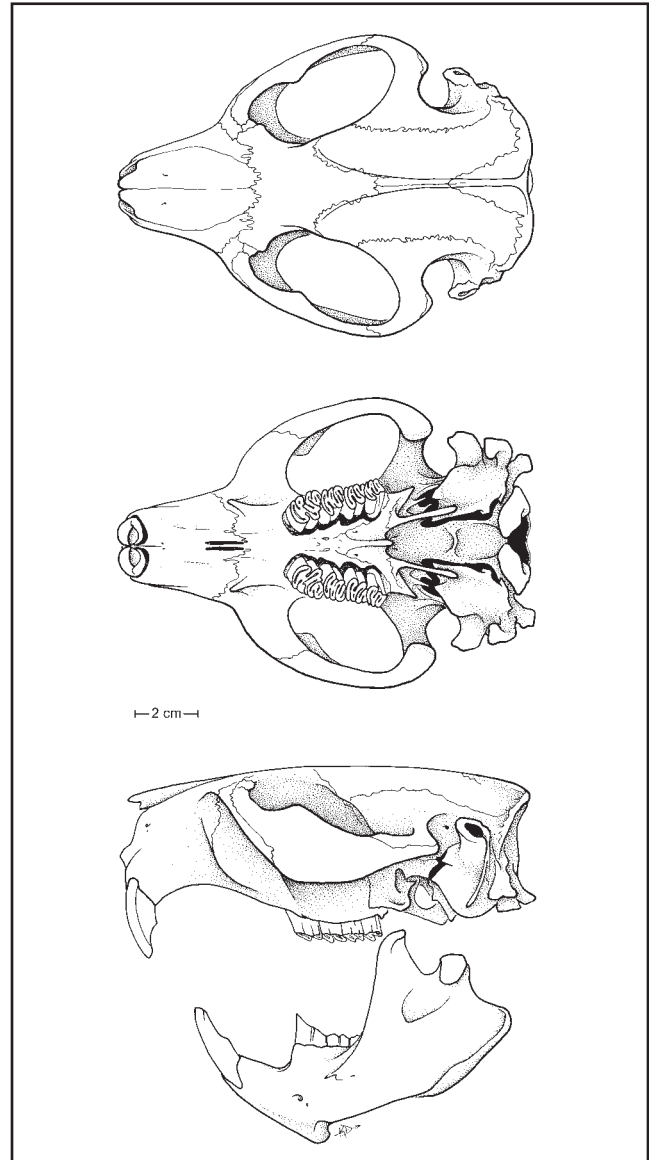


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Castor canadensis* from Cherry County, Nebraska (USNM 250191, female).

DISTRIBUTION

The beaver ranges throughout North America from Alaska east to Newfoundland and south into northern Mexico. It is absent from areas above the tree line, southwestern deserts, portions of the Midwest, and southern Florida (Larson and Gunnison 1983).

Southeastern Pocket Gopher

Geomys pinetis (Rafinesque, 1817)

Steven B. Castleberry and Joshua Laerm

CONTENT AND TAXONOMIC COMMENTS

The southeastern pocket gopher (*Geomys pinetis*) was originally described as *Mus tuza* (Pembleton and Williams 1978), but the original description was vague and the name was subsequently discarded (Harper 1952). The formerly recognized species *Geomys colonus*, *G. cumberlandius*, and *G. fontanelus* now are regarded as synonyms of *G. pinetis* based on morphological, mitochondrial DNA, protein electrophoretic, and karyotypic evidence (Awise et al. 1979, Williams and Genoways 1980, Laerm 1981a, Laerm et al. 1982). Although Pembleton and Williams (1978) list five subspecies (*G. p. austrinus*, *G. p. floridanus*, *G. p. goffi*, *G. p. mobilensis*, and *G. p. pinetis*), only two subspecies, *G. p. fontanelus* and *G. p. pinetis*, were recognized in a subsequent taxonomic revision based on karyotypic analysis (Williams and Genoways 1980). However, Humphrey (1981, 1992) suggests retention of *G. p. goffi* pending a review of diagnostic features that were not examined by Williams and Genoways (1980). Awise et al. (1979) suggests that there may be two alternate forms of *G. p. pinetis* separated by the Chattahoochee-Apalachicola river system. The literature is reviewed by Pembleton and Williams (1978).

DISTINGUISHING CHARACTERISTICS

The southeastern pocket gopher has a thick, cylindrical body, large forelimbs, and long, well-developed claws. Like other pocket gophers, *G. pinetis* has small eyes and ears, and a short naked tail. Measurements are: total length, 250–335 mm; tail, 76–96 mm; hind foot, 30–37 mm; weight, 220–420 g. Males are approximately 10% larger than females. The pelage is short and light brown to dark grayish-brown above, and lighter grayish-brown below. External fur-lined cheek pouches are present. The dental formula is I 1/1, C 0/0, P 1/1, M 3/3 = 20 (Figure 1). See keys for details.

CONSERVATION STATUS

The southeastern pocket gopher has a global rank of Secure (NatureServe 2007). It is considered Secure in Florida, Apparently Secure in Georgia, and Vulnerable in Alabama. The subspecies *Geomys p. fontanelus*, restricted to the type locality near Savannah, Chatham County, Georgia, and *Geomys p. goffi*, restricted to the type locality in Eau Gallie, Brevard County,

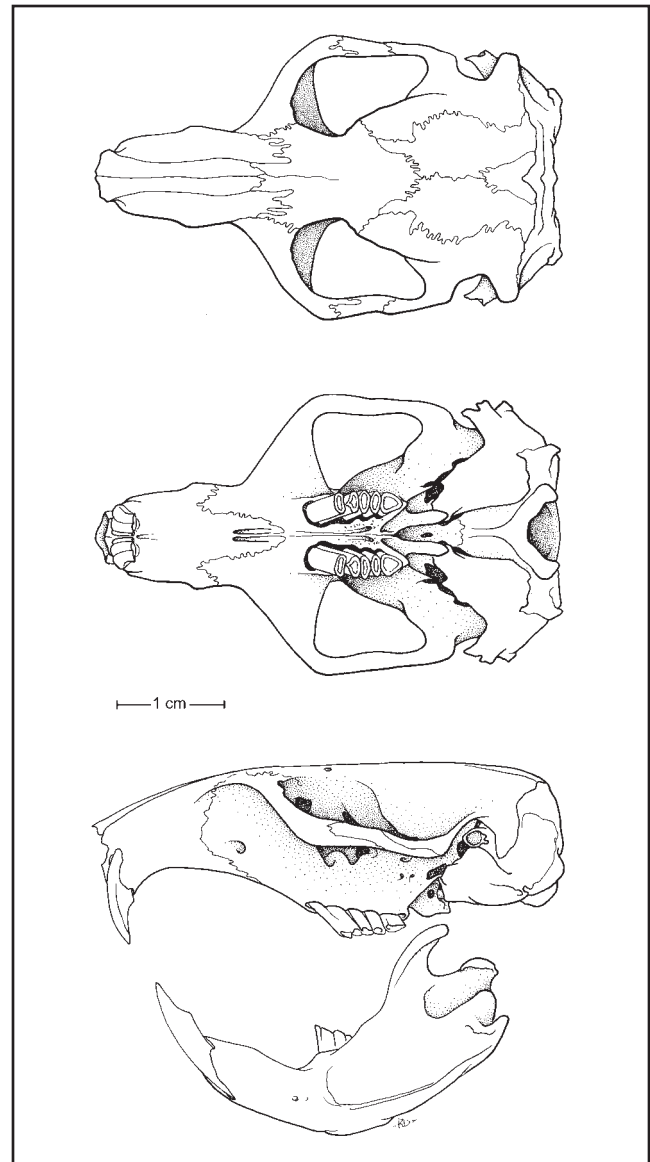


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Geomys pinetis* from Escambia County, Alabama (USNM 64949, male).

Florida, are considered extinct (Laerm 1981b, Humphrey 1981).

DISTRIBUTION

The southeastern pocket gopher is restricted to northern and central Florida (Bangs 1898, Sherman 1937,

Northern Pygmy Mouse

Baiomys taylori (Thomas, 1887)

Joshua Laerm, W. Mark Ford, and Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

There are eight described subspecies of the northern pygmy mouse (*Baiomys taylori*). Two occur in the South: *B. taylori subater* and *B. t. taylori* (Packard 1960, Hall 1981). The literature was summarized by Eshelman and Cameron (1987).

DISTINGUISHING CHARACTERISTICS

The northern pygmy mouse is among the smallest of North American rodents. Its measurements are: total length, 87–123 mm; tail, 34–53 mm; hind foot, 12–15 mm; ear, 9–12 mm; weight, 6–10 g. The dental formula is: I 1/1, C 0/0, P 0/0, M 3/3 = 16 (Figure 1). The pelage of the northern pygmy mouse is highly variable, ranging from grizzled reddish-brown to gray dorsally, and white, creamy buff, or gray ventrally. The tail is short, sparsely haired, and can be either uniformly gray or bicolored. This species is not confused easily with other sympatric sigmodontine rodents, such as *Peromyscus* and *Reithrodontomys*, all of which have longer body, tail, and hind foot lengths. See keys for details.

CONSERVATION STATUS

The northern pygmy mouse has a global rank of Apparently Secure. Texas also considers it Apparently Secure. (NatureServe 2007).

DISTRIBUTION

The northern pygmy mouse has been expanding its range both northward and eastward since the turn of the 20th century (Hunsaker et al. 1959, Schmidly 1983, Eshelman and Cameron 1987, Davis and Schmidly 1994). Figure 2 depicts the distribution of the northern pygmy mouse in the South. This species ranges throughout central and northern Mexico north into Arizona and New Mexico, with another northern extension into central and eastern Texas along the coast close to Louisiana (Blair 1941, Blair 1950, Hunsaker et al. 1959, Dalquest 1968, Schmidly 1983). Significant northern and western range expansions have been reported in Texas (Austin and Kitchens 1986, Hollander et al. 1987, Pitts and Smolen 1989, Jones and Manning 1989, Roberts et al. 1997, Pitts et al. 2001). Northern pygmy mice also have been reported recently from south-central and

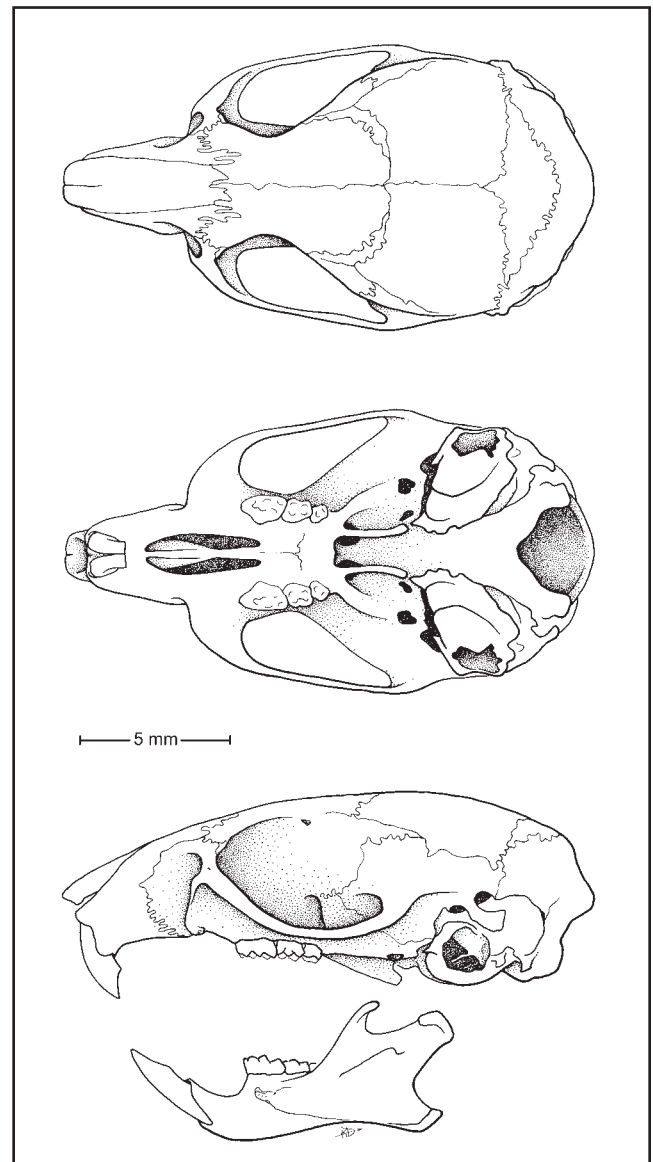


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Baiomys taylori* from Nayarit, Mexico (USNM 509957, female).

western Oklahoma (Stangl and Dalquest 1986, Cleveland 1986, Caire et al. 1989, Tumlinson et al. 1993). Northern populations probably are limited by cold weather and winter-kill (Caire 1991).

Florida Mouse

Podomys floridanus (Chapman, 1889)

Steven B. Castleberry and Joshua Laerm

CONTENT AND TAXONOMIC COMMENTS

The Florida mouse (*Podomys floridanus*) was described by Chapman (1889) as *Hesperomys floridanus*. It was subsequently referred to the genus *Peromyscus* by Bangs (1898). Osgood (1909) placed *Peromyscus floridanus* in the subgenus *Podomys*, which Carleton (1980) elevated to full generic rank. No subspecies are recognized. The literature on the Florida mouse is reviewed by Jones and Layne (1993).

DISTINGUISHING CHARACTERISTICS

The Florida mouse closely resembles members of the genus *Peromyscus*. The pelage of adults is brownish to brownish-gray on the dorsum and orange-buff on the cheeks, sides, and shoulders. The feet and under parts are white, but often with a tawny patch on the breast. The pelage is soft and silky. The tail is indistinctly bicolor and about 80% of the body length. Measurements are: total length, 166–220 mm; tail, 70–101 mm; hind foot, 21–28 mm; ear, 16–23 mm; weight, 20–47 g. The Florida mouse is distinguished from sympatric *Peromyscus* (*P. gossypinus* and *P. polionotus*) by its larger size and 5 plantar tubercles on the feet, in contrast with 6 plantar tubercles in *Peromyscus*. *Podomys* is reported to have a skunk-like odor (Layne 1990). The dental formula is I 1/1, C 0/0, P 0/0, M 3/3 = 16 (Figure 1). See keys for details.

CONSERVATION STATUS

The Florida mouse has a global rank of Vulnerable (NatureServe 2007). The Florida Natural Heritage Inventory Program also classifies it as Vulnerable. The conservation status is reviewed by Layne (1992).

DISTRIBUTION

The species has one of the smallest distributions of any North America mammal, being restricted to the northern two-thirds of peninsular Florida and an isolated region of Franklin County in the eastern panhandle (Layne 1992, Jones and Layne 1993; Figure 2). Its distribution is characterized as patchy, reflecting the distribution of vegetative associations to which it is generally restricted (Layne 1992).

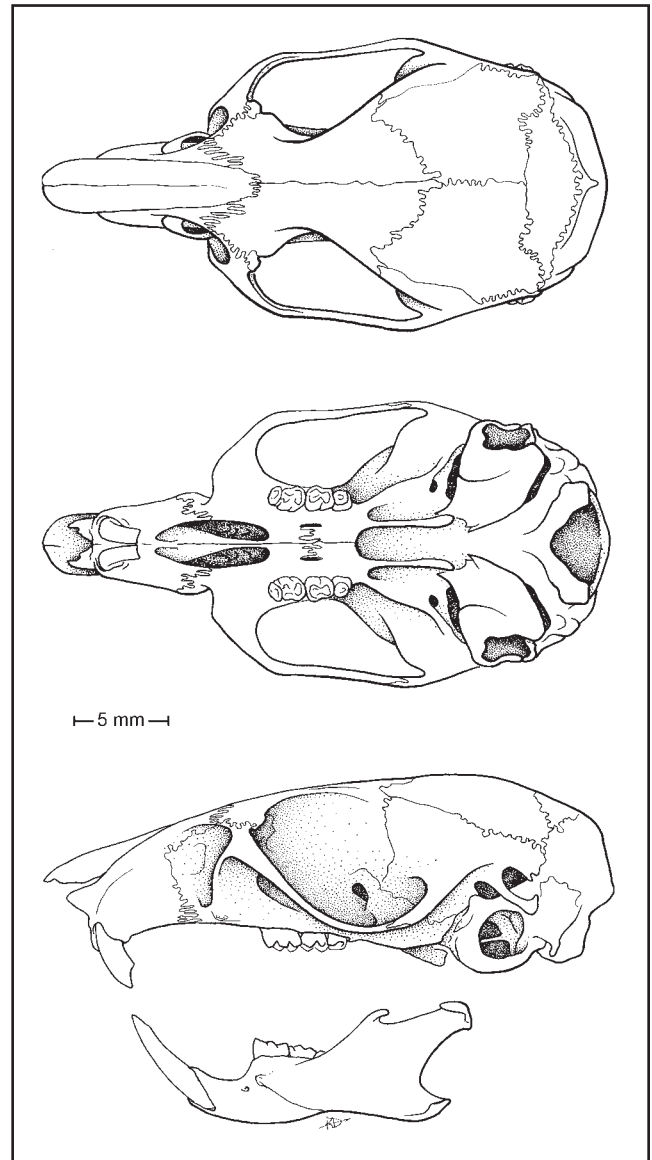


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Podomys floridanus* from Hernando County, Florida (USNM 248772, male).

ABUNDANCE STATUS

The Florida mouse is relatively common in preferred habitat. Population density estimates range from 1.6–28.0/ha (Layne 1992). Higher densities typically occur in sand pine (*Pinus clausa*) scrub habitat than in pineland habitat dominated by longleaf pine (*P. palustris*) and turkey oak (*Quercus laevis*; Layne 1990).

Southern Bog Lemming

Synaptomys cooperi (Baird, 1858)

W. Mark Ford and Joshua Laerm

CONTENT AND TAXONOMIC COMMENTS

There are eight subspecies of the southern bog lemming (*Synaptomys cooperi*) recognized, four of which occur in the South: *S. c. gossii*, *S. c. helaletes*, *S. c. kentucki*, and *S. c. stonei* (Wetzel 1955, Barbour 1956, Hall 1981, Linzey 1983, Long 1987). However, Whitaker and Hamilton (1998) indicate that *S. c. gossii*, *S. c. kentucki*, and *S. c. stonei* could be referable to *S. c. cooperi*. The literature was reviewed by Linzey (1983).

DISTINGUISHING CHARACTERISTICS

The southern bog lemming is a robust, short-tailed vole with a broad head, small ears, and small eyes. Its measurements are: total length, 119–154 mm; tail, 13–25 mm; hind foot, 16–24 mm; ear, 8–14 mm; weight, 20–50 g. The dental formula for this species is: I 1/1, C 0/0, P 0/0, M 3/3 = 16 (Figure 1). The pelage is bright chestnut to dark grizzled brown dorsally, grading into silver grizzled white ventrally, with gray to brown feet and tail. The southern bog lemming readily is distinguished from other voles by its short tail (usually less than hind foot length), presence of a shallow longitudinal groove along upper incisors, and deep reentrant angles on molars. See keys for details.

CONSERVATION STATUS

The southern bog lemming has a global rank of Secure (NatureServe 2007). It is listed as Secure in Virginia and Apparently Secure in Kentucky and Tennessee. It is listed as Vulnerable in North Carolina, Imperiled in Arkansas, and Critically Imperiled in Georgia. It is unranked in South Carolina.

DISTRIBUTION

The southern bog lemming is distributed throughout southeastern Canada and the north-central and northeastern portions of the United States. Although specimen records have been reported from the Delmarva Peninsula of Maryland (Paradiso 1969), the species is not known from the Virginia portion of the peninsula. There are disjunct populations of *S. c. helaletes* in the Great Dismal Swamp region of Virginia to Carteret and Jones counties, North Carolina, approximately 170 km south (Handley 1979, Clark et al. 1985, Rose 1981, Webster et al. 1984, Rose et al.

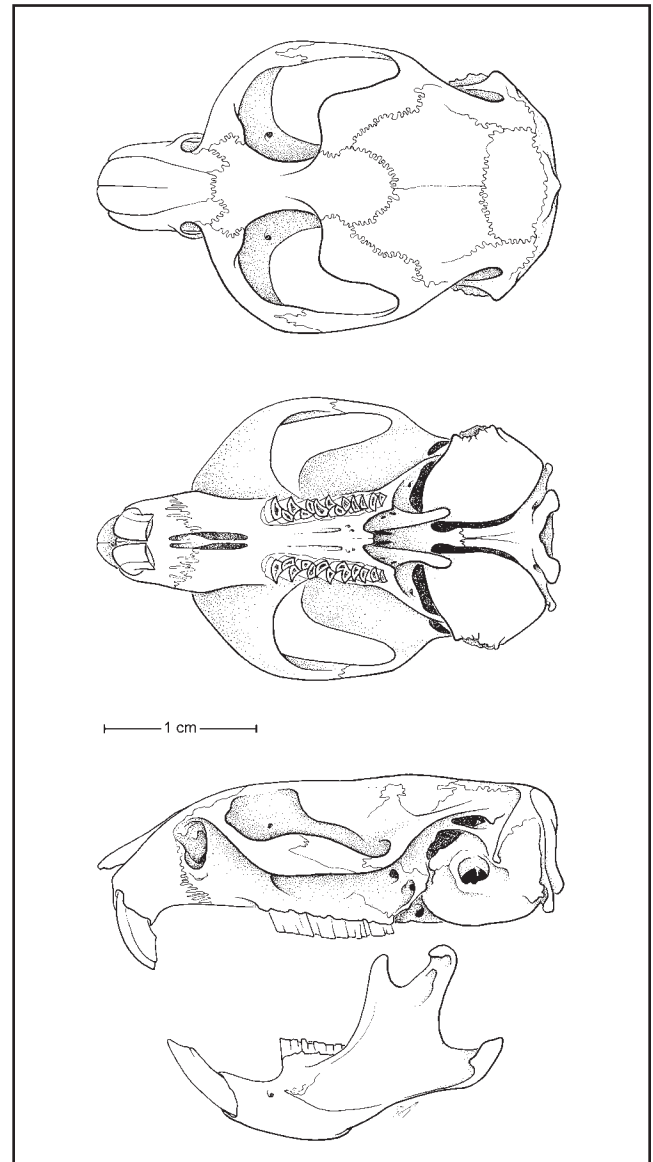


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Synaptomys cooperi* from The Great Dismal Swamp National Wildlife Refuge, Southampton County, Virginia (USNM 95879, male).

1990, Webster et al. 1992, Clark et al. 1993). *Synaptomys c. stonei* occurs at middle to high elevations throughout the Appalachian region of western Virginia (Stewart 1943, Smyth 1946, Linzey and Cranford 1984, Linzey 1984, Handley 1992), eastern Kentucky (Barbour and Davis 1974, Kiser and Meade 1993),

Nutria

Myocastor coypus (Molina, 1782)

Joshua Laerm and Wm. David Webster

CONTENT AND TAXONOMIC COMMENTS

A native to South America, the nutria was introduced first into the United States in 1899 and again in the 1930s. Some authorities suggest that these introduced populations are referable to *M. c. bonariensis*; however, individuals of three subspecies from numerous South American localities were brought into the United States at various times and cross-breeding was common to enhance the quality of their pelts, so subspecies designations are irrelevant at this time (Evans 1970). The literature is reviewed by Willner (1982), Kinler et al. (1987), and Woods et al. (1992).

DISTINGUISHING CHARACTERISTICS

This large semiaquatic rodent superficially resembles a beaver (*Castor canadensis*) or muskrat (*Ondatra zibethicus*) except for its long, round, nearly naked tail. It has relatively small eyes and short ears but long whiskers. External measurements are: total length, 850–1050 mm; tail, 300–450 mm; hind foot, 100–150 mm; ear, 20–30 mm; weight, 7–11 kg. Nutria have short, soft, dense underfur and long, coarse guard hairs. The upper parts are yellowish brown to dark brown, the underparts are gray, and the chin and the tip of the muzzle are frequently white to gray. The cranium is distinct; the large infraorbital openings are elongate vertically, the nasals are truncate posteriorly and end anterior to the posterior extent of the premaxillae, and the greatly elongate paraoccipital processes project ventrolaterally. The dental formula is I 1/1, C 0/0, P 1/1, M 3/3 = 20 (Figure 1). See keys for details.

CONSERVATION STATUS

The nutria has a global rank of Secure (NatureServe 2007). A conservation status rank of Not Applicable has been assigned for each state in the South where it occurs; the species is not a suitable target for conservation activities.

DISTRIBUTION

Nutria were introduced in the South, primarily in Louisiana, for use as weed control agents and fur farming, an effort that generally failed due to low pelt prices, low reproductive success, and poor competition with beaver pelts (Evans 1970, Linzey 1998,

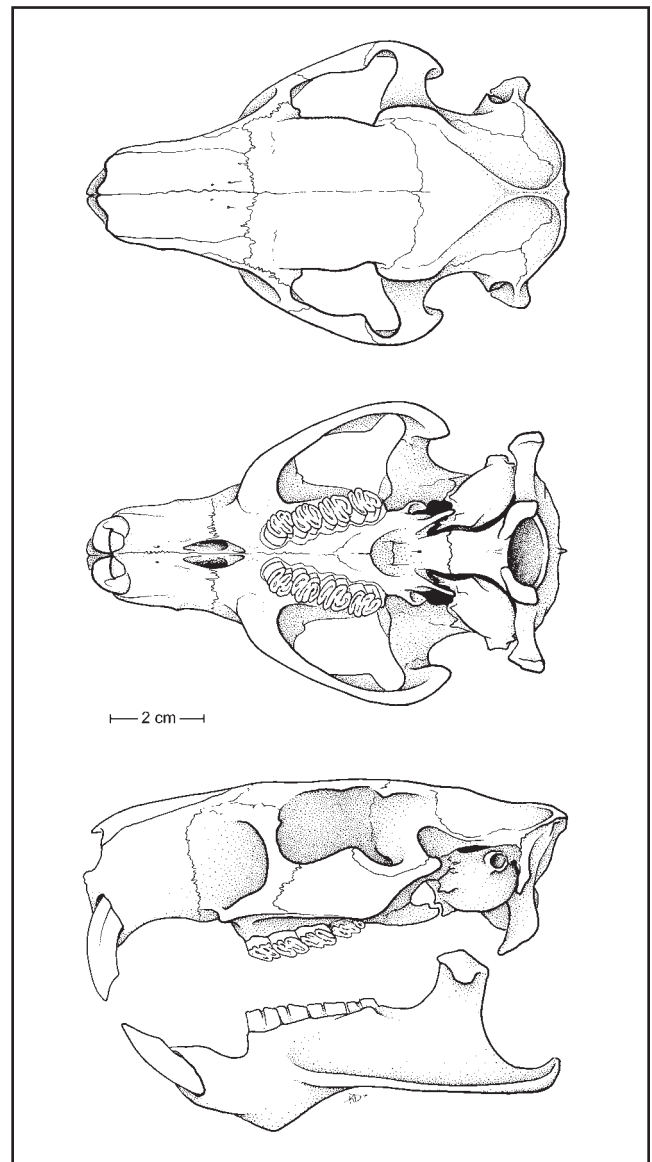


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Myocastor coypus* from St. Charles Parrish, Louisiana (USNM 559317, male).

Carter and Leonard 2002). However, numerous escapes and additional introductions have resulted in the establishment of viable populations throughout as many as 15 states (Evans 1970, Willner 1982, Kinler et al. 1987), mostly in the Gulf Coast region (Figure 2). Nutria occur throughout eastern Texas (Davis 1958, Schmidly 1983, Davis and Schmidly

Eastern Gray Squirrel

Sciurus carolinensis (Gmelin, 1788)

John W. Edwards and Joshua Laerm

CONTENT AND TAXONOMIC COMMENTS

Five subspecies are recognized, four of which occur in the South: *S. c. carolinensis*, *S. c. extimus*, *S. c. fuliginosus*, and *S. c. pennsylvanicus* (Hall 1981, Koprowski 1994). Lazell (1989) suggests that *S. c. matecumbei*, restricted to a few of the Florida Keys and long regarded a synonym of *S. c. extimus* (Hubbard and Banks 1970) may warrant recognition. Barkalow and Shorten (1973), Flyger and Gates (1982), Koprowski (1994), and Edwards et al. (2003) review the literature.

DISTINGUISHING CHARACTERISTICS

The gray squirrel is a medium-sized tree squirrel. Measurements are: total length, 380–525 mm; tail, 150–250 mm; hind foot, 54–76 mm; ear, 25–33 mm; weight, 300–750 g. There is no sexual dimorphism in size or pelage. Pelage most commonly is pale to dark grizzled gray above, with a “salt and pepper” appearance resulting from alternating bands of white, brown and black on hairs; mid-dorsum slightly more brownish; flanks and upper parts of feet with cinnamon to brownish wash. Ears are buff to gray to white (behind); chin, throat, and venter are white. The tail is elongated and flattened with brown and black bands and white tips. Pelage variants include melanistic black to sooty gray as well as yellowish to albino individuals and populations (Flyger and Gates 1982, Koprowski 1994). The gray squirrel is easily distinguished from the fox squirrel (*S. niger*) by its smaller size and presence of a pair of upper premolars. The dental formula is I 1/1, C 0/0, P 2/1, and M 3/3 = 22 (Figure 1). See keys for details.

CONSERVATION STATUS

The eastern gray squirrel has a global rank of Secure (NatureServe 2007). The species is listed as Secure in Alabama, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Tennessee, Texas, and Virginia. Arkansas lists it as Apparently Secure, and it is unranked in Florida and South Carolina. The gray squirrel is considered a game animal with harvest seasons regulated in all states in the South.

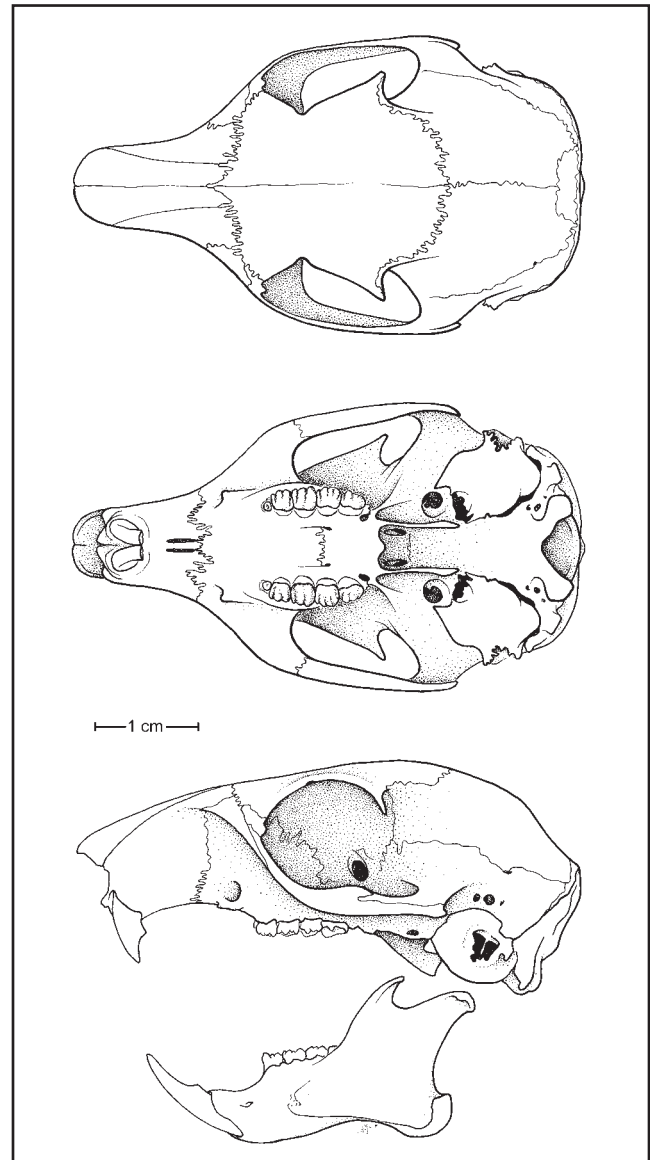


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Sciurus carolinensis* from the Peaks of Otter, Bedford County, Virginia (USNM 85506, male).

DISTRIBUTION

The eastern gray squirrel ranges throughout the eastern and central United States and southern Canada west to the limits of deciduous forests and south to Mexico. It has been widely introduced in the western United States, Canada, England, Europe, and elsewhere

Mountain Lion

Puma concolor (Linnaeus, 1771)

Margaret K. Trani and Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

The taxonomic classification of the *Felis concolor* group was revised and described by Nelson and Goldman (1929) and Young and Goldman (1946). Nowell and Jackson (1996) reviewed the taxonomy and placed the mountain lion into the genus *Puma* (Clark 2001, Baker et al. 2003). The mountain lion includes 15 recognized subspecies (Wilson and Ruff 1999); however, Culver et al. (2000) proposed a reduction of the genus to six subspecies based on genetic diversity. The only known reproducing population of mountain lions in the South today is that of the subspecies *P. c. coryi*, the Florida panther (Whitaker and Hamilton 1998, U. S. Fish and Wildlife Service 2006). The life history of the mountain lion is reviewed by Currier (1983) and Lindzey (1987). Beier et al. (2003) and the U. S. Fish and Wildlife Service (2006) reviewed the literature on the Florida panther.

DISTINGUISHING CHARACTERISTICS

The mountain lion is the largest native North American cat. Measurements are: total length, 150–274 cm; tail, 53.5–90.0 cm; hind foot, 22.0–29.5 cm; ear, 7.5–10.0 cm; weight, 35–100 kg. Adult dorsal pelage is tan but may appear grayish, reddish, or brownish. The cylindrical tail is long and is usually tipped with black. The ears are rounded and lack tufts or black coloration. The pads of the feet have a distinctive three-lobed appearance and the toes are equipped with long, sharp, retractile claws. The skull is short and rounded dorsally with a blunt rostrum and is distinguished from that of the bobcat (*Lynx rufus*) by size and number of teeth. The mountain lion skull exceeds 130 mm in length and has four cheek teeth in the upper jaw whereas the bobcat skull is smaller and has only three upper cheek teeth. The skull of the Florida panther is unique, with a flat, frontal region with broad, high-arched nasal bones (Young and Goldman 1946). The dental formula is I 3/3, C 1/1, P 3/2, M 1/1 = 30 (Figure 1). See keys for details.

The Florida panther is unspotted and typically rusty reddish-brown on the back, tawny on the sides, and pale gray underneath. A right angle crook (kink) near the end of the tail and a hair whorl (cowlick) in the middle of the back were commonly observed in Florida panthers through the early 1990s (U. S. Fish and Wildlife Service 2006). These were considered

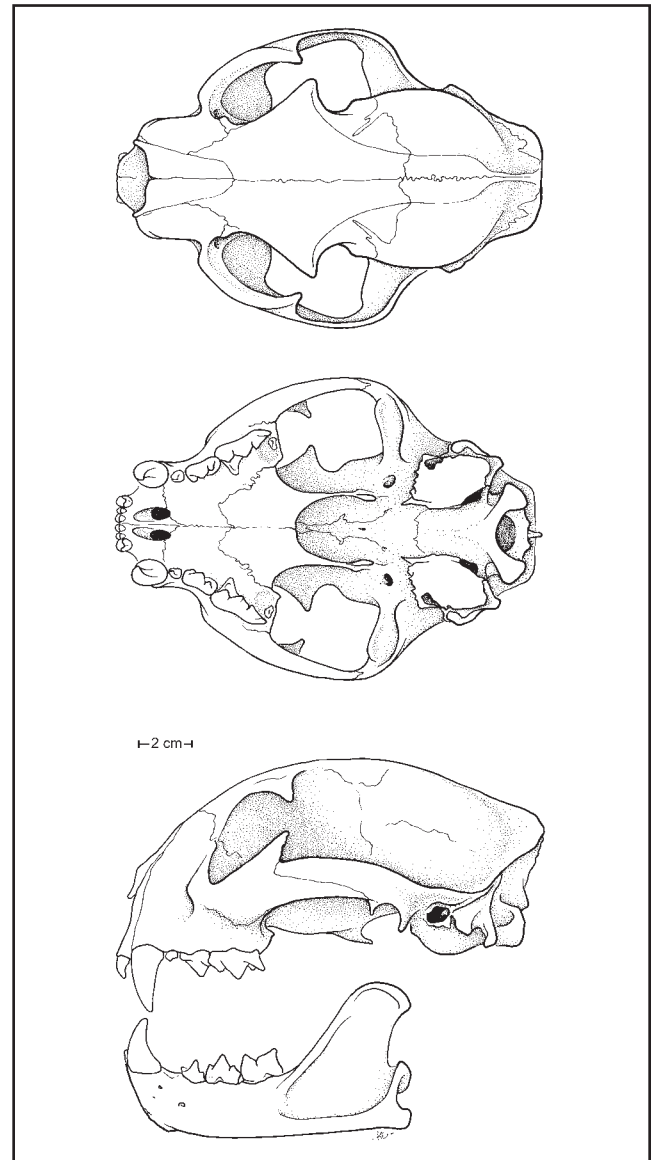


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Puma concolor* from Gila County, Arizona (USNM 271971 female).

expressions of inbreeding (Seal 1994). Since genetic introgression with the mountain lion (*P. c. stanleyana*) released into Florida from west Texas in 1995, these characteristics have dramatically decreased (Land et al. 2004).

Northern River Otter

Lontra canadensis (Schreber, 1777)

Margaret K. Trani and Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

The Nearctic northern river otter was recognized as distinct from Eurasian genera by van Zyll de Jong (1972, 1987). Wozencraft (1993) and Baker et al. (2003) followed van Zyll de Jong in using *Lontra* as the generic name. However, some authors (e.g., Whitaker and Hamilton 1998) continue to place the species in genus *Lutra*. Seven subspecies currently are recognized (Hall 1981, Lariviere and Walton 1998); one subspecies (*L. c. lataxina*) occurs in the South. The life history of the northern river otter is reviewed by Toweill and Tabor (1982), Melquist and Dronkert (1987), Lariviere and Walton (1998), and Melquist et al. (2003).

DISTINGUISHING CHARACTERISTICS

The northern river otter has a large, long body with short legs and a hydrodynamic shape that distinguishes it from other mustelids. Feet are pentadactyl and plantigrade with interdigital webbing pronounced on the longer toes of the hind foot (Melquist et al. 2003). The tail is about one-third of total length and tapered from base to tip. Measurements are: total length, 890–1200 mm; tail, 350–520 mm; hind foot, 100–140 mm; ear, 20–30 mm; weight, 4.5–15 kg. Females are 3–21% smaller than males (Blundell et al. 2002). The short, thick, and glossy pelage ranges from dark brown to dark reddish-brown dorsally, and pale brown to silver-gray ventrally. The throat and muzzle often are silvery gray to brownish-white. The ears are round and inconspicuous. The small eyes are positioned anteriorly (Lariviere and Walton 1998). The muzzle is broad with stiff vibrissae bordering the nose. The skull is relatively flat with a short, broad rostrum; the cranium narrows at the eye sockets. The auditory bullae are flattened. The teeth are adapted for crushing and cutting. The dental formula is $I\ 3/3, C\ 1/1, P\ 4/3, M\ 1/2 = 36$ (Figure 1). See keys for details.

CONSERVATION STATUS

The northern river otter has a global rank of Secure (NatureServe 2007). It is classified Secure in Georgia and Apparently Secure in Alabama, Arkansas, Louisiana, Mississippi, North Carolina, and Virginia. Kentucky, Tennessee, and Texas consider the species Vulnerable. It is Imperiled in Oklahoma and is

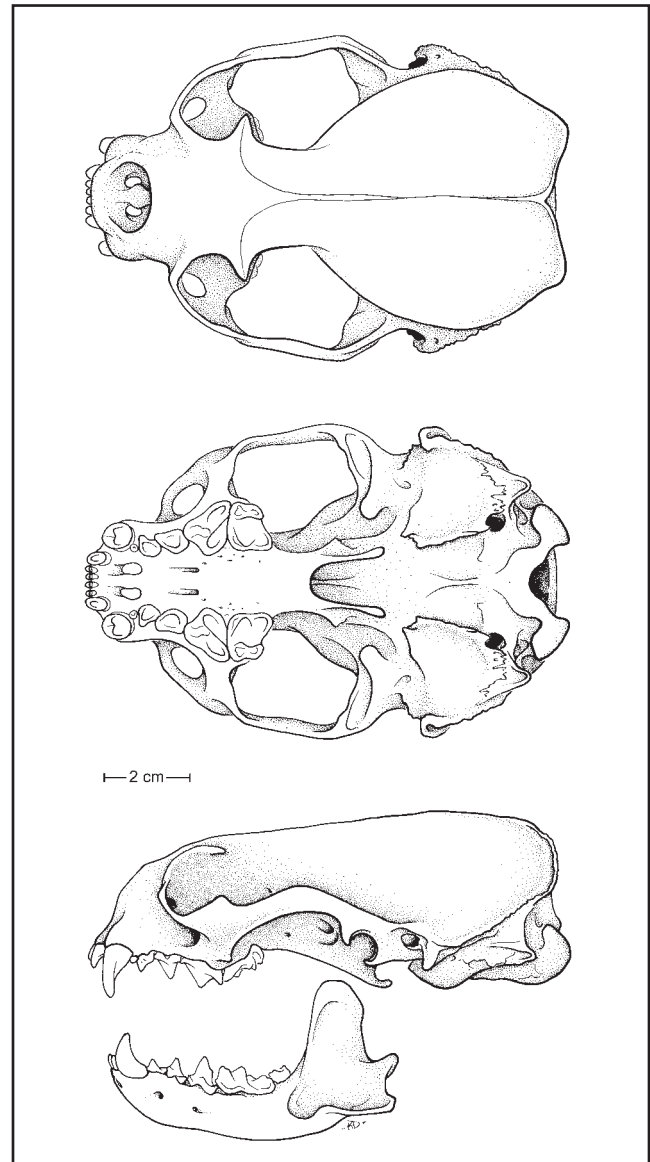


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Lontra canadensis* from Eleuthera, Bahama Islands (USNM 122018,

Unranked in Florida and South Carolina. The otter is protected under the Convention for the International Trade of Endangered Species of Fauna and Flora (CITES) because of concerns regarding trade in the European otter. The otter is closely monitored by states that allow harvest (Leopold and Chamberlain 2001). With the exception of Oklahoma, all southern

Elk

Cervus elaphus (Linnaeus, 1758)

David S. Maehr, John J. Cox, and Jeffery L. Larkin

CONTENT AND TAXONOMIC COMMENTS

Although the elk has been historically considered a subspecies of the red deer (*Cervus elaphus elaphus*), recent DNA analyses suggested that the elk is sufficiently divergent from its Eurasian ancestors to warrant specific status as *C. canadensis* (Polziehn and Strobeck 1998). The elk has been historically classified into six subspecies on the basis of morphological characteristics: *C. e. canadensis*, Eastern elk; *C. e. nelsoni*, Rocky Mountain elk; *C. e. manitobensis*, Manitoba elk; *C. e. merriami*, Merriam's elk; *C. e. roosevelti*, Roosevelt elk; and *C. e. nannodes*, Tule elk (Murie 1951). *C. e. canadensis* and *C. e. merriami* are extinct. Mitochondrial analysis supported the recognition of *C. e. nannodes* and *C. e. roosevelti* as valid subspecies, suggesting that *C. e. canadensis* and *C. e. manitobensis* be combined (Polziehn and Strobeck 1998). *C. e. nelsoni* is the only free-ranging subspecies in the South because of its use as a reintroduction surrogate for the extinct eastern elk. The common name, wapiti, is used in technical publications to distinguish the species in North America, avoiding confusion with names for the European moose (O'Gara 2002a).

DISTINGUISHING CHARACTERISTICS

The elk is a large grazer and cursorialist (Geist 1998) with long legs, conspicuous ears, and rump patch. Elk exhibit noticeable sexual dimorphism. Males are typically 20% larger and grow antlers, while females are smaller and rarely grow antlers (Murie 1951). The range of measurements across all subspecies are: total length, 198–262 cm; tail, 9–19 cm; hind foot, 60–74 cm; ear, 18–23 cm; weight, 171–497 kg (Peek 2003). *C. e. nelsoni*, used for reintroduction in the South, typically weighs between 225 (females) and 315 kg (males). The summer adult pelage is reddish to dark brown. The winter coat is dimorphic: males have a tan coat and a dark brown, shaggy neck mane; females have a light brown coat that fades as winter progresses. The head, neck, and lower regions of the body and extremities of both sexes are typically darker than the rest of the body throughout the year. A conspicuous, cream-colored to tan rump patch surrounds a short, stubby tail that is broad at the base and tapers to a marginal fringe. The pelage of juveniles is tan to reddish brown dappled with conspicuous cream to white-colored spots. *C. e. nelsoni* has light and spreading antlers with straight branches.

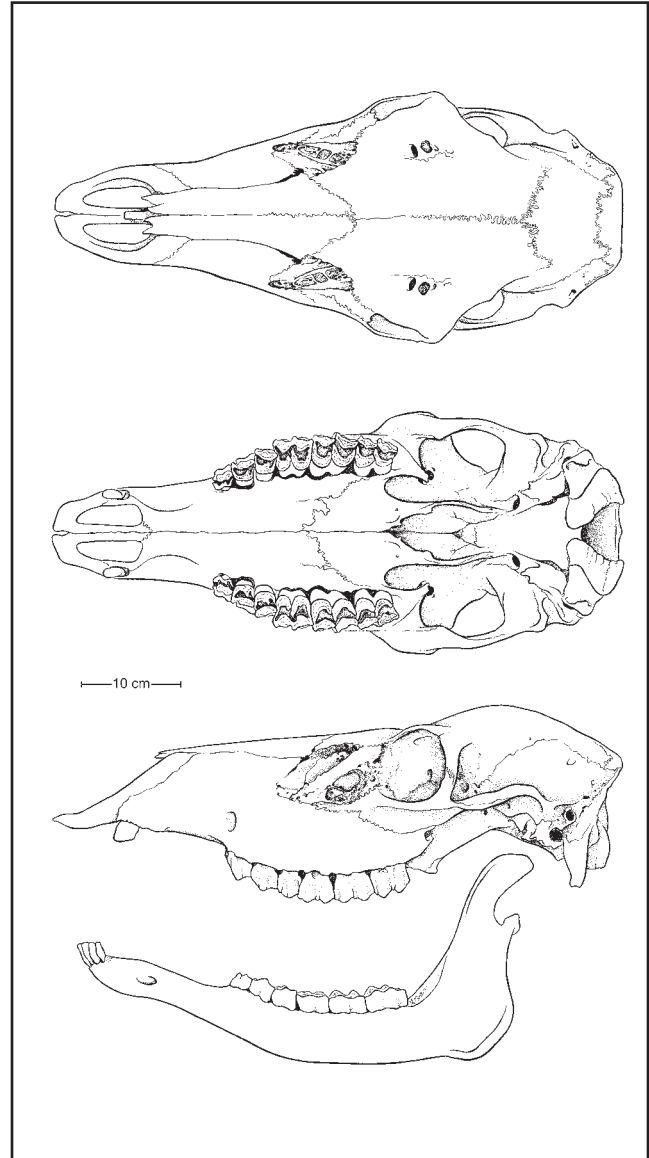


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Cervus elaphus* from Jackson, Wyoming (USNM 265054, female).

This contrasts with other subspecies that can have more curved branches (*C. e. nannodes*) or with *C. e. roosevelti* that supports antlers with a crowning shape with heavy, short branches (Peek 2003). Yearling and adult males begin antler growth between late March–early April. These are typically shed between late February–early April the following year. Yearling elk often grow single spike antlers or have fewer than 4

White-tailed Deer

Odocoileus virginianus (Zimmerman, 1780)

Margaret K. Trani and Brian R. Chapman

CONTENT AND TAXONOMIC COMMENTS

Since the original description of the species, taxonomists have assigned 12 different names to the North American deer (Baker 1984, Smith 1991). Although Hershkovitz (1948) proved that the name *Dama* had priority over *Odocoileus*, the International Commission on Zoological Nomenclature used its plenary powers to validate *Dama* as the generic name for the fallow deer of Europe, rejecting it for the North American deer species (China 1960). Consequently, *Odocoileus* became available for the North American deer. *Odocoileus virginianus* includes 30 recognized subspecies in North and Central America and eight in South America (Hall 1981, Baker 1984, Smith 1991). Eleven subspecies occur in the South: *O. v. clavium*; *O. v. hiltonensis*; *O. v. macrourus*; *O. v. mcilhennyi*; *O. v. nigribarbis*; *O. v. osceola*; *O. v. seminolus*; *O. v. taurinsulae*; *O. v. texanus*; *O. v. venatorius*; and *O. v. virginianus*. Smith (1991), Gerlach et al. (1994), and Miller and Marchinton (1995) review the life history.

DISTINGUISHING CHARACTERISTICS

The white-tailed deer is a large, long-legged ungulate with conspicuous ears. Measurements are: total length, 134–206 cm; tail, 15–33 cm; hind foot, 36–52 cm; ear, 14–22 cm; weight, 25–150 kg. The dorsal pelage is light brownish gray to reddish brown. There is a white band around the eye and muzzle; a white throat patch is present. The ventral pelage, insides of the legs, and linings of the ears are white. The dorsal pelage of juveniles is tan to reddish brown and dappled with conspicuous white spots. The tail of the adult, often carried erect when the animal is disturbed or running, is broad at the base and brown dorsally with a white marginal fringe and venter. Females are approximately 25% smaller than males. Adult males carry antlers, which begin growth in late April and are shed January–March. The dental formula is: I 0/3, C 0/1, P 3/3, M 3/3 = 32 (Figure 1). See keys for details.

The endangered Key deer (*O. v. clavium*) is much smaller than its mainland counterpart; maximum shoulder height is 76 cm. Females weigh up to 28 kg, while males may reach 36 kg (Whitaker and Hamilton 1998). The skull is as broad as that of mainland deer (i.e., greatest width of the skull across the orbits

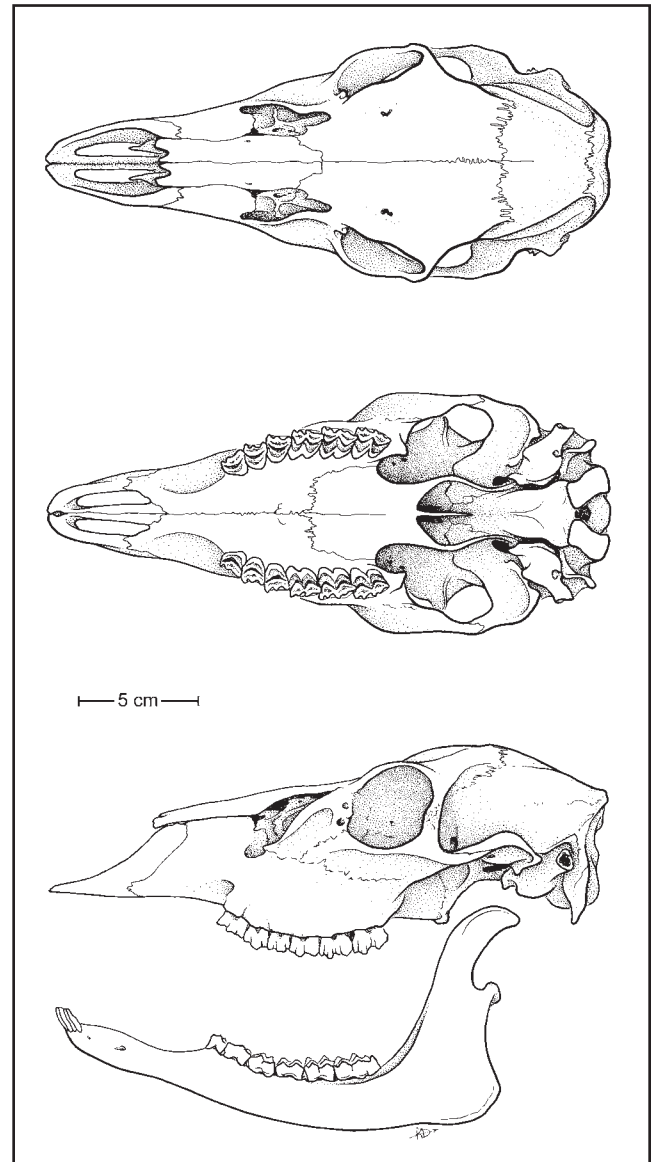


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Odocoileus virginianus* from Swanquarter Wildlife Refuge, Pamlico County, North Carolina (USNM 266377, female).

is 90–119 mm), but the molariform tooth row is shorter; the maximum length is 66 mm (Lazell 1989). Key deer also have proportionately longer tails, and although variable in color, they do not have the summer red and winter gray phases that characterize mainland deer.

Feral Pig

Sus scrofa (Linnaeus, 1758)

Brian R. Chapman and Margaret K. Trani

CONTENT AND TAXONOMIC COMMENTS

The feral pig (*Sus scrofa*) is native to northern Africa, Europe and Asia. The species was first introduced into the West Indies by Columbus in 1493 (Groves 1981) and Florida by DeSoto in 1593 (Gipson et al. 1998). Populations that now occur in the United States represent hybrid combinations of the European wild boar (*S. s. scrofa*) and domestic pig (*S. s. domesticus*; Rary et al. 1968, Wood and Lynn 1977). Common names include feral hog, feral swine, razor-back, wild boar, and wild hog. Sweeney and Sweeney (1982) and Mayer and Brisbin (1991) review the life history of the feral pig in the United States.

DISTINGUISHING CHARACTERISTICS

The feral pig is a large, hoofed mammal with a flattened snout. Measurements are: total length, 153–240 cm; tail, 21–38 cm; hind foot, 23–35 cm; ear, 24–26 cm; weight, 66–272 kg. Male pigs are somewhat larger than females; these differences are evident at 15 months and increase with age (Dickson et al. 2001). The most common pelage color is black but considerable variation is present. Some are brown, reddish brown, spotted black or brown, black and white, or all white. The pelage is usually coarse and dense. The elongated, mobile snout has a flattened terminal surface punctuated by terminal nares. The feet have four toes terminating in hooves, but the weight is borne by the two larger, central digits. The upper canine teeth are triangular in cross section, recurved, and visible externally as tusks; they are larger than the lower canines. The dental formula is: I 3/3, C 1/1, P 4/4, M 3/3 = 44 (Figure 1). A complete description of morphological variation is found in Mayer and Brisbin (1991). The only other species in the South that resembles the feral pig is the collared peccary or javelina (*Pecari tajacu*) in southern Texas. See keys for details.

CONSERVATION STATUS

The feral pig has a global rank of Secure (NatureServe 2007). A conservation status rank of Not Applicable has been assigned by each state in the South where it occurs; the species is not a suitable target for conservation activities. In many areas, the pig is considered an important recreational resource as a big game species. Florida, North Carolina, Texas, Tennessee, and

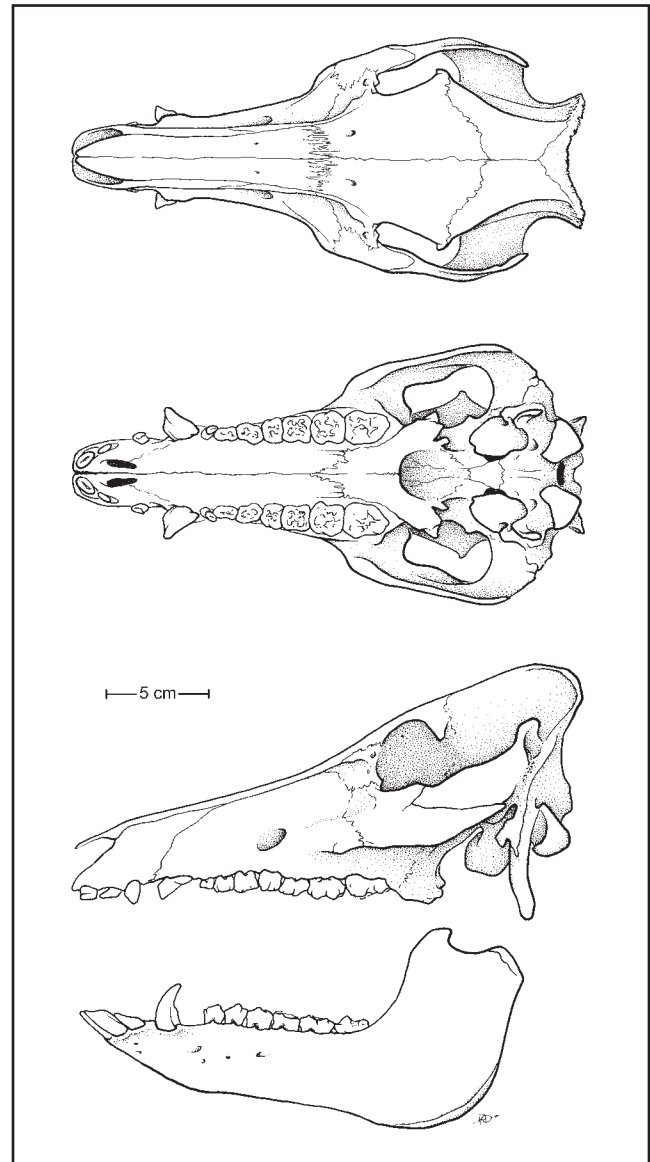


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Sus scrofa* from Beaufort County, South Carolina (USNM 256035, male).

other southern states allow hunting during specified seasons (Whitaker and Hamilton 1998).

DISTRIBUTION

The feral pig is found in California, Arizona, New Mexico, Missouri and throughout the southern United States in scattered locations (Sweeney and