

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

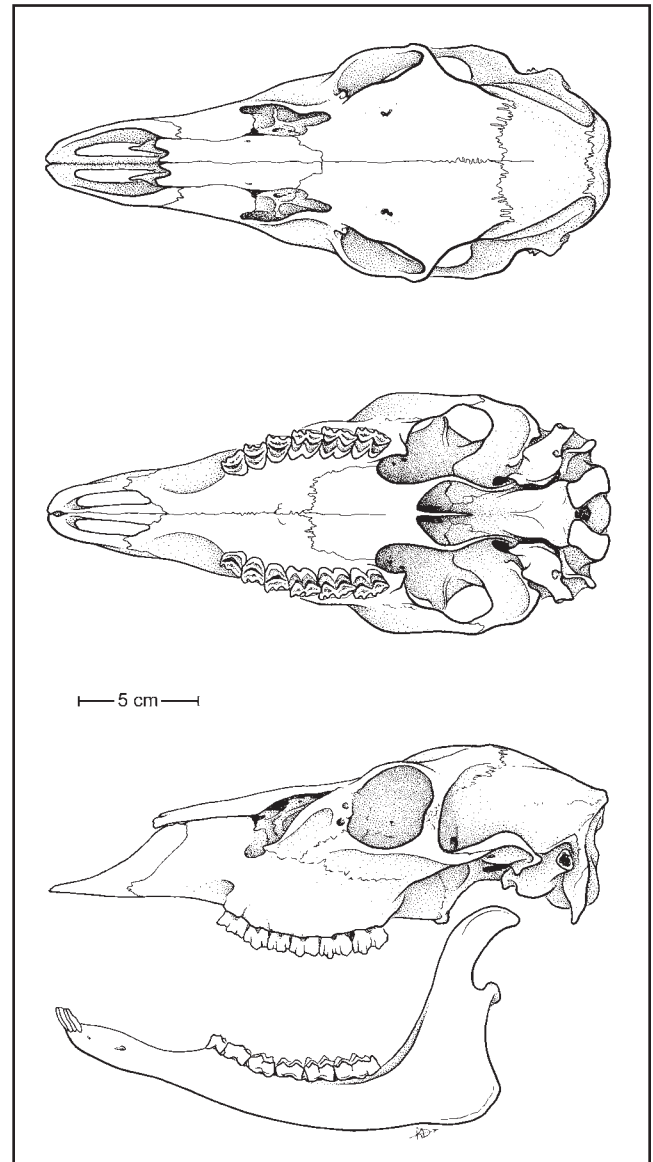


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Odocoileus virginianus* from Swanquarter Wildlife Refuge, Pamlico County, North Carolina (USNM 266377, female).

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.

CONSERVATION STATUS

The white-tailed deer has a global rank of Secure (NatureServe 2007). The species is also considered Secure in those southern states where it occurs with the exception of Arkansas, where it is Apparently Secure. The deer is unranked in South Carolina. Regulated hunting seasons are supported throughout the South.

The U. S. Fish and Wildlife Service (U. S. Department of the Interior 2007) classifies the Key deer as Endangered. Four other subspecies of concern include *O. v. nigribarbis*, found on Sapelo and Blackbeard Islands, Georgia; *O. v. hiltonensis*, known from Hilton Head Island, South Carolina; *O. v. taurinsulae*, known from Bulls Island, South Carolina; and *O. v. venatorius*, found on Hunting Island, South Carolina (Whitaker and Hamilton 1998).

DISTRIBUTION

Odocoileus virginianus ranges from south-central Canada throughout most of the United States and southward into South America (Hall 1981, Smith 1991, Choate et al. 1994). The species is common throughout the southern United States (Figure 2). The deer ranges throughout Virginia (Dueser et al. 1979, Gaudette and Stauffer 1988, Keiper 1990, Handley 1992, Knox 1997, Linzey 1998) and North Carolina (Clark et al. 1985, Webster 1988, Linzey 1995, Murray and Webster 1995). The deer inhabits South Carolina (Webster et al. 1985, Cothran et al. 1991, Caudell and Warren 1997, Scribner et al. 1997), Georgia (Sawyer et al. 1990, Osborne et al. 1992, Ford et al. 1993, 1994), and Florida (Folk and Klimstra 1991, Shea et al. 1992, Smith et al. 1996, Labisky and Fritzen 1998, Labisky et al. 1999). It occurs throughout Alabama (Ivey and Causey 1984, Dyess et al. 1994), Mississippi (Guynn et al. 1983, Jacobson 1984, Jones and Carter 1989), Louisiana (Lowery 1974), and eastern Texas (Schmidly 1983, Davis and Schmidly 1994). The deer ranges across eastern Oklahoma (Carlile and Lowry 1975, Caire et al. 1989), Arkansas (Nelson et al. 1988, Wigley and Garner 1988, Sealander and Heidt 1990, Kluvender et al. 1992), Tennessee (Bratton 1979, Kennedy 1991, Feldhamer et al. 1992), and Kentucky (Davidson et al. 1985, Paris et al. 1991).

The current range of the Key deer includes approximately 26 islands (330 km²) from Big Pine Key to Sugarloaf Key, Florida (U. S. Fish and Wildlife Service 1998). The National Key Deer Refuge and Great White Heron National Wildlife Refuge encompass much of this territory. The type locality is Big Pine Key, which is the center of the deer's range and supports two-thirds of the population.



Figure 2. Distribution of *Odocoileus virginianus* in the South: (1) *O. v. clavium*; (2) *O. v. hiltonensis*; (3) *O. v. macrourus*; (4) *O. v. mcilhennyi*; (5) *O. v. nigribarbis*; (6) *O. v. osceola*; (7) *O. v. seminolus*; (8) *O. v. taurinsulae*; (9) *O. v. texanus*; (10) *O. v. venatorius*; (11) *O. v. virginianus*.

ABUNDANCE STATUS

Deer are widespread and relatively abundant throughout the South, although populations on some islands have declined. Deer numbers have fluctuated dramatically since European settlement due to intensive hunting, widespread agricultural clearing, and other habitat alteration. Populations nationwide plummeted to less than a million animals by 1900 (Dickson 2001). Remnant populations were restricted to rugged mountainous terrain and hardwood swamps (Knox 1997). Decades later, state agencies initiated harvest restrictions and restocking programs (McDonald and Miller 1993). Populations have rebounded during the last several decades due to farm abandonment (Trani et al. 2001), lower hunting pressure, and the extirpation of large predators (Trani 2002). In some locations, populations have risen to the level of pest status.

Flather et al. (1999) present regional trends in white-tailed deer abundance in the Renewable Resources Planning Act (RPA) Wildlife Report. The RPA is a periodic assessment of natural resources on the nation's forests; population estimates and projections originate from state agencies based on species expert surveys. For states reporting on white-tailed deer, populations have increased approximately four-fold since 1975 (2 million–8 million). Currently, deer population estimates exceed one million

animals in Alabama, Georgia, Louisiana, Mississippi, North Carolina, and Texas (Miller 2001). There is concern among state personnel that deer increasingly may become a management problem during the next decade. Seven states expect deer numbers to decline slightly over the next 50 years (Flather et al. 1999). Relative densities of white-tailed deer have been recorded from less than 5.8/km² in marginal habitat to over 11.6/km² in optimal habitat of the South.

PRIMARY HABITATS

The deer uses a wide variety of habitats, and benefits from a mosaic of wetlands, forests, farmland, and early-successional seres. The deer occurs in numerous forest types in the region (Baker 1984, Hardin et al. 1984, Smith 1991, Shea et al. 1992). Important factors affecting habitat use include soil fertility and productivity; in general, the largest deer are found on fertile soils. Soil phosphorus is a useful predictor of potential physiological condition (Miller 2001). The most productive soils (and therefore the high quality habitats) occur in the agricultural areas of the Piedmont, Upper Coastal Plain, and bottomland habitat (Miller 2001). Forage quality and quantity are also important factors. Deer occupy the same home range year after year (Whitaker and Hamilton 1998); they are not territorial (Labisky and Fritzen 1998, Labisky et al. 1999) but will defend bedding sites. Home ranges of individual deer vary from 16–135 ha, although winter ranges may be larger. Bucks usually have greater home ranges than does, and may extend their range during the rut. Home range tends to be larger in open country than in thick vegetation (Whitaker and Hamilton 1998). The degree of fragmentation on a forested landscape may change home range extent (Inglis et al. 1979, Marchinton and Hirth 1984). Seasonal changes in home range are related to food availability.

REPRODUCTION

Females come into estrus in fall (Sauer 1984) and are receptive to males for 72 hours (White et al. 1995). If they are not inseminated, estrus may reoccur every 21–30 days (Knox et al. 1988). Plotka et al. (1977) suggest the deer is capable of estrous cycling until March of the following year; some captive females have had seven estrous periods between October–April (Knox et al. 1988). Hirth (1977) and Miller et al. (1987) describe behaviors associated with mating. The gestation period ranges from 187–222 days (Verme and Ullrey 1984). Many females produce twins, however litter size can range from 1–3. (Note: For the Key deer, twinning is infrequent and triplets have not been documented). Weaning is complete by 10 weeks of age (Marchinton and Hirth 1984).

Summer nutritional stress may reduce lactation, fawn growth, and body weight. In poor mast years, reproduction rates may be low and conception delayed.

FOOD HABITS

Although the white-tailed deer is often characterized as a browser (eating twigs, shoots, and leaves), research across the South has indicated that only a moderate portion of the diet consists of browse (Miller 2001). The deer is an opportunistic herbivore, consuming hard mast forbs, fruits, grasses, flowers, and fungi (Kirkpatrick et al. 1969, Harlow and Hooper 1972). When conditions allow, they are highly selective, choosing the most palatable, succulent, and nutritious portions of plants (Miller 2001). Browse, forbs, and native grasses are consumed during spring. Typical woody browse species include red maple (*Acer rubrum*), American beautyberry (*Callicarpa americana*), Japanese honeysuckle (*Lonicera japonica*), greenbrier (*Smilax* spp.), trumpet creeper (*Campsis radicans*), and Carolina jessamine (*Gelsemium sempervirens*). Herbaceous species include aster (*Aster* spp.), sweet clover (*Melilotus* spp.), white clover (*Trifolium repens*), vetch (*Vicia* spp.), goldenrod (*Solidago* spp.), and wintergreen (*Gaultheria procumbens*). Soft mast consumption peaks during the summer (Harlow and Hooper 1972, Johnson et al. 1995). Foods include blueberry (*Vaccinium* spp.), sumac (*Rhus* spp.), grape (*Vitis* spp.), hawthorn (*Crataegus* spp.), persimmon (*Diospyros virginiana*), plum (*Prunus* spp.), saw palmetto (*Serenoa* spp.), yaupon (*Ilex vomitoria*), and blackberry (*Rubus* spp.).

Hard mast is an important component of the fall and winter diet, often comprising over 70% of the foods consumed. Nutrition, reproduction, weight, and antler characteristics are influenced by acorn availability (Wentworth et al. 1990, Ford et al. 1994). Postnatal survival may decline following years of minimal acorn production. Agricultural grasses are often planted for winter food plots and include wheat (*Triticum aestivum*), oats (*Avena sativa*), and fescue (*Festuca* spp.). Food plots can improve physical condition and reproductive rates (Johnson et al. 1987, Kammermeyer and Moser 1990).

ASSOCIATED SPECIES

The white-tailed deer is associated with numerous vertebrates in the region. Predators include the Florida panther (*Puma concolor*), red wolf (*Canis rufus*), American black bear (*Ursus americanus*), coyote (*C. latrans*), and bobcat (*Lynx rufus*). Most predation by bobcats and coyotes is on young fawns; predation rates are low and insignificant when compared to other causes of mortality. Other than competition for acorns with eastern wild turkey (*Meleagris gallapavo*), squirrels

(*Sciurus* spp.), feral pigs (*Sus scrofa*), and other vertebrates, white-tailed deer do not compete directly for forage with native species (Miller 2001). Wild pigs can severely impact food plot plantings for winter deer food. Grazing of woodlands by domestic livestock can eliminate deer forage, reduce escape cover, and change plant species composition. Overabundant deer populations can have significant effects on forest regeneration (DeCalesta 1997, Stromayer and Warren 1997), and vegetation community stability (Bratton 1979, Miller et al. 1992). This provides the species with the ability to influence both plant and animal communities wherever it occurs.

The Key deer occurs in association with the Lower Keys marsh rabbit (*Sylvilagus palustris hefneri*) and silver rice rat (*Oryzomys argentatus*). These species make use of similar habitats including salt marshes, transitional areas, and fresh-water marshes (U. S. Fish and Wildlife Service 1998).

VULNERABILITY AND THREATS

There are no threats to the survival of the white-tailed deer in the region. The deer is susceptible to a number of diseases (such as hemorrhagic and chronic wasting disease) and is host to over 100 species of parasites including ticks, keds, lice, and bot flies (Miller 2001). Extensive networks of roads can have negative impacts on white-tailed deer (Graham 2002), stemming from increased hunter accessibility and vehicular mortality. Increases in the number of roads and vehicles are factors contributing to deer-vehicle collisions where deer density is high.

Populations of Key deer have improved in response to decreased illegal hunting (Lopez et al. 2004) and the establishment of a federal refuge. Urban development and habitat fragmentation continue to threaten the Key deer's recovery (Lopez et al. 2003). Fencing restricts deer movements, creating bottlenecks that interfere with the ability to reach permanent water and feeding areas (White et al. 1998). Highway mortality accounts for the majority of total deer mortality. Fire suppression has resulted in the deterioration of important rockland communities.

MANAGEMENT SUGGESTIONS

Mainland deer management centers on population control and habitat enhancement to maintain ecological balance. Regulated annual harvests are the primary tool of population management; harvest guidelines target specific sex and age classes to maintain populations within the carrying capacity of the habitat. Management programs differ across the region because habitat quality and population

dynamics vary dramatically between states. The overabundance of deer populations has become so prevalent, it represents an important wildlife management problem during the current decade.

Forested landscapes with a mosaic of habitat types and seral stages benefit white-tailed deer. Early successional communities provide herbaceous forage and soft mast, whereas late successional forests provide fall and winter mast and limited browse (Miller 2001). Timber harvest and prescribed fire create a diversity of age classes, providing forage and cover (Ford et al. 1993). In pine stands, fire can increase browse production, palatability, and nutrition. Burning in late winter or early spring promotes resprouting of vegetation in the warmer months. Stand thinning can enhance understory browse and release mast-producing trees. The maintenance of mature oak-pine stands is also beneficial. Food plots can be an important management tool; choice of food plantings target the winter and late summer nutritional stress periods. The contribution of agricultural food plots is reviewed by Kammermeyer and Thackston (1995) and Weeks (1995). Management of the endangered Key deer centers on the acquisition of additional land (U. S. Fish and Wildlife Service 1998).

Management and restoration of habitat includes prescribed burning, mowing clearings, planting native vegetation, removing exotic species, providing roadway bypasses, and protecting travel corridors. The use of prescribed fire as a management tool is hampered by urbanization. A low reproductive potential, coupled with intense residential and commercial development, suggests management and recovery of the Key deer will be difficult.

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