

# Coyote

## *Canis latrans* (Say, 1823)

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### CONTENT AND TAXONOMIC COMMENTS

Young and Jackson (1951) recognized 19 subspecies of the coyote. However, the integrity of individual subspecies and their taxonomic utility are questionable (Nowak 1978, Bekoff and Gese 2003). The three eastern subspecies currently recognized appear to intergrade imperceptibly, as translocations of the species have confused the subspecific taxonomy in the South (Paradiso 1968, Hill et al. 1987). These include *C. l. frustror*, *C. l. latrans*, and *C. l. thamnus* (Whitaker and Hamilton 1998). The life history of the coyote is reviewed by Young and Jackson (1951), Bekoff (1977), Voight and Berg (1987), Bekoff and Gese (2003), and Gese and Bekoff (2004).

### DISTINGUISHING CHARACTERISTICS

The coyote is a doglike carnivore with long legs. Measurements are: total length, 100–135 cm; tail, 27–42 cm; hind foot, 16.5–22.0 cm; ear, 9–12 cm; weight, 5–16 kg. The dorsal pelage is grizzled gray or buff overlaid with black-tipped hairs. The venter is pale cream or gray with a yellowish tint. The face is reddish brown or gray. The muzzle is narrow and the ears are erect. The tail, which is held down between the legs when running, is bushy and black-tipped. Melanistic individuals occur in some localities (Gipson 1976). Size variation is apparent in the South, with larger individuals in less humid areas of the region (Kennedy et al. 1986). The skull of the coyote is elongate with a narrow rostrum, and lacks the temporal ridges that distinguish the fox species. The coyote skull is differentiated from the red wolf (*C. rufus*) based on size; the coyote skull is usually less than 210 mm in total length whereas the red wolf skull is larger. Sealander and Heidt (1990) and Lawrence and Bossert (1967) provide keys to distinguish among the coyote, red wolf, and domestic dog (*C. familiaris*). The dental formula is  $I\ 3/3, C\ 1/1, P\ 4/4, M\ 2/3 = 42$  (Figure 1). See keys for details.

### CONSERVATION STATUS

The coyote 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, Georgia and North Carolina, where it is classified as Apparently Secure. It is unranked in Florida and South Carolina. Many states consider the

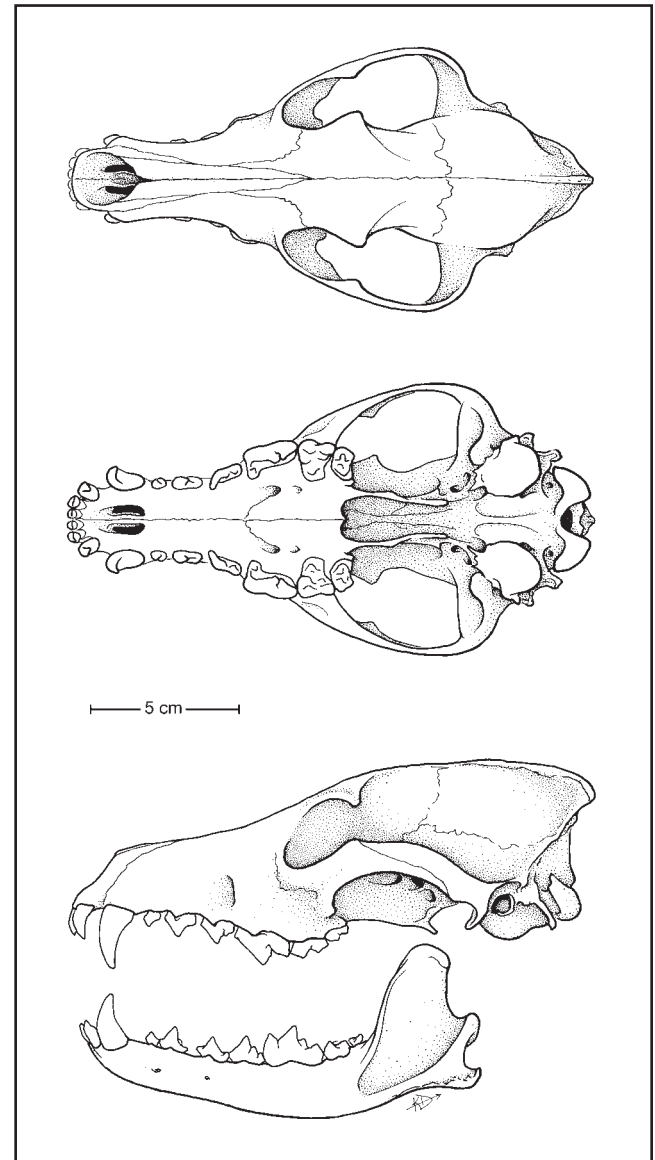


Figure 1. Dorsal, ventral, and lateral view of cranium and lateral view of mandible of *Canis latrans* from Sterling County, Texas (USNM 211666, male).

coyote a furbearing species with varying regulations on method of take and bag limit. For the majority of southern states, the coyote can be harvested throughout the year on private lands. Although variable by state, restrictions on season dates and harvest method occur on some public lands.

## DISTRIBUTION

The original distribution of the coyote included the plains and mountains of western and central North America from eastern Alaska to Indiana and southward to Costa Rica (Young and Jackson 1951, Paradiso 1968). In the last four decades, the coyote has expanded eastward across the United States due to the elimination of the red wolf and other large carnivores from their former ranges (Leopold and Chamberlain 2001). Some range expansion in the South was hastened by translocation efforts by sportsmen groups (Hill et al. 1987).

The species was introduced into scattered locations in Virginia (Handley 1992, Linzey 1998) and now occurs statewide (R. Farrar, Virginia Game and Inland Fisheries, personal communication). Expansion has occurred steadily across North Carolina (DeBow et al. 1998) and South Carolina (Cothran et al. 1991, Baker and Carmichael 1997; J. Kilgo, U. S. Forest Service, personal communication). Currently, the coyote occurs statewide in Georgia (Holzman et al. 1992, Whitaker and Hamilton 1998), Alabama (Sumner et al. 1984, Hoerath and Causey 1991), Florida (Brady and Campbell 1983, Wooding and Hardisky 1990, J. Gore, Florida Fish and Wildlife Conservation Commission, personal communication), Mississippi (Jones and Carter 1989, Chamberlain and Leopold 1999, 2001), Louisiana (Lowery 1974, Morrison et al. 1981, Mullin and Williams 1987, Giordano and Pace 2000), Tennessee (Kennedy 1991, Crawford et al. 1993, Linzey 1995), Kentucky (Barbour and Davis 1974, Hill et al. 1987, Crossett and Elliott 1991), Arkansas (Sealander and Heidt 1990), eastern Texas (Davis and Schmidly 1994), and eastern Oklahoma (Caire et al. 1989).

## ABUNDANCE STATUS

Coyote density varies with food abundance, season, and habitat (Gese and Bekoff 2004). Densities between 0.35–0.6/km<sup>2</sup> were reported in Tennessee (Babb and Kennedy 1989, Stephenson and Kennedy 1993, Crawford et al. 1993), whereas estimates ranged between 0.8–2.3/km<sup>2</sup> in Texas (Knowlton 1972, Andelt 1985). Flather et al. (1999) presented regional trends in coyote abundance based upon projections from state agencies. For those southern states reporting on the coyote, populations are at or near carrying capacity and are expected to remain stable. Based upon statewide surveys in Mississippi, Lovell et al. (1998) reported that the coyote had experienced a 7.5-fold increase since 1980. State biologists currently report that coyote population levels are continuing to increase in Arkansas (B. Sasse, Arkansas Game and Fish Commission, personal communication), Kentucky

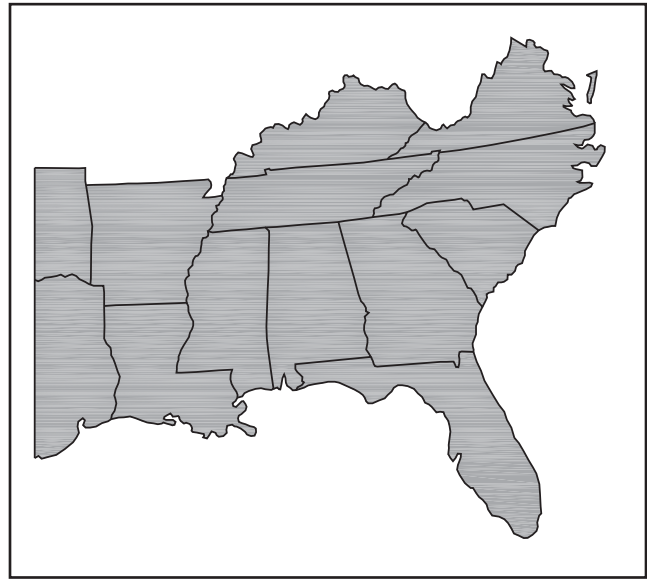


Figure 2. Distribution of *Canis latrans* in the South.

(L. Patton, Kentucky Department of Fish and Wildlife Resources, personal communication), and Texas (J. Young, Texas Parks and Wildlife Department, personal communication).

## PRIMARY HABITATS

Habitat use by the coyote is diverse, and reflects its opportunistic feeding habits (Andelt 1977). In the South, the species inhabits almost every habitat present from forests to grasslands, from uplands to coastal areas and bottomland swamps, from rural settings to urban environments (Gese and Bekoff 2004). Male and female habitat use does not appear to differ significantly.

Home range size varies with habitat, food distribution, and social organization (Bekoff and Wells 1986, Gese and Bekoff 2004). Kamler et al. (2005) reported that transient coyotes in Texas use larger home range (84 km<sup>2</sup>) areas, while resident coyotes occupy smaller territories (10 km<sup>2</sup>). Annual home range size was reported as 6–19 km<sup>2</sup> in Georgia (Holzman et al. 1992), 13–33 km<sup>2</sup> in Arkansas (Gipson and Sealander 1972), and 31–60 km<sup>2</sup> in western Tennessee (Babb and Kennedy 1989).

## REPRODUCTION

The coyote is monoestrus, and pair bonds may last for several years. Breeding season occurs between January–March (Kennelly and Johns 1976, Kennelly 1978). Approximately 60–90% of adult females and up to 70% of yearling females produce litters (Knowlton et al. 1999); gestation lasts 58–65 days (Leopold and Chamberlain 2001). Mean litter size is 6 pups, which is influenced by food availability (Bekoff and Gese 2003) and population density (Knowlton 1972).

during the previous winter. Maternal dens are constructed on brush-covered slopes, steep banks, rock ledges, and under hollow logs. Dens of other animals such as the American badger (*Taxidea taxus*) may also be used (Whitaker and Hamilton 1998). The young are born blind and helpless, and remain in the den until they are weaned at 5–7 weeks (Gier 1968). The pups reach adult weight by 9 months and are capable of breeding before 1 year of age (Gese and Bekoff 2004). Juvenile dispersal usually occurs during autumn and early winter; increased mortality is associated with dispersal as the coyote moves into unfamiliar areas (Knowlton et al. 1999).

## FOOD HABITS

The coyote is opportunistic, consuming food in relation to availability (Hoerath and Causey 1991). Common prey include voles (*Microtus* spp.), rats (*Rattus* spp.), pocket gophers (*Geomys* spp.), hispid cotton rat (*Sigmodon hispidus*), and the woodchuck (*Marmota monax*; Hilton 1978, Smith and Kennedy 1983, Wooding et al. 1984, Hoerath and Causey 1991, Chamberlain and Leopold 1999, Hodges 2001). Thornton et al. (2004) reported that common food items eaten in Florida include white-tailed deer (*Odocoileus virginianus*), feral pig (*Sus scrofa*), eastern cottontail (*Sylvilagus floridanus*), marsh rabbit (*S. palustris*), marsh rice rat (*Oryzomys palustris*), eastern gray squirrel (*Sciurus carolinensis*), cotton mouse (*Peromyscus gossypinus*), and saw palmetto (*Serenoa repens*) fruit. Eastern wild turkey (*Meleagris gallopavo*) and northern bobwhite (*Colinus virginianus*) was reported as prey in Tennessee, Mississippi, Georgia, and Florida (Lee and Kennedy 1986, Wagner and Hill 1994, Edwards 1996, Staller et al. 2005); striped skunk (*Mephitis mephitis*) was reported in Kentucky (Crossett and Elliott 1991). Predation on white-tailed deer fawns in some areas can be high (Blanton and Hill 1989). Predation on adult deer may be correlated with winter severity (Gese and Bekoff 2004), and hence may rarely occur in the South except for localized areas in the Central and Southern Appalachian Mountains. Other food items include various reptiles, amphibians, fish, snails, invertebrates, common persimmon (*Diospyros virginiana*) and other fruits, and carrion (Michaelson and Goertz 1977, Litvaitis and Shaw 1980, Stratman and Pelton 1997, Leopold and Chamberlain 2001). The coyote will hunt small mammals alone; when preying on larger prey such as ungulates, cooperation among pack members may occur (Gese et al. 1996). Excess food is cached by burying it in the ground. The coyote in suburban areas is adept at exploiting human-made food resources and readily consumes pet food.

## ASSOCIATED SPECIES

Where the coyote and red fox (*Vulpes vulpes*) are sympatric, home ranges do not overlap and strong avoidance occurs (Leopold and Chamberlain 2001). The coyote may suppress fox population growth by aggression and competition for food (Whitaker and Hamilton 1998). Litvaitis and Harrison (1989) observed avoidance behavior between the coyote and bobcat (*Lynx rufus*); Thornton et al. (2004) reported an ecological separation between these two species in Florida facilitated by dietary differences. Gese and Bekoff (2004) observed that the coyote will kill smaller canids such as the common gray fox (*Urocyon cinereoargenteus*), although their coexistence may be mediated by resource partitioning due to the arboreal nature of the gray fox (Neale and Sacks 2001). In red wolf reintroduction sites, the introgression of coyote genes into the wolf population through hybridization is a threat to recovery success (DeBow et al. 1998, Stoskopf et al. 2005). Fertile hybrids are also known between the domestic dog and coyote (Gese and Bekoff 2004).

## VULNERABILITY AND THREATS

Disease can be a substantial mortality factor, especially among pups. Serological analyses show that the species can be infected by canine parvovirus enteritis, distemper, hepatitis, rabies, and brucellosis (Bekoff and Gese 2003, Krebs et al. 2003). Sarcoptic mange may be locally common in some populations, resulting in reduced fecundity and increased mortality rates (Pence and Windberg 1994). The coyote hosts numerous ectoparasites including ticks (*Dermacentor variabilis*, *Amblyomma maculatum*), and biting lice (*Trichodectes canis*; Bekoff 1977). In addition, the coyote is susceptible to a variety of internal parasites including heartworm (*Dirofilaria immitis*), hookworm (*Ancylostoma caninum*), tapeworm (*Taenia pisiformis*), and various nematodes including *Physaloptera rara* (Foster et al. 2003).

Most studies indicate that human activity contributes to a high proportion of the deaths of coyotes (Bekoff and Gese 2003, Gese and Bekoff 2004). Human exploitation can be substantial in some coyote populations (Knowlton et al. 1999), with protection of livestock and game species constituting the motives for removal. The coyote does prey on domestic sheep, cattle, and poultry (Armstrong 1991, Philip and Armstrong 1994).

## MANAGEMENT SUGGESTIONS

Conservation measures have not been needed to enhance habitat quality for the coyote or to maintain



viable populations (Gese and Bekoff 2004). In areas of overpopulation, management centers on damage prevention and population control. Knowlton et al. (1999) reviewed many of the techniques for reducing coyote depredation including protective fencing, frightening devices, and use of repellents. Coyote control efforts promote sound husbandry methods that prevent livestock losses to predation. Research needs include development of non-lethal depredation techniques and methods of fertility control, and resolution of potential conflicts at the urban interface.

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