

## Cougar (*Puma concolor*)

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### Introduction

The cougar (*Puma concolor*) is a large, slender cat with a tawny coloration above fading to white below. Its long, muscular tail is often tipped with black. The dark ears stand erect on a round head that seems disproportionately small.

Due to excessive exploitation following European colonization, market hunting of deer herds (a staple prey item), and deforestation, significant population declines have occurred throughout the past few centuries. Cougars were hunted to the point of assumed extirpation in the eastern U.S. and Canada by 1900. However, sightings throughout these regions steadily increased during the 20<sup>th</sup> century; and by the 1960's, cougars were believed to still exist. This prompted listing of the Eastern cougar (*P. c. cougar*), as an endangered species in 1973 under the protection of the Endangered Species Act of 1973.

During this period, hunting pressures and persecution also impacted another eastern subspecies the Florida panther (*P. c. coryi*). Such impacts prompted federal listing of the Florida subspecies as Endangered on March 11, 1967 pursuant to the Endangered Species Preservation Act of 1966. Both subspecies carry this status throughout all of their current range.

### Taxonomy

Family: Felidae  
Subfamily: Felinae  
Genus: *Puma*  
Species: *concolor*  
Subspecies: *cougar*

Family Felidae contains all of the world's cats. There are 41 known species of felids worldwide; the majority of which serve a vital role as the top predator in their respective ecosystems. Although large, the cougar is related to smaller felines, which justifies its classification in Subfamily Felinae (the "small cats"). The most widely used common names for this species include the cougar, painter, panther, puma, mountain cat, mountain lion, and catamount.



Photo credit: <http://sciway2.net/2002/a26e/rpage2.htm>

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Historically, 32 subspecies have been described for the cougar across the western hemisphere. However, most of these have been local variations that gradually blended together across their range. Thus, much confusion surrounds the taxonomy of this species. Throughout the species' range, genetic separation between populations is currently being challenged by recent genetic research, which suggests that genetic differences between the populations do not merit separation into subspecies. Recently, researchers have proposed that the Central and South American cougars should represent 5 subspecies: *P. c. costaricensis* (Central America), *P. c. capricornensis* (eastern South America), *P. c. concolor* (northern South America), *P. c. cabrerai* (central South America), and *P. c. puma* (southern South America). In addition, recent genetic research suggests that all North American cougars should be treated as one subspecies, *P. c. cougar*. This proposed subspecies revision would include the following synonyms and previous subspecies: *arundivaga*, *aztecus*, *browni*, *californica*, *coryi*, *couguar*, *floridana*, *hippolestes*, *improcera*, *kaibabensis*, *mayensis*, *missoulensis*, *olympus*, *oregonensis*, *schorgeri*, *stanleyana*, *vancouverensis*, and *youngi*.

These research findings prompted the U.S. Fish and Wildlife Service (USFWS) to initiate a five-year review (a periodic process that is conducted to ensure accurate listing classification) of the endangered Eastern cougar subspecies on January 29, 2007. Results should be available in early 2012, and will likely be in agreement with the above classifications due to acceptance by Wilson and Reeder (2005 edition; this is considered a definitive mammalian nomenclature reference) and other authorities on taxonomy. Until that time, however, any cougars found in the wild in the eastern U.S. remain protected.

The status of the endangered Florida panther, here collapsed into the North American cougar, is currently under debate and thus remains uncertain. Eastern cougars and Florida panthers can be found listed as distinct subspecies in most research and conservation literature, and under the Endangered Species Act. Because these two subspecies (i.e. *couguar* and *coryi*) are federally endangered, this issue will take time to resolve.

## Status

The Eastern subspecies is federally endangered throughout all of its range. The cougar has an approved recovery plan in place (created August 2, 1982), but no critical habitat has been designated. It is also listed under CITES Appendix I; which means it is threatened with extinction, and trade is only permitted in extraordinary circumstances. The USFWS presumes this subspecies to be extinct although reports of cougars in the eastern and southern Appalachian Mountains continue to persist.

The Florida panther is also federally endangered throughout all of its range. The Florida panther has an approved recovery plan in place (created December 18, 2008), but no critical habitat has been designated. This subspecies is also listed under CITES Appendix I. Currently, the only documented Florida panthers in the wild occur in south Florida.

Conservation organizations have been investigating the cougar in eastern North America for several years now. Some of the most prominent groups include The Eastern Cougar Foundation (ECF), Eastern Puma Research Network (EPRN), and Cat Specialist Group of the World Conservation Union's Species Survival Commission. Over 5,100 sightings have been documented by EPRN throughout the East since 1965. More than 165 sightings were reported by ECF in the year 2000 alone – some of which occurred in: Alabama, Georgia, Tennessee, South Carolina, Louisiana, and Mississippi.

Of these sightings, approximately 12 have been accompanied by sufficient field evidence to allow confirmation. These are located in the Great Lakes region. Additional information is available on the ECF website. Acceptable forms of evidence include a specimen (living or dead), body part(s), scat, hair samples, tracks preserved in plaster, or video/photos. Though proof now exists that cougars currently inhabit parts of the East, the challenge remains to prove that individuals are reproducing. Until

confirmation of a cub's existence in the wild occurs, wildlife officials await hard evidence that self-sustaining cougar populations exist in the eastern U.S. Sightings and captured individuals are often traced to captive individuals that have either escaped or have been released. Most cougars found in the wild in the eastern US can be traced back to an individual once in human captivity. Often, genetic analysis reveals cats of South American origin.

## Distribution

Cougars have the most expansive distribution of all the New World cats although the species' current range has been reduced by 2/3 from the historic distribution. They occur from the Canadian Yukon, across the U.S., and down into southern South America. Their distribution covers 110 degrees latitude, and individuals can be found at elevations from sea level to 14,000 feet. The former eastern subspecies historically ranged from the southeastern U.S. north to Canada. The subspecies has been combined as noted above and the distribution of cougar east of the Mississippi River is the subject of much debate. The Florida subspecies historically ranged throughout the Southeast, from Arkansas eastward to South Carolina and down into Florida. Its current range has been drastically reduced to a small pocket in southern Florida as a direct result of human-induced factors. Though this is the officially accepted range, sightings throughout the Southeast still occur.

## Description

The cougar is the second largest cat in the Americas, surpassed in size only by the jaguar (*Panthera onca*). Length of the head and body (excluding the tail) is generally 3 – 5 ft. The tail measures an additional 2 – 3.5 ft. Average weight is between 66 – 265 lb., with males being 40% larger than females. Adults stand to 2 – 2.5 ft. in height at the shoulders.

Cougars have very large paws, along with the largest hind legs (proportionately) of all other felids. This anatomy allows them to leap great distances both vertically (up to 18 ft.) and horizontally (20 – 40 ft.). All felids are digitigrade (walk on their toes), with each foot having 4 weight-bearing toes. Cougars have 5 digits on the forepaws and 4 digits on the hind paws, each of which contain a sharp, curved retractable claw. The fur has a uniform sandy brown to reddish coloration which fades to white below. Darker fur is exhibited around the muzzle, back of ears, and tip of tail. The nose has a pinkish coloration, and is bordered by black extending down to the lips. Young are born with blue eyes; circular, brownish-black spots across the entire body; and distinct banding on the face and tail. As they mature, the eyes change to gold/grayish brown and the markings fade. Remnant banding around the muzzle is observed in adults.



## Form and Function

There is no evidence to suggest that cougars native to the eastern U.S. differ biologically from western individuals. Cougars have a notable broad skull. The forehead region is steeply-sloped, while the rostrum is broad. Though the mandible (lower jaw) appears short, it is deep and has well-pronounced musculature. It contains 30 teeth with the dental formula: 3/3, 1/1, 3/2, 1/1. The carnassial teeth (last premolar and first molar used for shearing meat) are thick and long. The canines are sharp, thick, and compressed. Incisors are straight and short. Cougars have 4 cheek teeth on each side of the upper jaw; bobcats (*Lynx rufus*) only have three.



Cougar cubs. Note the blue eyes, spots, and banding on the face.  
Photo credit: <http://www.biokids.umich.edu>

Adults are unable to roar as they lack the specialized larynx and hyoid apparatus necessary for such a vocalization. However, they frequently growl, hiss, yowl, whistle, and purr. Individuals have a greenish-gold eyeshine. They may be active during the day or at night, but prefer to be nocturnal in areas of human habitation. Cougars are considered to be crepuscular, meaning that they are most active at dawn and dusk. They are mainly terrestrial, but climb very well (especially when ascending trees to avoid canids). Though cougars generally avoid contact with water (except when crossing rivers), they are quite agile swimmers.

## Ecology

**Reproduction:** Sexual maturity in both males and females is reached between 2 – 3 years of age. Females first breed at this time, then every 2 – 3 years thereafter. They have a 23-day cycle, and are in estrus for approximately 8 days. Copulation is frequent but short, with each act lasting less than one minute. Courtship and mating can occur at any time, with mating spanning an entire season. In the Southeast, the mating season peaks in the winter and spring.

The chance of conception per mating during estrus is approximately 67%. Average gestational period is 88 – 97 days. Young can be born at any time of the year. Litter size is 1 – 6 young. Cubs are born in a well-concealed den which is usually masked under dense vegetation. Birth weight ranges between 1/2 to 1 lb. Cubs first open their eyes about 10 days after birth. At this time, the ear pinnae begin to unfold, teeth begin to erupt, and cubs begin to play. The mother is solely responsible for the care of her cubs, as males of this species take no part in parenting. By about 40 days of age, the mother has weaned her cubs. The cubs will remain with their mother for 15 – 26 months, after which males will disperse much farther than females.

In captivity, males remain reproductively active to about 20 years of age, whereas females are active to about 12 years of age. Reproductive longevity in the wild is reported at 8 – 13 years. Average lifespan of wild individuals is 18 – 20 years. Captive cougars can live slightly longer.

**Feeding:** Cougars function as top predators within their ecosystems. Like other felids, they are obligate carnivores (they only consume meat). Cougars are vital in the control of large populations of ungulates. In the Southeast, cougars primarily consume white-tailed deer (*Odocoileus virginianus*), wild boar (*Sus*

*scrofa*), rabbits (Leporidae), raccoon (*Procyon lotor*), nine-banded armadillo (*Dasyurus novemcinctus*), and birds. In other parts of its range, staple prey items include large mammals such as mule deer (*Odocoileus hemionus*), white-tailed deer, elk (*Cervus elaphus*), caribou (*Rangifer tarandus*), moose (*Alces alces*), bighorn sheep (*Ovis canadensis*), and wild boar. Additional prey includes: coyote (*Canis latrans*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), porcupine (*Erethizon dorsatum*), skunks (Mephitidae), Virginia opossum (*Didelphis virginiana*), squirrels (Sciuridae), small rodents, fish, and small reptiles. Domestic animals are taken occasionally, especially if left out or pastured in the open at night.

The cougar is considered an ambush predator. It lies in wait, quietly stalking its prey through cover. Once in close range, the cat leaps onto the back of its prey and delivers a fatal bite to the neck. Using a powerful bite below the skull, the cougar ensures either suffocation of its prey or a broken neck. Annual prey consumption is estimated at 1,890 – 2,860 lb of large mammals, or approximately 48 medium-sized ungulates per cougar. Uneaten portions of a kill are cached and covered with dirt, sticks, and leaves. The cougar will then return to its kill over a period of several days. In the event the meat becomes tainted, the cougar can sense this and will not consume it.

**Behavior:** Cougars are solitary and secretive, seldom being seen. Although attacks on humans have been reported (mainly in California and British Columbia), cougars usually avoid human contact. They use scrapes and scent-marking (deposition of urine or fecal material) to establish territory boundaries and advertise reproductive state. Males directly compete with one another for territory rights and mates. When engaged in conflict, males hiss, spit, and swat at each other with their paws. If neither backs down, then physical combat is likely to ensue. Males will kill other males when attempting to take over a territory. Also, males will kill cubs which will often result in the female entering estrous and breeding.

**Habitat:** Preferred habitat is highly variable, but includes wilderness areas, forests, mountains, xeric areas, grasslands, and swamplands. Rocky outcrops and crevices, caves, and dense vegetation are the preferred forms of shelter. Home ranges of males are much larger than females. Males typically range over 55 – 300 square miles, whereas females range 10 – 135 square miles. Female home ranges can display significant overlap, but male home ranges do not overlap with other males. Instead, male home ranges generally include the home ranges of at least 2 females. Individuals can travel long distances (hundreds of miles), mainly along trails or dirt roads as these require less energy expenditure.

**Enemies:** Aside from humans, adult cougars have no predators in the wild. However, young and ill or injured adults may be killed by wolves or bears. Cougars must compete with other apex predators for food, including the brown bear (*Ursus arctos*), American black bear (*U. americanus*), gray wolf (*C. lupus*), and American alligator (*Alligator mississippiensis*). Currently, humans pose the greatest threat to cougars through persecution, habitat loss, and prey base depletion.

**Populations:** Population densities vary from one individual per 33 square miles to as many as one per 5 square miles. Densities vary depending on the amount of prey and other resources in the area. The most recent documented count for the Florida subspecies is 87 individuals, reported in 2003. Currently, this endangered population (inhabiting the southern tip of FL, south of the Caloosahatchee River) is believed to consist of approximately 100 individuals.

## Disease

Documented diseases include bacterial infections, feline immunodeficiency virus (FIV), feline leukemia virus (FeLV), feline infectious peritonitis (FIP), feline panleukopenia virus (FPV, also known as feline distemper), rabies, pseudorabies, and congenital heart defects (mainly the result of inbreeding

among the Florida subspecies). Many of these viruses lead to immunosuppression and eventual death in domestic felids; however, the significance of such viruses to wild cougars is largely unknown. One dead female in southern Florida was discovered to have high traces of mercury in her system, but whether this attributed to her death is unknown (it is posited that depredation of raccoons leads to bioaccumulation of the toxin).

## **Economic Value**

Cougars were historically captured for the zoo and pet trade. In the West, cougars have considerable trophy value for recreational and sport-hunters. In its role as an apex predator, the cougar is important to humans in helping to control wildlife populations that can decimate vegetation and agricultural crops. Cougars also have ecotourism and intrinsic value; they are considered a wilderness icon. Many states continue to allow cougars to be kept in captivity with appropriate permits.

## **Medicinal Value**

No medicinal value has been reported for the species.

## **Damage**

Though rare, cougar attacks on humans have been documented. Such attacks are generally on children and petite adults traveling alone at dawn, dusk, or night. It is believed that in these instances, humans are mistaken for ungulate prey. Cougars can have negative impacts by preying on pets and livestock. Depredation is not common, but can occur if animals are left out at night, or if inadequate husbandry practices are in place. During one 3-year period, livestock comprised less than 1% of cougar diet in Utah. Through depredation pressures, cougars can have negative effects on populations of prey species. Vehicular damage may occur in the event of a collision with a cougar.

## **Legal Aspects**

The Eastern subspecies had been listed as endangered under Georgia Protection of Endangered, Threatened, Rare or Unusual Species and in the Georgia Code; however, in 2006 the cougar was removed due to lack of evidence of its existence. In addition to its listing as a federally endangered species, the Florida subspecies is state-listed as endangered in Florida. Listing is under the Florida Endangered and Threatened Species Act and Florida Administrative Code. A coalition of conservation organizations announced the Florida Panther Protection Program in 2008. The Program is a collaborative undertaking that seeks to join conservation interests with eastern Collier County (a cougar population center) residents in southwestern Florida to facilitate better understanding and management of the cougar. The Program's main objectives are to protect a significant, contiguous range for the cat; and to create a fund that will provide for acquisition and restoration/enhancement of cougar habitat. This funding would also aid in the installation of panther crossings and fencing, which enable the cats to cross roads safely.

## Control to Reduce

In terms of cougar attacks, 13 confirmed human fatalities have occurred in North America during the past 100 years. Other attack victims have sustained non-fatal injuries. Thus, the threat of cougar-induced human mortality has been exaggerated through various media outlets.

Relocation has been used in the management of problem cougars, namely individuals that have depredated livestock or occupy ranges within residential areas. However, this technique is controversial due to the potential liabilities involved. Survival rates of translocated cougars are believed to be fairly low. Currently in the West, management of livestock depredation or incidents involving humans usually involves elimination (i.e., lethal removal) of the problem cat. However, it is important to consider that the cougar is sometimes blamed for domestic pet or livestock depredation that was carried out by another predator (such as free-ranging dogs or coyotes).

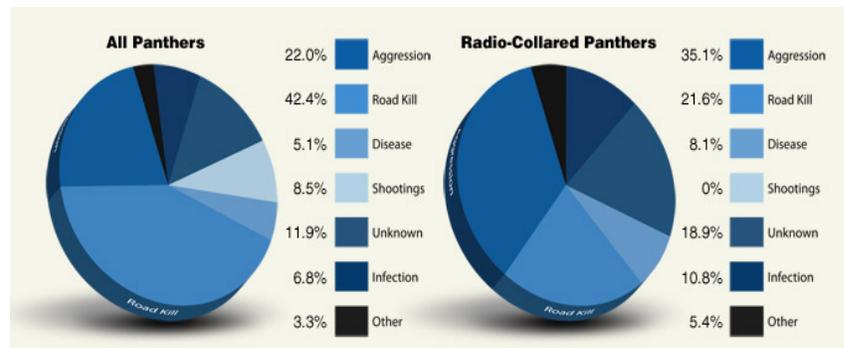
In western areas where cougars have negative impacts on ungulate population dynamics, general population reductions via hunting may be prudent. A more efficient mode of control, however, is the specific removal of offending cougars. Selective removal may be especially effective in eastern regions where the cougar population itself faces conservation threats, or where other limiting factors exist (i.e. social, political, and economic). In the Southeast, controls are not in place to reduce cougar numbers as they are federally endangered.

## Other Threats

Continued human encroachment threatens both the quality and quantity of cougar habitat. Vehicular injury and mortality are also serious threats. From 1979 – 1997, 20 cougar deaths (12 males, 8 females) and 6 injuries were documented from collisions with vehicles in Florida. An additional 14 cougar deaths were documented in 2007 alone. Intraspecific aggression (territorial disputes amongst cougars) also threatens the Florida panther's continued existence. Additional threats include inbreeding effects (caused by small population size), bioaccumulation of pollutants (such as mercury), parasitism, and disease. A potential future threat is sea level rise, which would put tremendous strains on the cougar and its habitat.

## Management to Enhance

The Eastern and Florida subspecies' historically ranged throughout the eastern U.S., spanning from the Southeast north to Canada. Today, the only remaining breeding population inhabits the southern tip of Florida, south of the Caloosahatchee River. Male cougars have recently been discovered traveling up to northeast portions of the state, but females are not believed to travel such extensive distances. To enhance the cougar's survivability, habitat corridors and sufficient range area are critical. Population modeling shows that the cougar faces a low extinction risk in areas of at least 850 square miles. A minimum of 1 – 4 new individuals entering this population per decade would markedly increase its persistence.



**Causes of mortality in Florida panthers from 1979-1997. Vehicular mortality and intraspecific aggression represent the most significant causes.**  
Courtesy of the Florida Fish and Wildlife Conservation Commission.

Due to the fact that vehicular collisions significantly impact cougar mortality, underpasses are currently being constructed to provide for safe passage of cougars. These devices not only protect cougars, but a variety of other wildlife as well. In 1993, when Florida State Road 84 was converted to the divided 4-lane Interstate 75, underpasses were created to allow for safe wildlife travel below the flow of traffic. A smaller design was constructed beneath Florida State Road 29, just north of Interstate 75. Currently, a total of 36 wildlife underpasses have been constructed on Interstate 75, and 6 underpasses on State Road 29. Plans are currently underway for additional underpasses in the future.

## Human Use

**Native Americans:** Native Americans may have used the pelt, bone, and meat of this species. The cougar is common in Native American mythology. It was admired as a protector, and considered a source of power in disease prevention and hunting agility. Cheyenne Indians viewed the cougar as a provider and friend, as circling birds would lead them to cougar kills. Apache and Walapais tribe medicine men used cougar body parts to defend against evil spirits.



Cougar underpass beneath I-75 in Florida. Photo credit: Florida Fish and Wildlife Conservation Commission.

**Colonists:** Colonists may have used the pelt of this species.

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