

## I. INTRODUCTION

### Historical Distribution

At one time, *Felis concolor* ranged from British Columbia throughout the United States, Central America, and South America to Patagonia. In the United States today, substantial populations are found only in the remote regions of the western mountains.

The Florida panther (*F. c. coryi*), one of 30 subspecies presently recognized, originally ranged from eastern Texas eastward through Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida and parts of Tennessee and South Carolina (Goldman 1946). This is essentially the area mapped by Hall (1981)(Fig. 1).

### Taxonomy

The Florida panther was first described as a separate geographic race of *Felis concolor* by Charles B. Cory in 1896, who assigned it *F. c. floridana*. Bangs (1899), however, noted that *F. floridana* had previously been used for a bobcat and, believing that the Florida panther was restricted to peninsular Florida and could not intergrade with any other form, assigned it full specific status as *Felis coryi*.

Nelson and Goldman (1929) revised the taxonomic classification of the *Felis concolor* group and reassigned the Florida panther subspecies status as *F. c. coryi* Bangs. This designation also incorporated *Felis arundivaga*, which had been designated by Hollister (1911) from specimens collected in Louisiana. The most recent taxonomic review of the species, as well as detailed descriptions of each subspecies, including *Felis concolor coryi* (based on 17 specimens), is by Goldman (1946).

### Description

The Florida panther is a medium-sized, relatively dark subspecies with short and rather stiff pelage. It is distinguished from other subspecies by its long limbs, small feet, and rich ferruginous color (Bangs 1898), particularly in the mid-dorsal region. The skull has a relatively broad, flat frontal region with remarkably broad and highly arched or upwardly expanded nasals. Three external characters are often observed on Florida panthers which are not found in combination on other subspecies of *F. concolor* (Belden 1982) -- a right angle crook at the terminal end of the tail, a whorl of hair - a "cowlick" in the middle of the back, and irregular white flecking on the head, nape, and shoulders.

Mature male Florida panthers examined in the wild have weighed from 106 to 148 lbs., and measured nearly seven feet from nose to tip of tail. Females were considerably smaller, with a weight range of 65 to 100 lbs. and measuring about six feet from nose to tip of tail.

Figure 1. Historic range of the Florida panther (*Felis concolor coryi*) from Hall (1981).

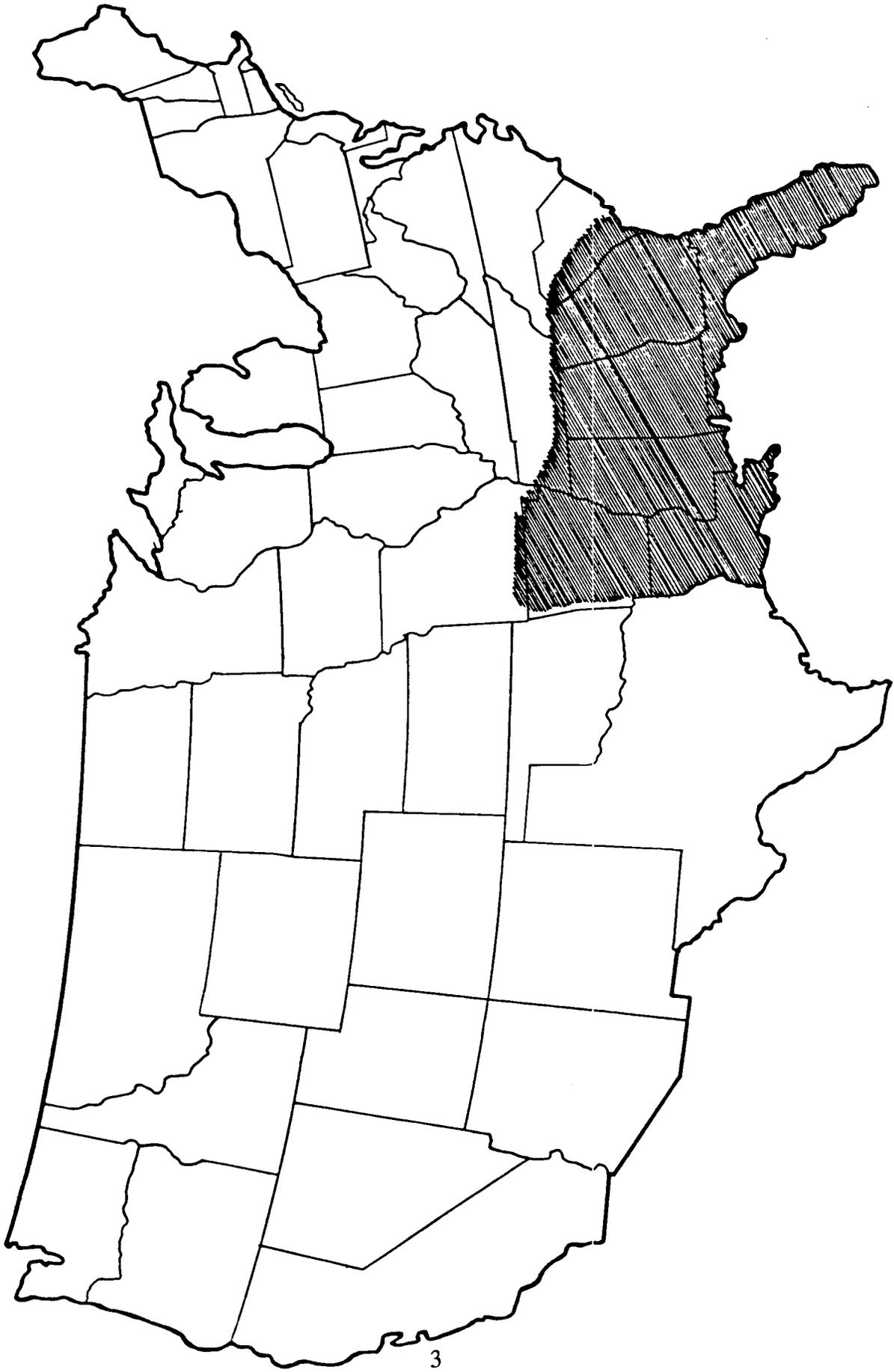


Figure 1. Historic Range of the Florida Panther

Panther tracks consist of four toe marks in a semi-circle ahead of the imprint of a three-lobed heel pad (Belden 1978b). The claws are encased in a sheath and normally do not show in a walking track. When walking the hind foot is often placed in the imprint made by the forepaw. Other less easily identifiable evidence that indicates the presence of panthers are scats, scrapes, and kills. Scrapes are made by pushing up small mounds of dirt and debris with very short backward raking motions with the hind feet. These six-inch-long scrapes usually back up against some object such as a palmetto bush, fallen log, etc., or are found along grassy roads or trails and are typically urinated or defecated upon. Scrapes are made by both sexes, perhaps more frequently during the breeding season (Belden, pers. comm. 1986).

### Habitat

*Felis concolor* has the most extensive natural distribution of any terrestrial mammal in the western hemisphere, excepting man. It is found in montane coniferous forests, lowland tropical forests, swamps, grassland, dry brush country, or any other area with adequate cover and prey (Nowak and Paradiso 1983).

Daytime locations of radio-collared panthers in southwest Florida are highly variable but all are typically heavily vegetated. Commonly used habitat types include mixed swamp forest, hardwood hammock, slash pine-saw palmetto woodlands, and oak-pine woodlands. Most day-bed sites are located in dense, 2-3 m tall saw palmetto thickets bordered by hardwood hammock and wet prairie.

Nighttime telemetry indicates panthers often leave the dense cover used during the day for more open wet prairie, freshwater marsh, or agricultural land. These observations probably reflect movement/feeding patterns of prey species (FGC & NPS - unpublished data).

### Food

Throughout the entire range of *F. concolor* in North America, deer is the most consistently important food (Nowak and Paradiso 1983). Remains of rabbit, feral hog, and deer have been found in scats from north Fakahatchee Strand, south of Sunniland, and deer, rabbit, and raccoon in scats from eastern Everglades National Park (McBride 1985). Deer was found in 46% of the scats, rabbit in 31%, cotton rat in 20%, wild hog in 15%, raccoon in 11%, armadillo in 7%, and birds in 3% (Belden 1982).

### Hunting

Panthers approach their prey slowly and attack with a short, high speed rush at close range. After making a kill, panthers drag their victims to a place of concealment to feed. The forequarters of the carcass are eaten first, after which it is buried with grass and debris and often fed upon later (McBride 1985).

Large prey, such as deer, are usually killed by biting into the spinal cord on top of the neck where the neck and head join. This distinctive killing method provides an excellent way to identify their presence in an area.

### Home Range and Movements

Radio-instrumentation studies indicate that Florida panthers use large areas and may stay for varying periods of time in a specific location (Belden 1982). An individual panther's tracks have been found over areas of 500 sq. km. or more during a given 30 day period (McBride 1985). Of 6 panthers studied in 1986, 2 adult males had ranges averaging 666 sq. km., 3 adult females had ranges averaging 192 sq. km., and one juvenile male had a home range of 433 sq. km. (Dave Maehr, pers. comm 1987). Home ranges of two radio-instrumented females with kittens in Everglades National Park averaged about 200 sq. km. (Bass, pers. comm. 1987). During the winter, panthers appear to move as much in the daytime as at night, but in summer they normally do not move at all in the daytime (op. cit.). Individuals on occasion move as much as 30 km. overnight, and at other times remain in the same location for a week or more. There is considerable overlap in ranges, but adult animals are rarely found together with the exception of during the breeding period, November through March (Roelke et al. 1985; Belden 1982).

The Florida panther is a capable swimmer, readily crossing canals and sloughs and ranging well out into the wetter portions of the Everglades. Even during periods of high water, it is apparently little inconvenienced. Panthers also readily use oil roads and tram roads as travel lanes, and routinely cross highways (McBride 1985).

### Population Estimate

The Florida panther occurs in remote areas in south Florida with a population estimate of 20-50 animals (Forrester et al. 1985). On Federal, State and private lands in Collier and Hendry Counties, the estimate is 23 animals (Robertson et al. 1985).

### Social Interactions

Florida panthers are generally solitary except during courtship and that period of time the female is raising young. Occasionally, however, adult males and females are found in close proximity to each other outside of the courtship period (Maehr pers. comm. 1986). The reason for this behavior is unknown at present.

### Reproduction

The Florida panther breeding season starts in October and continues through March, with the majority of conceptions occurring from November to March (Roelke et al. 1985). However, frequent encounters between males and females have been

documented throughout the year (FGC - unpublished data). Males are at least 3 years old at sexual maturity but females may mature at under 3 years. The gestation period is assumed to be 90-95 days. Living litters documented in Florida have consisted of 1, 2, and 3 kittens (FGC unpublished data). Four full term fetuses were found in a road-killed female and 3 fetuses were detected in a female treated for foot injuries due to gunshot (FGC - unpublished data).

### Health Status

Two major areas of critical concern to panther health have been identified - poor physical condition and anemia of many animals (particularly females) within the Fakahatchee Strand State Preserve and eastern Big Cypress National Preserve, and exposure to infection by several potentially pathogenetic viral, bacteriologic, and parasitic agents (Roelke et al. 1986).

One of the most significant infectious diseases which may affect Florida panthers is feline panleukopenia. Antibodies to this virus and closely related parvovirus were detected in 23 of 26 (88 percent) of the panthers examined (Roelke et al., 1986). Also known as feline distemper, this virus is a highly contagious, devastating disease known primarily in domestic cats. Given the pathogenicity of this virus and the documented species' susceptibility to it (Bittle 1981; Wallach et al. 1984), it is reasonable to assume that panthers in Florida have experienced some degree of clinical disease and mortality, especially in individuals under one year of age. Females with high titers can provide passive protection to the kittens for only a limited period of time (8 to 14 weeks), after which the kittens are susceptible. However, once an animal has survived an infection and mounted an immune response, it probably is protected for life. Panleukopenia has also been diagnosed in bobcats, and recent experimental evidence indicates that raccoons are also highly susceptible. Both species in south Florida have antibodies to the virus, indicating exposure and may function as reservoir hosts (Roelke, pers. comm. 1986).

Another pathogenic virus detected in panthers is feline calicivirus, a primarily upper respiratory virus. It usually is quite mild, but certain strains can cause severe oral lesions and even death. Thirteen of 26 panthers examined by Roelke, et al. (1985) had antibody titers to this virus. Recovered animals can harbor and shed the virus for a considerable time.

Another potential pathogen found in the Florida panther is the hookworm, *Ancylostoma pluriidentatum*. Forrester, et al. (1985) found six of seven panther carcasses examined had hookworm infection. The mean number of adult worms per panther was 254, with a range of 36 to 744. In dogs, hookworms are known to consume an estimated 1/20th of a cc of blood per day. Therefore, a panther could be losing a significant amount of blood per day at the level of worm infection noted. On a short term basis, this amount of loss could possibly be tolerated, but over an extended

period of time the loss could be debilitating. Limited research (Roelke, et al. 1985) with two captive cougar kittens (non-*coryi*) indicated that hookworms caused severe anemia, depressed serum iron, poor weight gain, and "unthrifty" condition. Had anthelmintics not been used, the kittens would probably have died. Hookworm parasitism in older panthers may contribute to chronic anemia and weight loss, especially when the animals are nutritionally compromised. Effects of parasitism can show up secondarily in nutritional deficiencies or concomitant diseases.

Roelke, et al. (1985) speculated that either panleukopenia or hookworms, acting independently or concurrently, especially when coupled with other environmental or nutritional stresses, could result in significant mortality in panthers under one year of age, and could thereby lower recruitment.

### Present Status

Panther sightings, most of which are at best questionable, have been reported in Arkansas, Florida, and Louisiana (Layne and McCauley 1976; Lewis 1969, 1970, Lowery 1974, McCauley 1977, Sealander 1956, 1979, Sealander and Gipson 1973, and Yenke 1982). Other reports indicating the possible presence of the animal in other areas have been summarized by Jenkins (1971) and Nowak (1974). However, consistently conclusive recent evidence of the animal's presence is available only from the Big Cypress and Everglades Physiographic Regions of South Florida (Belden 1978; McBride 1985; Belden 1979, Florida Panther Survey, Job I-E-1 Performance Report, Florida Endangered Wildlife Project E-1-03) (Fig. 2).

Panther sign is found regularly in these areas and reproduction has been documented. In addition, periodic confirmed sightings have come from adjacent areas as far north as Glades County and as far east as Palm Beach County. Panther sign cannot, however, be predictably found in areas other than the Big Cypress and Everglades Physiographic Regions (Belden, et al. 1987).

### Reasons for Decline

The decline of Florida panther numbers and distribution has been under way at least since the arrival of Europeans. The elimination process started with early settlers, who attempted to destroy panthers at every opportunity because of potential and real losses of livestock, and fear. Hunting was typically done by using dogs to pursue and tree the cat, at which time it was easily shot. Given these conditions, it is not surprising that most populations were eliminated before 1900.

Figure 2. Area where consistent documented evidence of the presence of panthers occurs.

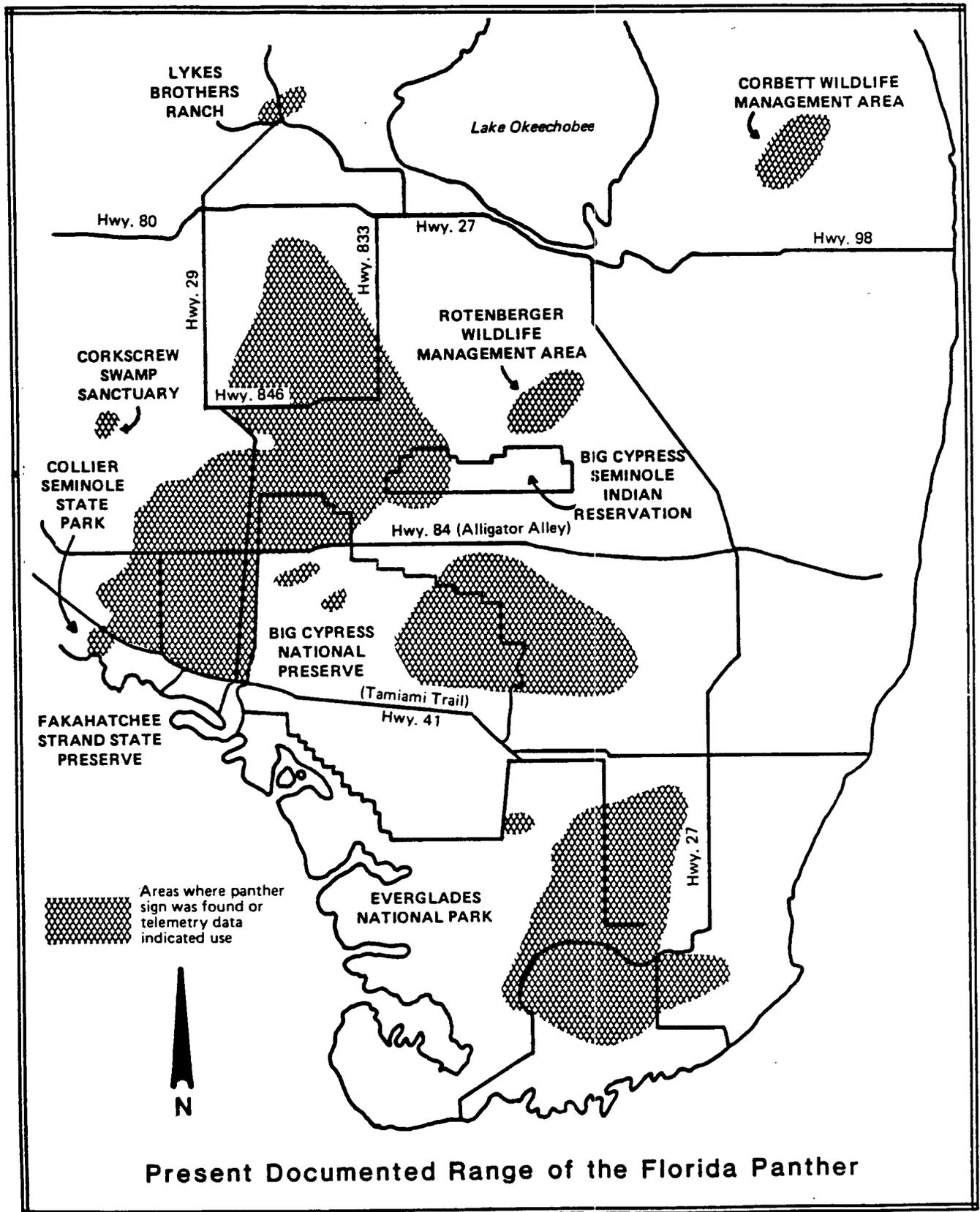


Figure 2.

The panther has only recently been protected in the southeastern States. As late as 1973, it was considered a predator in Mississippi and given no protection under State law; the species was not fully protected in Florida until 1958. A significant panther population was still present in southern Florida around the turn of the century, but enormous human population growth since has resulted in a continuous and accelerated decline.

### Present Threats to the Species

Present threats (not necessarily in order of priority) to the survival of the Florida panther in south Florida include:

1. Low population numbers/depressed genetic viability. Low numbers make the species especially vulnerable to natural or man-caused catastrophes and suppressed genetic viability. Male panthers exhibit an unusually high percentage of abnormal sperm. Five males examined to date had greater than 93% abnormal sperm (Roelke 1985; Roelke pers. comm. 1986.). The significance of this as it relates to reproductive fitness is yet to be determined, but such may reflect a critical degree of inbreeding, as demonstrated in other felids (O'Brien, et al. 1985; Wildt, in press).
2. Increased human presence. Increased human populations in Florida have results in greater human use and occupation of panther habitat by residents, hunters, tourists and industry. Roads have been built through areas occupied by panthers and more are anticipated. Vehicular traffic continues to increase annually. Twelve panthers are known to have been struck by vehicles between 1980 and 1986, 10 of which were killed. As hunter use demands accelerate, the potential exists for competition between panthers and hunters for deer and hogs, and occasionally hunters illegally shoot panthers. Off-road vehicle traffic is increasing, making accessible large areas that formerly had been isolated wilderness. Increased or intensified urbanization, agriculture, water management, mineral exploitation, and industrialization in panther habitat have also resulted from human population growth.
3. Diseases and parasites. Panthers are known to be exposed to panleukopenia, feline calicivirus, and pseudorabies, and are infected with hookworms and ticks. Any or all may increase kitten mortality and/or seriously reduce the vitality of adults.
4. Reduced prey base. Panthers likely need to consume up to one deer or hog per week (pregnant females two) in order to maintain proper vigor and health (McBride 1985). There is concern that deer and hogs in several areas of south Florida may not be sufficiently abundant to meet that need. Reasons for the

decline of prey species include human alteration of the habitat, improper management of the habitat, and/or other human impacts such as water control, public use, etc. Moreover, much of south Florida has never produced high deer densities because of low habitat quality.

### Accomplishments

Since the Florida panther was listed as an endangered species by both State and Federal governments, and since the initial panther recovery plan was approved in 1981, considerable recovery effort has been made.

The Florida Panther Record Clearinghouse was established in 1976 by the Florida Game and Fresh Water Fish Commission and is maintained at its Wildlife Research Laboratory, 4005 S. Main Street, Gainesville, 32601. Thousands of panther sightings have been reported and reviewed, and many field-investigated. From these efforts, it has been confirmed that panthers exist in the Fakahatchee Strand, the Corn Dance Unit in the Big Cypress National Preserve, the Everglades National Park, Corkscrew Swamp, Indian reservations, and on private lands to the north and east of Fakahatchee Strand, extending into Hendry and Glades Counties (west of Lake Okeechobee).

Panther movements have been tracked through radio-instrumentation studies by the Florida Game and Fresh Water Fish Commission and the National Park Service. The resulting data have been computer analyzed to document habitat use, daily activities, home range characteristics, social interactions, etc., and to identify areas where panthers cross roadways.

Nighttime speed limits have been reduced in some areas to provide protection to panthers crossing highways. Major highway improvement projects for State Road 29 and Interstate 75 (State Road 84) have been initiated and special protective features such as wildlife crossings, bridge extensions, fencing, and shoulder expansions were identified and determined to be construction requisites in biological opinions issued by the Fish and Wildlife Service.

A captive-breeding/reintroduction study is underway by the Florida Game and Fresh Water Fish Commission. Facilities have been constructed by Gilman Paper Company at their White Oak Plantation near Yulee, Florida, to accommodate portions of this work. Panther diseases and parasites have been, and are continuing to be, investigated. Efforts are underway to purchase and secure approximately 30,000 acres of north Fakahatchee Strand in Collier County. Other major land purchases are scheduled within the Fakahatchee Strand State Preserve, Golden Gate Estates, and lands impacted by the construction of Interstate 75.

The National Park Service is preparing a General Management Plan for the Big

Cypress National Preserve that will outline the management of all natural resources within the Preserve; the Florida panther will be a featured species. The draft plan is scheduled for release in the summer or fall of 1988.

The panther was designated the official Florida State mammal in 1982. The Florida Panther Technical Advisory Council was established pursuant to Chapter 38-172, Laws of Florida, in 1983 to advise the Florida Game and Fresh Water Fish Commission on technical issues regarding the Florida panther.

The Florida Panther Interagency Committee was established in May, 1986, to provide guidance and coordination on research and management activities. The primary agencies involved in the Committee are the Florida Department of Environmental Protection, Florida Game and Fresh Water Fish Commission, National Park Service, and U.S. Fish and Wildlife Service.

Work to save the Florida panther, and to carry out the tasks of this recovery plan, will continue to require joint cooperative efforts involving many agencies, organizations, and individuals. Currently, directly involved are the agencies represented on the Florida Panther Interagency Committee. However, many other Federal, State, and local agencies including the U.S. Army Corps of Engineers, Florida Department of Transportation, Florida Department of Public Safety, Florida Department of Environmental Regulation, South Florida Water Management District, and others, will play an important role as will numerous public and private research organizations, various local and national conservation groups, and individual landowners within the present and potential range of the panther.