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## STATUS OF COYOTES IN SOUTH FLORIDA

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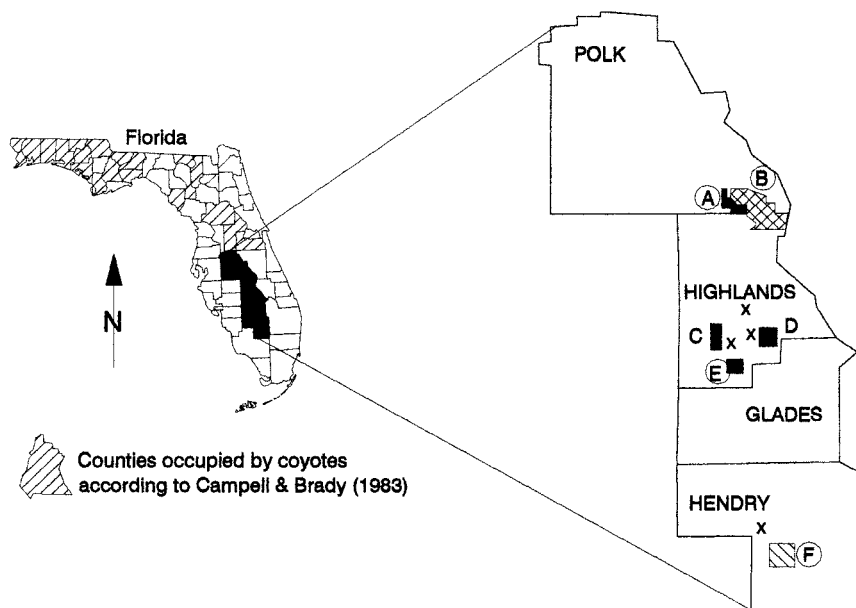
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**Abstract.**—A late spring 1995 survey for coyotes in south Florida revealed an established population in the region from southern Polk County to southern Hendry County that has the potential to compete with native carnivores and become an economic burden on farmers and ranchers.

Extensive changes in south Florida land use patterns began in the early 1900s (De Bellevue 1976) and have created a denatured landscape that is very different from pre-Columbian conditions. A mosaic of large farm fields and fragmented forests has also facilitated a new combination of wildlife species that exhibit a variety of adaptive responses. Florida panthers (*Felis concolor coryi*), bobcats (*Lynx rufus*), black bears (*Ursus americanus*), and other carnivores may benefit locally from some of these changes, but this less-forested environment has caused range-wide distribution contraction, population decreases, and increased anthropogenic mortality. Some of the beneficiaries of a drained and more open landscape include exotic species with relatively small home ranges and generalist food requirements such as the nine-banded armadillo (*Dasypus novemcinctus*), wild hog (*Sus scrofa*), white-winged dove (*Zenaida asiatica*), and European starling (*Sturnus vulgaris*). The nomadic cattle egret (*Bubulcus ibis*) is likely the most abundant of these new immigrants. All of these species are numerous and obvious members of today's south Florida fauna.

A relatively recent, and little understood addition to this wildlife community is the coyote (*Canis latrans*). Although coyotes were introduced into south-central Florida as early as the 1920s (Hill et al. 1987), these individuals are thought to have disappeared (Brady and Campell 1983). Although these authors suggested that coyotes were restricted to 18 mostly Panhandle counties (Figure 1), Cunningham and Dunford (1970) documented a reproducing Polk County population in 1969. Wooding and Hardisky (1990: 13) classified coyote occupation in south Florida as "scattered." Regular discoveries of coyote sign in Collier and Hendry counties began in 1989 during searches for Florida panthers, suggesting a recent expansion into this part of the state. This likely is



**Figure 1. Locations searched for coyote sign from 3-18 June 1995. Circled letters represent locations where signs were found. Xs represent areas outside of formally searched properties where coyote signs also were found. A=Arbuckle Wildlife Management Area, B=Avon Park Air Force Range, C=Archbold Biological Station, D=MacArthur Agro-Ecology Research Center, E=Hendrie Ranch, F=Hilliard Brothers Ranch.**

the result of changing land-use patterns and the coyote's dispersal abilities (Harrison 1992).

The coyote has no competitors in most of its range except for man. Its catholic diet and ability to increase in numbers despite predator control efforts have encouraged the spread of this medium-sized carnivore that now inhabits most of eastern North America. Maehr (1996) measured food habits overlap among large mammalian carnivores in south Florida and speculated that the coyote will compete more with bobcats, black bears, and Florida panthers, than these native species currently compete with each other. Further, coyotes are considered notorious predators of domestic livestock and agricultural crops (Robel et al. 1981, Bekoff 1982).

Hill et al. (1987) suggested that coyote "research efforts should document the nature and extent of impacts on wild fauna and agricultural commodities, and if appropriate, determine control methods compatible with the region's social values and land uses." A thorough understanding of coyote habitat requirements, food habits, and reproductive

output in south Florida will be necessary to accurately evaluate the potential impact of this species on agriculture and native wildlife. As a first step in better understanding coyote ecology in south Florida, we conducted a two-week survey for coyote sign. This represents the first systematic effort beyond mail surveys to document a portion of the species' distribution in Florida.

#### STUDY AREA

Coyote sign was searched for at selected localities in an area that ranged from the southern terminus of the Lake Wales ridge to the northern drainages of the Big Cypress Swamp (Figure 1). Vegetative communities surveyed included sand pine scrub, dry prairie, improved pasture, pine flatwoods, scrubby flatwoods, vegetable farms, and citrus groves. Descriptions of the native plant communities can be found in Myers and Ewel (1990). Property ownership was predominantly private with the exception of the Avon Park Air Force Range (APBR), and Arbuckle Wildlife Management Area (AWMA). The other properties searched included Archbold Biological Station (ABS), the MacArthur AgroEcology Research Center (MAERC), the Hendrie Ranch, and the Hilliard Brothers Ranch (Figure 1). Public roads adjacent to properties in southern Highlands County, especially those with access to citrus groves, were also searched. Time constraints precluded searches on other private lands in Collier and southern Highlands counties.

#### METHODS

We contacted by telephone owners of property >2000 ha to request permission to search for coyote sign using the technique described for Florida panthers by Roof and Maehr (1988). Coyote tracks and scats (feces) were looked for along unpaved roads, canal banks, fire breaks, and trails by walking or by driving a slow-moving all-terrain cycle or pickup truck. Scats were identified as those of coyotes if they were associated with coyote tracks, and if they did not exhibit the distinct segmentation typical of bobcat feces. Locations of sign were recorded on area maps or on county highway maps. Surveys were conducted from 3 through 18 June 1995. Not all contacted property owners granted permission for us to search for coyote sign. Thus, the findings presented here are a patchy representation of actual coyote distribution in south Florida.

#### RESULTS AND DISCUSSION

*Southern Polk County / Northern Highlands County*—Coyotes were present in both the Polk and Highlands sections of APBR (Table 1). The highest concentration of sign was found in the north-central portion of the range, but evidence of coyotes was encountered throughout the property. Records maintained by APBR personnel indicate that coyotes have been seen on the Air Force Range since 1970, but that they appear to be concentrated in the center of the facility (P. Walsh, pers. comm.). Our survey suggests a more widespread distribution of coyotes than indicated by sightings alone. The AWMA provided sparse evidence of coyotes. However, because it is contiguous with APBR, the individuals using Arbuckle are likely residents of both areas.

**Table 1. Frequency of coyote track sets among properties searched from 3-18 June 1985.**

Area searched	Number of track sets found
Arbuckle Wildlife Management Area	2
Archbold Biological Station	4 <sup>a</sup>
Avon Park Air Force Range	38
Hendrie Ranch and vicinity	3
Hilliard Brothers Ranch	11
MacArthur Agro-Ecology Research Center	7 <sup>a</sup>

<sup>a</sup>Tracks found within 1.0 km of property.

*Southern Highlands County*—Neither ABS nor the MAERC contained sign of coyotes; however, tracks were found within 1.0 km of ABS (Table 1) and coyotes have been seen by the ranch manager on the latter property (J. Mullahey, pers. comm.). Tracks were found on nearby properties: immediately to the west of MAERC, immediately east of ABS, and just north of State Highway 70. In these cases coyote sign was associated with citrus groves. This was the same area frequented by a Florida panther before its capture and instrumentation in 1988 (Layne and Wassmer 1988, Maehr et al. 1992). Our survey was insufficient to determine the status of coyotes on ABS and MAERC, however, sign was found in similarly vegetated areas such as AWMA and APBR. The relatively open nature of MAERC and the relatively heavily vegetated ABS are land cover opposites, but such cover is used by coyotes elsewhere.

Coyotes were implicated by a local rancher in the deaths of over 200 sheep near Venus, Florida, during 1993 and 1994 (J. Hendrie, pers. comm.). While they may not have been responsible for all of these losses, the presence of their sign on and in the vicinity of the Hendrie Ranch suggests that coyotes certainly have the opportunity to prey on a domestic species that is consumed by coyotes throughout their range. Generally, the coyote causes more sheep losses than does any other predator in the western U.S. where dollar losses in an individual state can exceed  $3 \times 10^6$  (Bekoff 1982).

*Southern Hendry County*—Although only one area was searched in Hendry County, anecdotal evidence suggests that coyotes are widespread throughout the sections of the county that contain improved pasture and other agricultural activities. In addition to frequent sighting reports, and reports of harvested animals, we documented coyote tracks at the edge of a vegetable farm near Felda, Florida, during November 1994 (Maehr pers. observation). This survey turned up abundant sign on Dinner Island where improved pasture dominates the landscape. The area originally supported extensive pine flatwoods and

a combination of isolated wetlands and the large north-south-flowing Okaloacoochee Slough before the uplands were cleared for agriculture. Surrounding properties (where permission to survey was unobtainable) are very similar in terms of vegetation and land use, and likely support comparable numbers of coyotes as exist on Dinner Island.

Despite our inability to conduct an uninterrupted survey throughout south Florida, the consistent discovery of coyote sign in most areas examined suggests that the species is continuously distributed from southern Polk County through Hendry County and that major highways and the Caloosahatchee River in the region do not appear to be a barrier to coyote movement. Lack of access to property in Glades County precluded surveys in this relatively unpopulated area; however, the combination of extensive improved pasture and remnant forests has created a milieu very similar to occupied range to the north and south. Contrary to the conclusions by Campell and Brady (1983) and Wooding and Hardisky (1990), this survey revealed that a substantial area of southern peninsular Florida now is permanently occupied by coyotes. This difference may have resulted from biases inherent to mail surveys, or it may reflect a change in the coyote's status since the earlier papers were written. Evidence supporting range expansion is provided by APBR natural resources staff who have seen coyotes at least 51 times since 1970 (P. Walsh pers. comm.), but most (>95%) were seen from 1992 through 1995. In addition, three coyotes were harvested on APBR after 1992, and Mr. James Hendrie reported significant depredations on sheep only within the last 2 years in southern Highlands County. Layne (1994) listed several other recent records from Charlotte, DeSoto, and Highlands counties, and coyotes have been seen near Bassinger, Okeechobee County, and implicated in nearby goat depredations (G. Tanner, pers. comm.)

With the exception of their apparent expanding range, little can be inferred about coyote ecology in south Florida beyond an apparent preference for open grasslands (Nowak 1991: 1068). Three scats from APBR contained native plant and animal remains, and they were collected in an area that is an active livestock range. Although there is some evidence that coyotes in Florida are a significant predator on livestock, abundant native prey species likely reduce the potential for depredations. Nothing has been reported on coyote den requirements in Florida; however, H. W. Kale, II (pers. comm.) observed a coyote family within a dense saw palmetto (*Serenoa repens*) thicket in the phosphate region of central Polk County. Saw palmetto is commonly used by all of south Florida's native mammalian carnivores for food, cover or both (Maehr and Layne 1996).

Until the 20th century, Florida supported permanent populations of native canids that included red wolves (*Canis rufus*) (Robson 1992)

and gray foxes (*Urocyon cinereoargenteus*). Although it could be argued that the coyote has simply filled the vacant niche of an extirpated congeneric, the loss of the red wolf coincided with predator control that was followed by the clearing of forests. As a result, Florida has become an increasingly open, range-like state that is more similar to the native range-lands of western North America that are considered typical coyote habitat.

The presence of coyotes was confirmed from the southern Lake Wales Ridge to the northern Big Cypress Swamp. The inconsistent discovery of sign may be the result of differences in habitat quality, brief survey efforts, or may reflect the coyote's continuing range expansion. In any event, the distribution of sign was sufficient to be the product of a population that exists in numbers that could impact native carnivores, farmers, and ranchers.

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