



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
South Florida Ecological Services Office  
1339 20<sup>th</sup> Street  
Vero Beach, Florida 32960

October 8, 2002

Colonel James G. May  
District Engineer  
U.S. Army Corps of Engineers  
Post Office Box 4970  
Jacksonville, Florida 32232-0019

Service Log No.: 4-1-02-F-014  
Application No.: 199602945 (IP-DY)  
Dated: January 17, 2002  
Applicant: Barron Collier Company  
County: Collier

Dear Colonel May:

This document provides the Fish and Wildlife Service's (Service) biological opinion for the proposed Barron Collier Company project known as *Winding Cypress* in Collier County, Florida, and its effects on endangered red-cockaded woodpeckers (*Picoides borealis*) and endangered Florida panthers (*Puma concolor coryi*). This document also provides concurrence with the U.S. Army Corps of Engineers (Corps), determinations of "may affect, but not likely to adversely affect" for the eastern indigo snake (*Drymarchon corais couperi*) and wood stork (*Mycteria americana*). The biological opinion and concurrences are provided in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This Biological Opinion is based on information provided in the public notice for the proposed action, field investigations, meetings, letter correspondence, email correspondence, and phone conversations with the Corps; the applicant - Barron Collier Company; the applicant's consultant - WilsonMiller; the applicant's attorney - van Ness Feldman; the U.S. Environmental Protection Agency (EPA); the Florida Department of Environmental Protection (DEP), Rookery Bay National Estuarine Research Reserve; the Florida Fish and Wildlife Conservation Commission (FWC); the South Florida Water Management District (SFWMD); the Southwest Florida Regional Planning Council (SWFRPC), the Florida Wildlife Federation (FWF), the National Wildlife Federation (NWF), and other sources of information. A complete administrative record of this consultation is on file at the Service's South Florida Ecological Services Office in Vero Beach, Florida.

## Consultation History

On February 3, 1995, the Service received a request for information on threatened and endangered species in the project vicinity from the applicant's consultant, known then as Wilson, Miller, Barton and Peek, Incorporated (now WilsonMiller).

On March 21, 1995, the Service indicated that the project contained habitat suitable for Florida panthers and red-cockaded woodpeckers and that both species had been recorded onsite. The letter noted the presence of one red-cockaded woodpecker colony and the use of the site by panthers. The Service offered to work with Barron Collier Company to develop measures that would avoid and minimize impacts to listed species and maximize overall project benefits.

On March 5, 1999, and July 23, 1999, the Service received letters transmitted from the FWC to the SWFRPC Development of Regional Impact coordinator. The letters indicated that the project site contained habitat suitable for the Florida panther, Florida black bear (*Ursus americanus floridanus*), Big Cypress fox squirrel (*Sciurus niger avicennia*), wood stork, red-cockaded woodpecker, and other state-listed species. The FWC recommended that Barron Collier Company mitigate offsite for listed species habitat impacts and provide a less fragmented habitat preserve onsite.

On March 19, 2001, and May 20, 2001, the Service received letters transmitted from DEP to the Corps. The letters stated that the proposed project must not degrade water quality beyond ambient conditions established when Rookery Bay was designated an Outstanding Florida Water (Chapter 17-3.302, Florida Administrative Code). DEP recommended that water quality testing be conducted before, during, and after construction, that operation of weirs on U.S. Highway 41 mimic natural freshwater timing and quality, that mitigation focus on protecting land in the headwaters of Henderson Creek, that onsite flow-ways be maintained or restored, and that landscaping be done with native plants and not category I or II invasive plants.

On October 25, 2001, the Service met with Barron Collier Company, van Ness Feldman, and WilsonMiller in Vero Beach, Florida, to discuss the proposed project. Barron Collier Company noted that the land had been in the family for 50 years that it was zoned for urban development, and that the project had received unanimous approval from the Collier County Environmental Advisory Council, Planning Commission, and Board of County Commissioners. Barron Collier Company proposed to mitigate project impacts by preserving a section of land adjacent to a wildlife crossing on U.S. Highway 29, which connects Big Cypress National Preserve with Fakahatchee Strand State Preserve. Barron Collier Company agreed to submit a habitat impact and mitigation analysis that justified the proposal.

On November 9, 2001, the Service met with Barron Collier Company, van Ness Feldman, and WilsonMiller in Vero Beach, Florida, to continue discussion of the proposed project. The Service agreed that the offsite preserve had high value at the local and regional scale.

On December 20, 2001, the Service met with Barron Collier Company and WilsonMiller in Vero Beach, Florida, to continue discussion of the proposed project. Barron Collier Company stated that based on the habitat impact and mitigation analysis that a section of land for the offsite preserve was adequate. However, Barron Collier Company proposed to increase the offsite preserve to a section and a half to satisfy public concern about the proposed project and its impact on listed species. On January 11, 2002, Barron Collier Company and WilsonMiller met with the FWC

(Jim Beever) and received support for offsite preserve as compensation for project impacts.

On January 17, 2002, the Corps issued a public notice for permit application 199602945 (IP-DY) for proposed impacts to 250.8 acres of jurisdictional wetlands. The Corps noted the presence of suitable habitat for listed species, the proximity of the project site to Picayune Strand State Forest, the existence of one abandoned and one dead red-cockaded woodpecker cavity tree onsite, an active red-cockaded woodpecker cluster five miles north of the project site, a red-cockaded woodpecker fledgling dispersal radius of 10.6 miles for the species in south Florida, wood stork foraging habitat onsite, the lack of wood stork nesting records onsite, and the submission of an eastern indigo snake management plan. Barron Collier Company proposed an onsite preserve comprised of 720 acres of wetlands and 54 acres of uplands. The Corps provided a determination of "may affect, not likely to adversely affect" for threatened eastern indigo snakes and endangered wood storks. The Corps also provided a determination of "may affect" for Florida panthers and red-cockaded woodpeckers.

On January 28, 2002, Barron Collier Company and WilsonMiller met with the FWC (Darrell Land) and received support for the offsite preserve as compensation for project impacts.

On February 8, 2002, WilsonMiller transmitted a letter to the Service summarizing the meetings of October 25, November 9, and December 20, 2001. A *Florida Panther Habitat Assessment Methodology* was attached.

On February 11, 2002, the Service received a copy of a letter transmitted by EPA to the Corps. The letter notified the Corps that in accordance with the procedural requirements of the 1992 404 (q) Memorandum of Agreement, Part IV, 3(a) that the proposed work may affect aquatic resources of national importance and recommended denial. The EPA discussed overall project purpose, less environmentally damaging alternatives, avoidance and minimization of wetland impacts, the adequacy of the mitigation proposal, water quality, and potential impacts to Rookery Bay National Estuarine Research Reserve.

On February 15, 2002, the Service received a copy of a letter transmitted from the NWF and the FWF to the Corps. The letter discussed endangered species, water quality, cumulative impacts, avoidance, minimization and mitigation. Based on permit review criteria in the Corps' *Final Southwest Florida Environmental Impact Statement*, the NWF and FWF concluded that the permit should be denied.

On March 14, 2002, the Corps transmitted to the Service, via fax, land use and habitat cover types and information on surveys for listed plant and animal species from the *Winding Cypress SFWMD Environmental Supplement* to facilitate review of the permit.

On March 14, 2002, the Service analyzed Geographic Information System data and determined that habitat on the project site had been used 25 times between April 1992 and December 2001 by two Florida panthers and two Texas cougars for daytime rest sites.

On March 18, 2002, the Service requested from the Corps, via telephone, a table summarizing upland and wetland land use and habitat cover types because there was conflicting information in the public notice. The tables provided in the public notice indicated there were 792.9 acres of wetlands while the paragraph “Work & Purpose” indicated that there were 961.4 acres of wetlands. The Corps forwarded the Service’s request to WilsonMiller via email.

On March 19, 2002, WilsonMiller informed the Corps, via email, that the land use and habitat cover types provided in the public notice were based on vegetation as determined from aerial photography and not the Corps’ wetland jurisdiction maps.

On March 20, 2002, WilsonMiller transmitted to the Service, via fax, the summary table of upland and wetland land use cover types.

On April 4, 2002, the Service transmitted a letter to the Corps. The Service concurred with the determination of “may affect, not likely to adversely affect” for eastern indigo snakes. The Service could not concur with the determination of “may affect, not likely to adversely affect” for wood storks or “may affect” for Florida panthers and red-cockaded woodpeckers and requested the information necessary to concur or to initiate formal consultation as required in the regulations governing interagency consultations (50 CFR § 402.14).

On April 15, 2002, the Service met with the Corps, EPA, Barron Collier Company, and WilsonMiller in Fort Myers, Florida, to discuss the proposed project. Barron Collier Company provided a drawing that showed six site plan modifications made between August 1998 and July 2002. The onsite preserve increased to 840 acres and the onsite impacts were reduced by 127 acres.

On April 29, 2002, Barron Collier Company, WilsonMiller, and EPA made a visit to the project site.

On May 2, 2002, Barron Collier Company, WilsonMiller, and the Service made a visit to the project site. There was discussion on wetland avoidance, minimization, and mitigation; the onsite preserve, the offsite preserve, onsite panther use, and listed species issues.

On May 15, 2002, WilsonMiller transmitted a letter to the Service acknowledging receipt of the Service's April 4, 2002, letter and stating that a response was forthcoming. WilsonMiller also requested that the Service provide comments on the *Florida Panther Habitat Assessment Methodology*.

On August 8, 2002, the Corps transmitted a letter to the Service. The following items were attached to the letter: the July 2002 *Winding Cypress Environmental Supplement*, a pre- and post development Wetland Rapid Assessment Procedure (WRAP) analysis for the 1,928-acre project site, a pre- and post-enhancement WRAP for the 1,030.4-acre offsite preserve, the July 2002 revised site plans; Barron Collier Company's July 19, 2002, response to public notice comments; Barron Collier Company's May 24, 2002, response to the Service's April 4, 2002, letter; the Corps' May 11, 1998, jurisdictional validation letter, the February 2002 *Wildlife and Habitat Management Plan*, the May 2002 *Red-cockaded Woodpecker Update*, the February 2002 *Eastern Indigo Snake Management Plan*, the April 2002 *Big Cypress Fox Squirrel Management Plan*, the May 2002 *Listed Species Report* for the 1,030.4-acre offsite preserve, and the February 2002 *Panther Mitigation Assessment*. Based on the information provided, the Corps requested that the Service concur with the determination of "may affect, not likely to adversely affect" for wood storks and that formal consultation (50 CFR § 402.14) be initiated on Florida panthers and red-cockaded woodpeckers.

On September 10, 2002, the Service advised the Corps that formal consultation on Florida panthers and red-cockaded woodpeckers had been initiated and that the projected date of completion of the biological opinion would be on, or before, October 7, 2002.

The Service has also reviewed the WRAP analysis that was submitted on August 8, 2002, as an appendices to the Corps concurrence request, and concurs with the Corps determination of "may affect, not likely to adversely affect" for wood storks.

#### State Project Coordination

The proposed action is subject to water quality certification by the SFWMD with technical assistance offered to the SFWMD by the FWC. The FWC also offered comments and recommendations throughout development of the proposed action to the Corps under the Fish and Wildlife Coordination Act of 1958, as amended (48 Stat. 40; 16 U.S.C. 661 *et seq.*).

## BIOLOGICAL OPINION

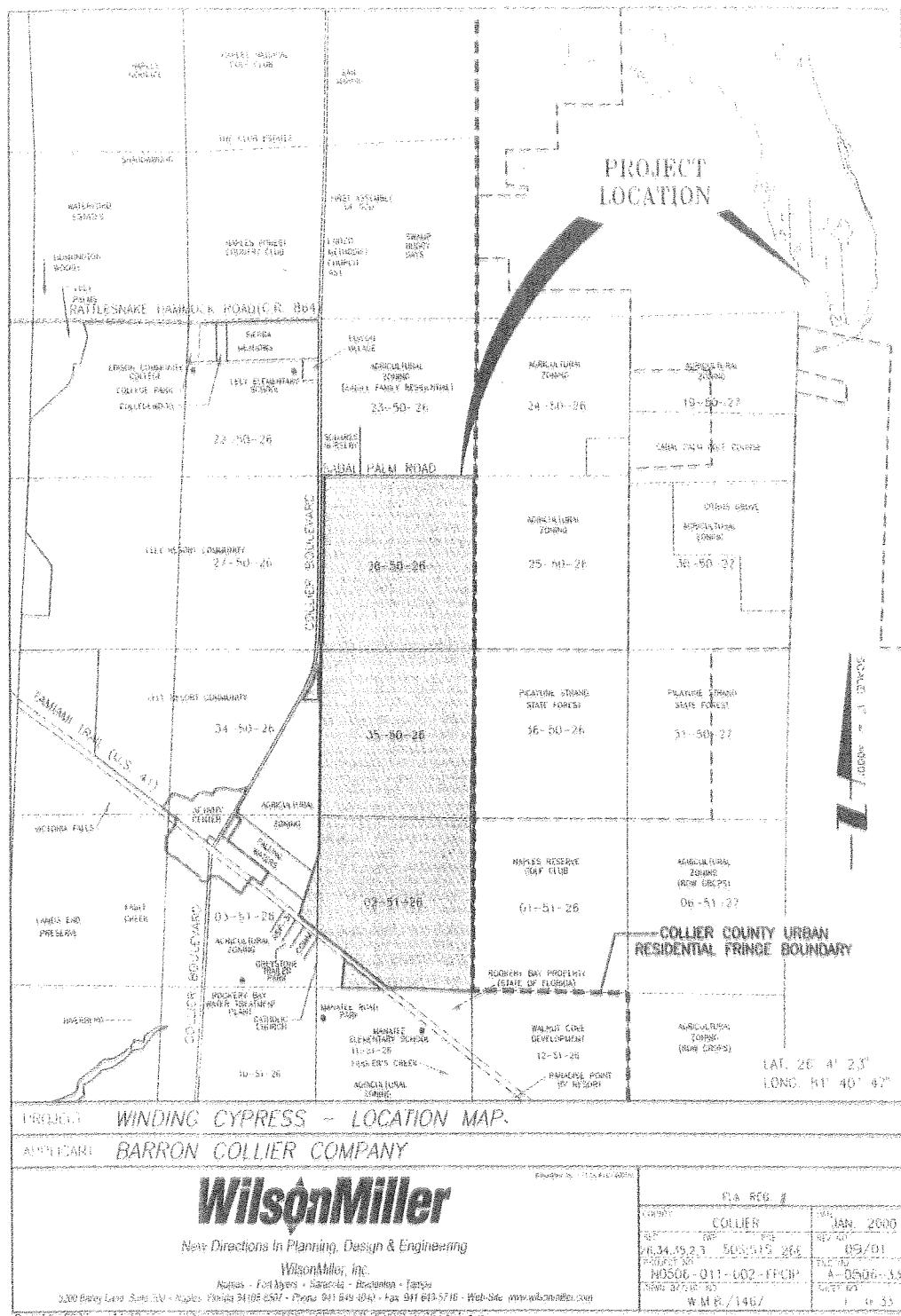
### DESCRIPTION OF THE PROPOSED ACTION

The applicant, Barron Collier Company, proposes to construct a 18-hole golf course community. The 1,928-acre project site is comprised of 975.4 acres of jurisdictional wetlands and 952.6 acres of uplands. Specifically, the project site is comprised of 842.8 acres of forested uplands, 819.9 acres of forested wetlands, 54.7 acres of non-forested uplands, 128.3 acres of non-forested wetlands, 55.1 acres of disturbed uplands, and 27.2 acres of disturbed wetlands. Exotic plant species such as Brazilian pepper (*Schinus terebinthifolius*) and melaleuca (*Melaleuca quinquenervia*) have encroached on 1,410.2 acres (73 percent) of the project site. Nine percent (173.5 acres) of the project site is characterized as disturbed.

The site plan has gone through six iterations since August 1998. Barron Collier Company proposes to discharge 1,079,730 cubic yards of fill material into 164 acres of wetlands and excavate 763,070 cubic yards of material from 37.2 acres of wetlands. Total wetland impacts have been reduced 18.6 percent. As compensatory mitigation for impacts to 201.2 acres of wetlands, Barron Collier Company proposes to preserve and enhance 764.5 acres of wetlands and 75.5 acres of uplands onsite and place the proposed 840-acre onsite preserve under a conservation easement granted to SFWMD.

In order to minimize direct and indirect effects to the panther and panther habitat and direct and indirect effects to the southwest Florida population of red-cockaded woodpeckers, Barron Collier Company proposes to: (1) preserve and enhance 840 acres onsite, which are adjacent to the Florida Division of Forestry, Picayune Strand State Forest, (2) preserve and enhance 1,030.4 acres offsite, which provide a direct corridor connection between Big Cypress National Preserve and Fakahatchee Strand State Preserve, and (3) deed the 1,030.4-acre offsite preserve to the DEP.

The project site is bounded on the north by Sabal Palm Road, on the east by Picayune Strand State Forest, on the south by U.S. Highway 41, and on the west by County Road 951 (Collier Boulevard). The site is located in Sections 2 and 3, Township 51 South, Range 26 East, and Sections 26, 34, and 35, Township 50 South, Range 26 East, Collier County, Florida (Figure 1).



**Figure 1.** Site of the proposed action, Winding Cypress, in Collier County, Florida.

## Action Area

### Florida Panther

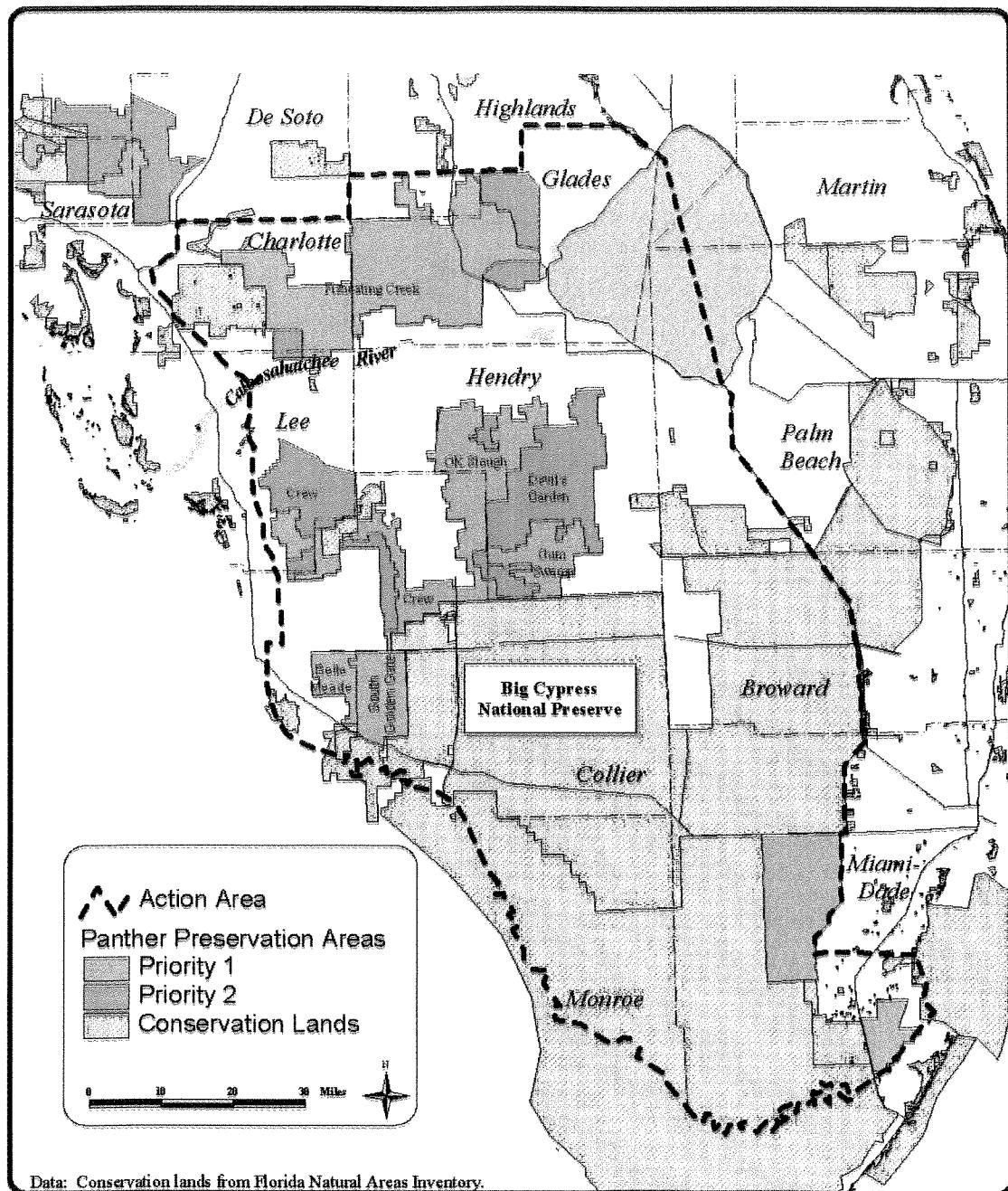
For the purpose of this consultation, the action area includes the current occupied range of the panther in south Florida (Figure 2). The Service reviewed panther radio-telemetry data, known den sites, and other information to delineate an action area that includes lands in Charlotte, Glades, Hendry, Lee, Collier, Palm Beach, Broward, Miami-Dade, and Monroe Counties, as well as the southern portion of Highlands County. Developed urban coastal areas in eastern Palm Beach, Broward, and Miami-Dade Counties, and in western Charlotte, Lee, and Collier Counties were excluded because they contain little to no panther habitat and it is unlikely that panthers would use such areas. The Florida Keys, in Monroe County, were excluded for the same reason.

The action area is larger than the proposed action identified in the Corps' public notice. The proposed action may have direct and indirect effects on the ability of the extant panther population to breed, feed, and shelter. Therefore, potential direct and indirect effects to individual panthers in proximity to the proposed action may affect the extant population.

### Red-cockaded Woodpecker

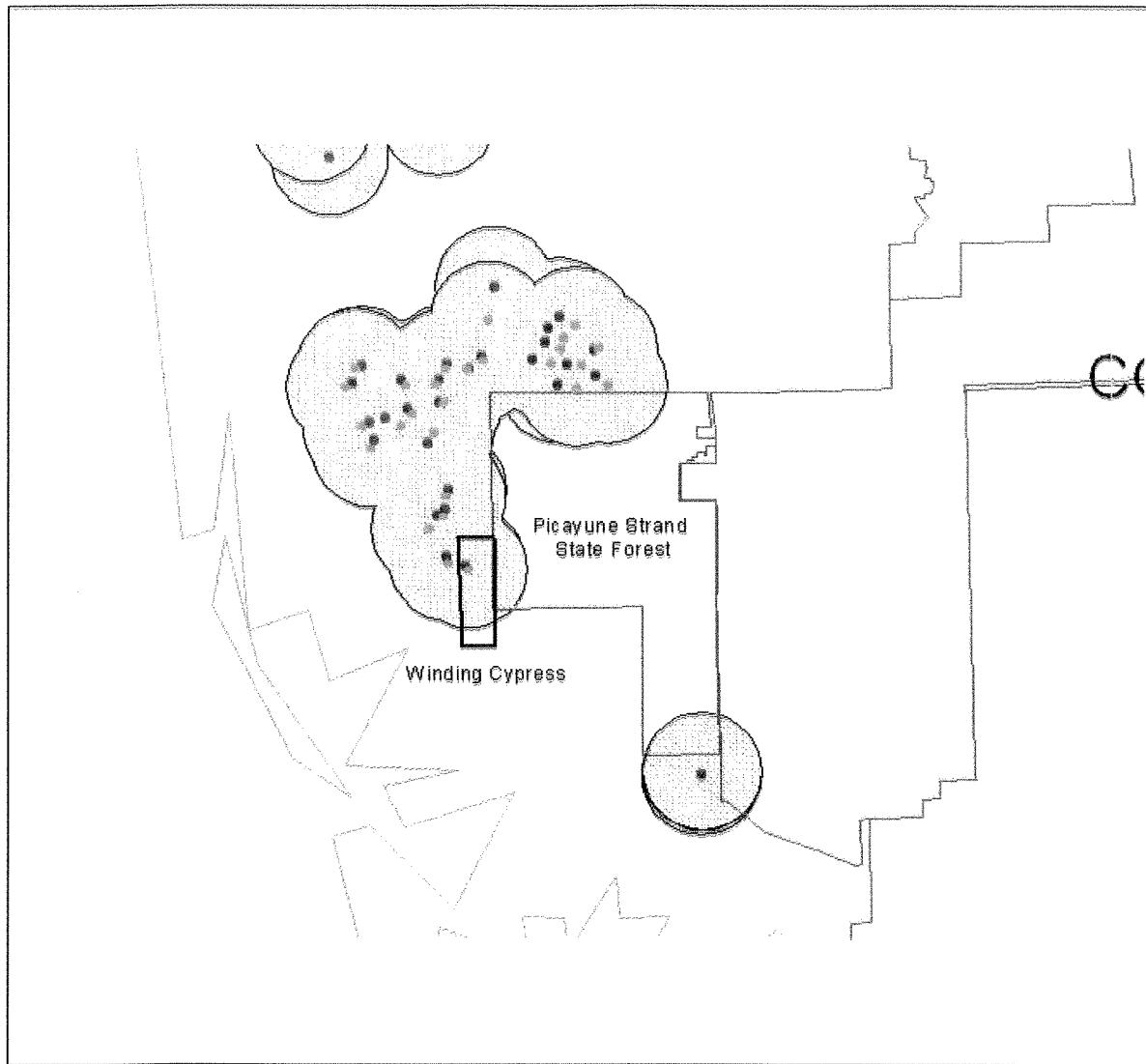
For the purpose of this consultation, the action area for the red-cockaded woodpecker includes the Big Cypress National Preserve, Picayune Strand State Forest, and all pine habitats on private lands contiguous with these two public lands (Figure 3). This area comprises a mixture of pine uplands, hydric pine flatwoods, and pine mixed with cypress and/or cabbage palm. The condition of pine habitats and suitability for red-cockaded woodpeckers is directly related to fire and chemical and mechanical land management practices designed to control the midstory vegetation. On private lands the pine habitats may be interspersed with agricultural, commercial, or residential land use cover types.

The action area is larger than the proposed action identified in the Corps' public notice. The proposed action may have direct and indirect effects on the ability of the southwest Florida red-cockaded woodpecker population to breed, feed, and shelter. Therefore, potential direct and indirect effects to individual red-cockaded woodpeckers in proximity to the proposed action may affect the southwest Florida population.



**Figure 2.** Florida panther section 7 consultation action area.

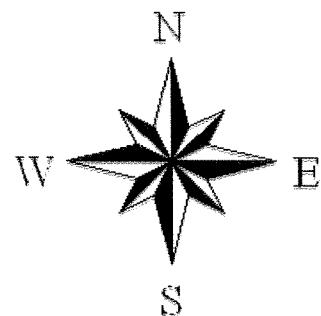
# Red-Cockaded Woodpecker Occurrence Area



**South Florida Ecological Services  
Consultation Map**

Red-Cockaded Woodpecker  
Occurrences and Foraging Area

Figure 3



## STATUS OF THE SPECIES

### Florida Panther

The following discussion is summarized from the *South Florida Multi-Species Recovery Plan* (MSRP) (Service 1999). A complete panther life history discussion can be found in the MSRP. The reader should be aware that most of the life history studies were completed in the 1980s and early 1990s prior to genetic restoration. Current research efforts are focused primarily on monitoring the status and progress of genetic restoration efforts. No critical habitat has been designated for the panther, therefore, none will be affected.

### Species Description

The panther is a medium-sized subspecies of a puma or mountain lion that is characterized as being relatively dark tawny in color, with short, stiff hair (Bangs 1899), and relatively longer legs and smaller feet (Cory 1896) than other subspecies. Skulls of the panther have been described as having a broad, flat, frontal region, and broad, high-arched or upward-expanded nasals (Young and Goldman 1946).

The coat of adult panthers is unspotted and typically rusty reddish-brown on the back, tawny on the sides, and pale gray underneath. The long cylindrical tail is relatively slender compared to some of the other subspecies (Belden 1988). Panther kittens are gray with dark brown or blackish spots and have five bands around the tail. The spots gradually fade as the kittens grow older and are almost unnoticeable by the time they are six months old. At this age, their bright blue eyes slowly turn to the light-brown straw color of the adult (Belden 1988).

Three external characters are often observed in panthers remaining in southwest Florida which are not found in combination in other subspecies of *P. concolor*. These characters are: (1) a right angle crook at the terminal end of the tail, (2) a whorl of hair or "cowlick" in the middle of the back, and (3) irregular, light flecking on the head, nape, and shoulders (Belden 1986). The light flecking may be a result of scarring from tick bites (Maehr 1992a).

Adult male panthers reach a length of around 2.15 meters (seven feet) from the nose to the tip of their tail and have reached or exceeded 68 kilograms (150 pounds) in weight, but typically average around 54.5 kilograms (120 pounds). They stand approximately 60 to 70 centimeters (23 to 27 inches) at the shoulder. Female panthers are considerably smaller with an average weight of around 34 kilograms (75 pounds) and average length of about 1.85 meters (six feet).

### Habitat

Maehr (1990a) estimated the current occupied range of the panther to be 2.2 million acres (880,000 hectares) in south Florida. Native landscapes within the Big Cypress Swamp region of south Florida, within occupied panther range, are dominated by slash pine (*Pinus elliottii*), cypress, and freshwater marshes, interspersed with mixed-swamp forests, hammock forests, and

prairies (Duever *et al.* 1979). Private lands represent about 50 percent of occupied panther range in south Florida. The largest contiguous tract of panther habitat is the Big Cypress/Everglades ecosystem in Collier, Monroe, and Miami-Dade Counties. Suitable habitat extends into Lee, Hendry, Charlotte, Glades, Broward, Palm Beach, and southern Highlands Counties. Poorer-quality (low nutrient, frequently saturated) soils prevalent south of Interstate 75 in south Florida do not produce the quality or quantity of forage required to support large herds of deer and other panther prey items. The influence of soils on primary productivity makes it unlikely that habitat in Big Cypress National Preserve and Everglades National Park is as productive as habitat on private lands in northern and western Collier County in terms of panther health, reproduction, and density. Better soils and drainage also make private lands north of Interstate 75 more suitable for intensive agriculture and urban growth (Maehr 1992a).

Native upland forests are preferred by panthers in southwest Florida (Maehr 1990a), although McBride (2001) hypothesizes that understory cover may also be a key factor in panther habitat use. Highly preferred habitat types are relatively limited in availability but are sought by panthers as daytime resting cover (Maehr *et al.* 1991a). Understory thickets of saw palmetto have been identified as the most important resting and denning cover for panthers (Maehr 1990a). Early telemetry investigations ( $n = 6$ ) indicate that panther use of mixed swamp forests and hammock forests was greater than expected relative to their availability within the panthers' home range (Belden *et al.* 1988). As investigations expanded onto private lands between 1985 and 1990, it was determined that panthers preferred native upland forests, especially hardwood hammocks and pine flatwoods, over wetlands and disturbed habitats ( $n = 26$ ) (Maehr *et al.* 1991a). Hardwood hammocks were consistently preferred by panthers, followed by pine flatwoods (Maehr *et al.* 1991a). This may be related to the fact that, among major vegetation types in Florida, hardwood hammocks have the greatest potential for producing important panther prey species such as the white-tailed deer (*Odocoileus virginianus*), feral hog (*Sus scrofa*), and raccoon (*Procyon lotor*) (Harlow 1959, Belden *et al.* 1988, Maehr 1990a, Maehr 1992a, Maehr *et al.* 1991a).

Male panthers use more cover types and have larger home ranges than females. The home range size of male panthers is influenced by the percentage of hardwood hammock, hardwood swamp, water, grass, agricultural land, barren land, scrub, and brush in the landscape. Smaller male home ranges have greater percentages of hardwood hammocks and hardwood swamp, while larger home ranges have greater percentages of water, grass and agricultural land, barren land, shrub, and brush. Larger female home range size has been positively correlated with higher percentages of dry prairie, shrub swamp, and shrub and brush (Maehr 1992b). Similar to male home range size, female panther home range size is inversely related to habitat quality, which may also influence reproductive success (Maehr 1992b, Maehr *et al.* 1989a).

Mating and denning behavior, aggressive encounters between males, movements and home range shifts, dispersal, survival, recruitment, displacements and replacements of individuals, and other social and ecological interactions are interpreted from telemetry data and field investigations (Land *et al.* 1999). The telemetry data collected for panthers show a preference towards heavily

forested public lands, which is where a majority of panthers have been captured and radio-collared. However, telemetry data, which are collected three times a week between sunrise and mid-day, primarily reflect a panther's choice of day rest sites, or maternal den sites.

Dispersing males may wander widely through unforested and disturbed areas. Agricultural and other disturbed habitats, freshwater marsh, thicket swamp, and mixed swamp are not preferred, and are either used in proportion to their availability or are avoided (Maehr 1990a). Habitats avoided by panthers include agriculture, barren land, shrub and brush, and dry prairie. Panthers have not been found in pastures during daytime telemetry location flights but may travel through them at night (Maehr *et al.* 1991a, Maehr 1992a).

Habitats characterized as avoided by panthers provide food and cover for panther prey, provide a buffer against more intensive land uses such as urban development, have a capacity to be restored to a native condition more conducive to panther use, and are part of the rural landscape matrix that has allowed the panther to persist in south Florida. Panthers also utilize low cover to approach within striking distance of prey and capture the prey after a short, high-speed rush from a concealed position (McBride 1976) and have recently been documented denning in sawgrass (*Cladium jamaicense*) (Land *et al.* 2001).

### Life History

Panthers are essentially solitary. Interactions between panthers were infrequent during a 1985-1990 study. Most interactions occurred between adult females and their kittens. Interactions between adult male and female panthers were second in frequency. Interactions between males and females lasted from one to seven days and usually resulted in pregnancy. Documented interactions between males were not uncommon and resulted in serious injury or death to some individuals. Aggressive encounters between females have not been documented (Maehr *et al.* 1991a).

### Reproduction and Demography

The pattern of Florida panther distribution involves several males maintaining large, mutually exclusive home ranges containing several adult females and their dependent offspring. This spatial arrangement seems to be a prerequisite for successful reproduction (Maehr 1993). Male panthers are polygynous. Breeding activity peaks in fall and winter (Maehr 1992a). Parturition is distributed throughout the year with 81 percent of births occurring between March and July. Litter sizes range from one to four kittens, with a mean of 2.2 kittens per successful litter<sup>1</sup> (Maehr *et al.* 1991a). Intervals between litters range from 16 to 37 months.

Den sites are usually located in dense, understory vegetation, typically saw palmetto (*Serenoa repens*) (Maehr 1990a). Two panther dens recently documented in sawgrass (Land *et al.* 2001)

---

<sup>1</sup> A successful litter is one in which the kittens have survived to an age of at least six months.

illustrate an exception to the norm. Den sites are used for up to two months by female panthers and their litters from parturition to weaning and are also used in subsequent years. Female panthers losing their litters generally produce replacement litters. Five of seven females whose kittens were brought into the captive breeding program successfully reproduced again an average of 10.4 months after the removal of the litter (Land 1994).

Early estimates of infant mortality varied and were in conflict. For example, Roelke *et al.* (1993) characterized infant mortality as relatively high with fewer than half of all births resulting in offspring that survive beyond six months of age (Roelke *et al.* 1993). Land (1994) estimated the kitten survival rate between age six months and one year at 0.895, based on a sample of 15 radio-instrumented kittens monitored from six months to one year of age.

Age at first reproduction has been documented at 18 months for females (Maehr *et al.* 1989b). The first sexual encounters for males have occurred at approximately three years of age (Maehr *et al.* 1991a). Dispersal of young typically occurs around 1.5 to two years of age, but may occur as early as one year of age (Maehr 1992a). Young panthers are considered recruited into the population when they have successfully reproduced (Dennis Jordan, Service, personal communication 1997).

Females are readily recruited into the population as soon as they are capable of breeding (Maehr *et al.* 1991a). Males appear to have more difficulty being recruited. Sub-adult male recruitment is complicated by the lack of dispersal habitat and competition with adult male panthers for territories. Without large areas of suitable habitat to accommodate dispersal, young males have few opportunities for recruitment as residents. As a result, the panther's ability to increase and outbreed has been severely restricted. Successful male recruitment appears to depend on the death or home range shift of a resident adult male (Maehr *et al.* 1991a). Turnover in the breeding population is low; documented mortality in radio-collared Florida panthers is greatest in sub-adult and non-resident males (Maehr *et al.* 1991b).

### Foraging

Food habit studies of panthers in southwest Florida indicate that the feral hog is the most commonly taken prey followed by white-tailed deer, raccoon, and nine-banded armadillo (*Dasyurus novemcinctus*). Deer and hogs accounted for 85.7 percent of consumed biomass north of Interstate 75 and 66.1 percent south of Interstate 75 (Maehr 1990a). No seasonal variation in diet was detected; however, panthers inhabiting an area of better soils consumed more large prey. Differences in prey abundance and availability were indicated by an eight-fold greater deer abundance north of Interstate 75 versus south of Interstate 75, although the estimated number of deer consumed did not differ between the north and south portions of the study area. Hog numbers were lower south of Interstate 75. Fewer large prey may, in part, explain the poorer physical condition, larger home ranges, and lower reproductive output of panthers south of Interstate 75. Hogs dominated the diet of panthers in the north in terms of both estimated biomass and numbers. In the south, deer accounted for the greatest estimated biomass consumed,

whereas raccoons were the highest estimated number of prey items consumed. Domestic livestock were found infrequently in scats or kills, although cattle were readily available north of Interstate 75 (Maehr *et al.* 1990a).

#### Movements and Dispersal

Adult panthers occupy available habitat in southwest Florida in a pattern similar to that of western cougars (Land 1994). More than 7,000 telemetry locations on 26 radio-collared panthers between 1985 and 1990 indicated that home-range size varied from 21 to 461 square miles (53 to 1,183 square kilometers), averaging 200 square miles (519 square kilometers) for resident males and 75 square miles (193 square kilometers) for resident females. Home ranges of resident adults were stable unless influenced by the death of other residents. Home-range overlap was extensive among resident females and limited among resident males (Maehr *et al.* 1991a).

Dispersal distances average 36.4 miles (58.7 kilometers) for sub-adult males and 9.9 miles (16 kilometers) for an adult female. Mean dispersal age was 17.9 months. Dispersing males wander widely through unforested and disturbed areas (Maehr 1992a). The limited dispersal opportunities for sub-adult males may encourage fighting among males (Maehr *et al.* 1991a).

Activity levels for panthers peak around sunrise and sunset. The lowest activity levels occur during the middle of the day. Females at natal dens follow a similar pattern with less difference between high and low activity periods. Although some travel occurs during the day, panthers are mostly nocturnal (Maehr *et al.* 1990b).

There are no known differences in seasonal movements, wet and dry season habitat use, seasonal variation in diet, or effects of season on road crossings. There may be a response to fluctuations in water levels; however, the response is believed to be unmeasurable (Maehr 1989; Maehr *et al.* 1990b, 1991a).

#### Status and Distribution

Of the 27 recognized subspecies of *P. concolor* described by Hall (1981), the Florida panther is the sole remaining subspecies in the eastern United States. Historically, the panther was distributed from eastern Texas or western Louisiana and the lower Mississippi River valley east through the southeastern States in general, intergrading to the north with *P. c. cougar*, and to the west and northwest with *P. c. stanleyana* and *P. c. hippolestes* (Young and Goldman 1946) (Figure 4). The Florida panther had been eliminated from most of the historic range by 1950. The Federal government listed panthers as endangered in 1967 (32 FR 4001). The Service cited heavy hunting and trapping pressures, an inability to adapt to changes in the environment, and developmental pressures as the reasons for the species decline (Service 1967). Occasional sightings and sign were reported throughout the rural southeast between 1950 and 1980 (Anderson 1983). The only confirmed panther population was found in south Florida (Belden 1982).

The first bounty on Florida panthers was passed in 1832. Another Florida law passed in 1887 authorized a payment of \$5.00 for panther scalps (Tinsley 1970). At the beginning of the 20<sup>th</sup> century the Florida population may have numbered as many as 500 (Seal *et al.* 1989). The

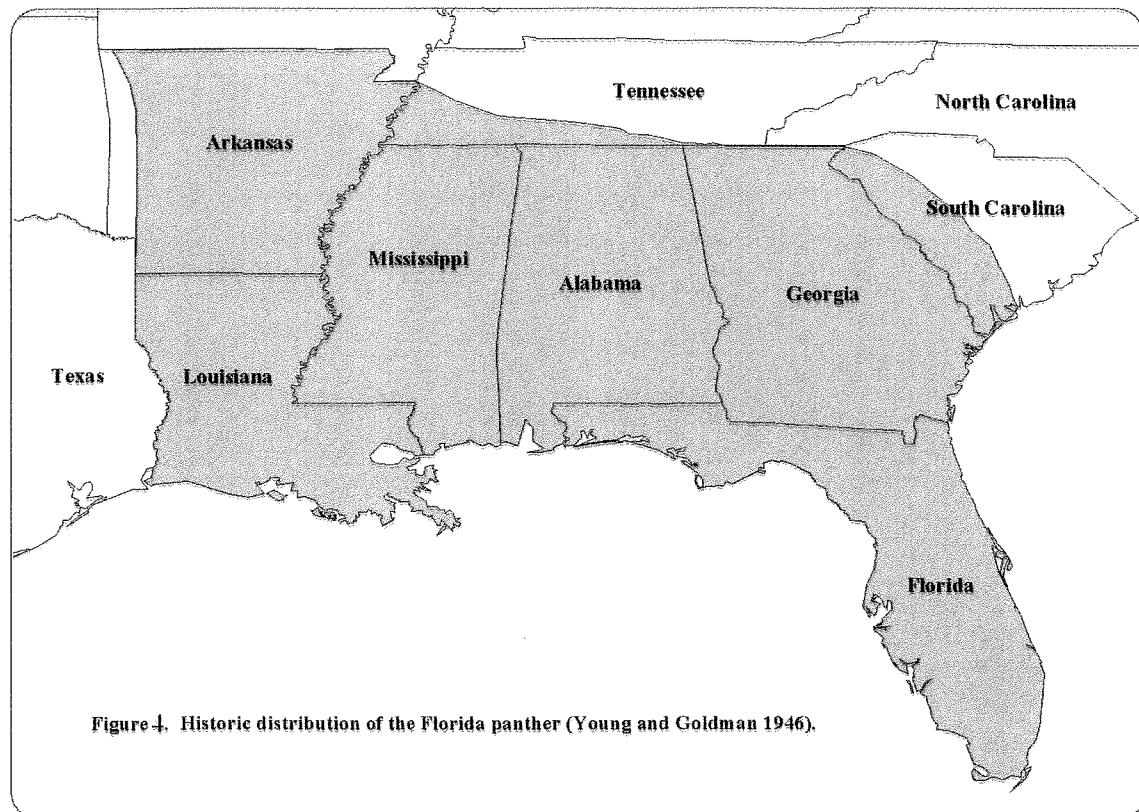


Figure 4. Historic distribution of the Florida panther (Young and Goldman 1946).

State of Florida declared the panther a game species in 1950 and an endangered species in 1958. The population was estimated at 100 to 300 statewide in 1966 (Smith 1970, Schemnitz 1972). The Big Cypress population was estimated at 125 in 1969 (DOI 1969), and a south Florida population at 92 in 1972 (Schemnitz 1972). In the 1970s, the Florida Game and Fresh Water Fish Commission (the predecessor of the FWC) established a Florida Panther Record Clearinghouse to ascertain the status of the panther. The first field searches were made in 1972. The Florida Panther Act, a State law enacted in 1978, made killing the panther a felony. Telemetry investigations began in 1981, primarily on public lands in southwest Florida. The number of radio-collared panthers being monitored has increased from 8 in 1984 to 46 in 2001 (Land *et al.* 2001).

Maehr *et al.* (1991a) estimated the density of panthers in southwest Florida between February and July 1990 to be one panther per 42.9 square miles (110 square kilometers). When extrapolated over a 1,965.6 square-mile (5,040 square-kilometer) area thought to be occupied by radio-instrumented panthers in southwest Florida, the estimated population of the area was 46 adults (9 resident males, 28 resident females, and 9 transient males) between December 1985 and October 1990. This population estimate assumed homogeneous density and similar age and sex composition over time and space. Maehr *et al.* (1991a) considered the population to be higher because the estimation technique excluded panthers in Everglades National Park, eastern Big Cypress National Preserve, and areas north of the Caloosahatchee River. The Florida Panther Interagency Committee, comprised of the Fish and Wildlife Service, National Park Service, Florida Department of Environmental Protection, and the former Florida Game and Freshwater Fish Commission, estimated the population at 30 to 50 adults (Logan *et al.* 1993). The most recent surveys estimate the current population at 78 (McBride 2001). The estimate includes adult and sub-adult panthers with and without radio-collars. The estimate also includes ten panthers whose radio-collars have failed and whose fate is unknown. It does not include kittens at the den and it does not include extrapolations.

#### Population Viability

Early population viability analyses projected extinction of the panther in 25 to 40 years under existing demographic and genetic conditions (Seal *et al.* 1989, 1992). Geographic isolation, habitat loss, small population size, and associated inbreeding have resulted in the loss of approximately half of the panther's genetic diversity (Roelke 1990). Land *et al.* (2001) indicate that representation of Texas cougar genes in the south Florida population is probably close to the goal of 20 percent (Seal *et al.* 1994), although two of the eight Texas females are over-represented. The occurrence of kinked tails and cowlicks has been reduced in intercross progeny. Information on other morphological traits associated with genetic isolation and inbreeding such as cryptorchidism, sperm deformities, atrial septal heart defects, and skull morphology cannot be collected until the intercross progeny mature or pass away. However, the fecundity of the intercross progeny would seem to indicate that sperm deformities have been reduced. For example, one first-generation male captured and examined in the field by Smithsonian theriogenologist Dr. Jo Gayle Howard had a sperm count three times that of a Florida panther, a sperm motility rate that was twice as high, a percentage of normal sperm that was four times greater, and a sperm concentration that was ten times higher (McBride 2001). Since the genetic restoration program was initiated in 1995, the number of panthers monitored annually has increased, highway mortality has increased, and panthers have moved into formerly unoccupied niches on public land in south Florida. These are indications of a robust population that vary dramatically from population parameters prior to 1995. Florida panther and Texas cougar kitten survival to six months is currently estimated at 52 and 72 percent, respectively, and the average at 62 percent (Land *et al.* 2001).

### Red-cockaded Woodpecker

The following discussion is summarized from the *South Florida Multi-species Recovery Plan* (Service 1999) and Technical/agency *Draft Revised Recovery Plan* (Service 2000). No critical habitat has been designated for the red-cockaded woodpecker, therefore, none will be affected.

The red-cockaded woodpecker is a nonmigratory resident of mature pine forests of the southeastern United States. Once common, it ranged from Texas to Florida, north to Maryland, and inland to Kentucky, Tennessee, and Missouri (Hooper *et al.* 1980). Timber management and land use practices have severely reduced this species' range, virtually extirpating it north of North Carolina and from the interior states except Arkansas (Walters 1990, Ligon *et al.* 1986).

The red-cockaded woodpecker's unique natural history and habitat requirements make it vulnerable to modern land use practices because they require older pine trees for nest and roost cavities, and extensive pine and/or mixed pine/hardwood forests to meet their foraging requirements.

In 1970, the red-cockaded woodpecker became one of the first species to be listed as endangered by the Service, primarily as the result of declining abundance due to a reduction of suitable habitat. Despite more than 20 years of protection, the species continues to decline in many areas including south Florida (Beever and Dryden 1992, Service 1999).

The red-cockaded woodpecker is the only woodpecker that excavates nest and roost cavities in living pine trees. Cavities must be excavated in the heartwood because resin flow in sapwood would fill the cavity. Heartwood diameter, as a function of age, necessitates the red-cockaded woodpecker's dependence on old trees for cavity excavation (Walters 1991). Cavity trees are often 80 to 120 years old, depending on the species and older where available (Costa and Kennedy 1994, Ligon *et al.* 1986, Walters 1991).

Excavation of cavities in living pines is a difficult process which may take 10 months to several years to complete (Hooper *et al.* 1980, Walters 1991). Because suitable trees are scarce and cavity construction is a significant investment of time and energy, cavities are a critical determinant of habitat quality and are the ecological basis of group formation (Copeyon *et al.* 1991).

A group typically consists of a breeding pair and possibly one or more nonbreeding males. Red-cockaded woodpeckers are one of the few woodpeckers to exhibit a cooperative breeding system; unmated male birds assist the mated pair with incubation and feeding nestlings. These "helpers" are usually offspring of the dominant male (Hooper *et al.* 1980, Costa and Kennedy 1994).

The stand of trees including and surrounding the cavity trees is called a cluster. Cluster habitat varies throughout the range of red-cockaded woodpeckers, but can generally be described as a mature pine stand, clear of midstory, with 8 to 80 square feet of basal area per acre

(Service 2000). Hardwood midstory reduces the habitat quality, eventually leading to cavity abandonment when the midstory reaches cavity height (Costa and Escano 1989, Walters 1991).

Red-cockaded woodpeckers typically require large (84 to 494 acres) home ranges of open pine and/or mixed pine/hardwood forests with pines 10 inches or larger in diameter at breast height for foraging (Costa and Kennedy 1994; Service 1985, 2000). The number of acres required to supply adequate foraging habitat depends on the quantity and quality of the pine stems available. In south Florida, red-cockaded woodpeckers use smaller trees for nesting and maintain larger territories than populations throughout the remainder of the range (Beever and Dryden 1992).

The recovery of the red-cockaded woodpecker is directly linked to the viability of discrete populations within each southern state. Red-cockaded woodpeckers in southwest Florida are part of the South/Central Florida Recovery Unit (Service 2000). This recovery unit does not contain a primary or secondary core population because no Federal properties in this unit have sufficient habitat to support populations of this size (Service 2000). However, red-cockaded woodpeckers in south and central Florida may be genetically different due to the presence of at least one unique allele. Due to Florida's historic temperate climate, red-cockaded woodpeckers remained here during the last glacial event, thus providing the source population during the advancement of the longleaf pine/scrub oak community (Service 2000). Due to these unique characteristics, red-cockaded woodpecker populations in south and central Florida are considered an essential component of the species (Service 2000).

All populations on State and Federal lands in south and central Florida are designated essential support populations and are included in criteria for delisting (Service 2000). However, the south and central Florida recovery unit is not likely to sustain viable populations and one or more of these populations may be lost to stochastic events. In some instances, translocation of red-cockaded woodpeckers into small, isolated essential populations may be necessary to ensure their long-term persistence.

There are an estimated 85 active red-cockaded woodpecker clusters in southwest Florida; 51 percent are on Federal lands, 35 percent are on State lands, and 14 percent are on private lands. Red-cockaded woodpecker populations on public lands are periodically monitored and the status of birds on these lands range from increasing to decreasing. Effective land management actions are ongoing in the FWC's Cecil Webb Wildlife Management Area where 27 active red-cockaded woodpecker clusters occur. This population is about 45 miles north of the project site and is considered stable. Big Cypress National Preserve is about 25 miles east of the project site and contains 43 clusters that are actively managed and this population is increasing.

There are an estimated 3 active and 11 inactive clusters in Picayune Strand State Forest. This population has been in decline for many years. However, purchase of these lands by the State of Florida and the implementation of aggressive land management actions is likely to stabilize the

population in the near future and result in long-term increases in the number of active clusters. However, this population is small and may be vulnerable to stochastic events that could lead to extirpation despite the State's management efforts. This population is adjacent to the project site.

Information from the early 1990s indicate that 12 active clusters existed on private lands (Beever and Dryden 1992). Since that time, however, landowners have become wary of the species and restricted access to their parcels. Thus, the number and distribution of red-cockaded woodpeckers on private lands cannot be reliably determined. Although the exact number and location of red-cockaded woodpeckers on private lands are unknown, it can be reasonably assumed that they have declined on private lands since the early 1990s because suitable habitat has been lost, fragmented, and degraded as a result of urban encroachment and lack of management.

#### Analysis for the species likely to be affected

The Corps issued a public notice for the proposed project on January 17, 2002, and provided a determination of "may affect" for Florida panthers and red-cockaded woodpeckers. The Corps transmitted Barron Collier Company's biological assessment to the Service on August 8, 2002. Based on the information provided, the Corps requested that the Service initiate formal consultation on Florida panthers and red-cockaded woodpeckers. On September 10, 2002, the Service informed the Corps that formal consultation had been initiated on Florida panthers and red-cockaded woodpeckers and that the projected date of completion would be on, or before, October 7, 2002.

#### ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions, which are contemporaneous with the consultation in progress. As previously noted, the action area for each of the species discussed in this biological opinion includes the entire southwest Florida distribution of the species, which is larger than the action area in the Corps public notice. To set the environmental baseline and evaluate the effects to the species, the discussions are sub-divided into the consultation action area and the Corps public notice action area.

Status of the species within the action area

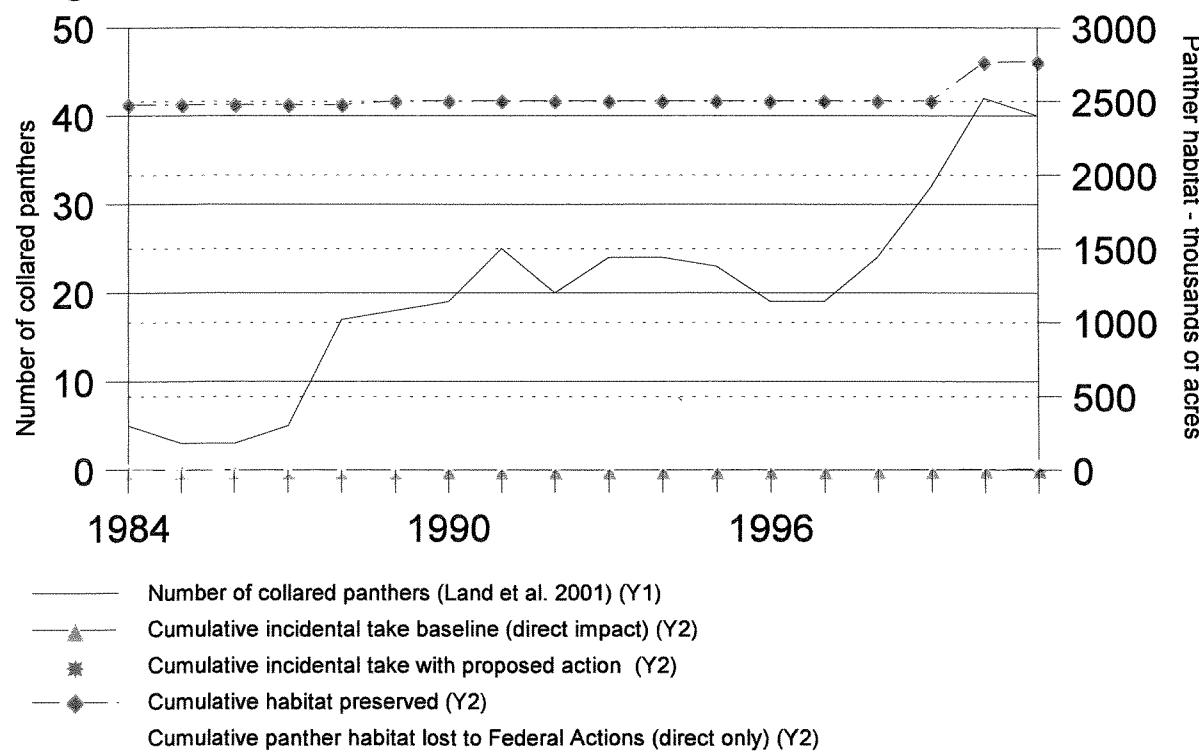
### Florida Panther

#### Consultation Action Area

Of the 27 recognized subspecies of *P. concolor* described by Hall (1981), the Florida panther is the sole remaining subspecies in the eastern United States. At the beginning of the 20<sup>th</sup> century the Florida population may have numbered as many as 500 (Seal *et al.* 1989). The population was estimated at 100 to 300 statewide in 1966 (Smith 1970, Schemnitz 1972). The Big Cypress population was estimated at 125 in 1969 (DOI 1969), and a south Florida population at 92 in 1972 (Schemnitz 1972). The Florida Panther Interagency Committee, based on telemetry data collected between 1981 and 1991 estimated the population at 30 to 50 adult panthers (Logan *et al.* 1993).

Telemetry data represent the annual range and movements of radio-collared panthers and not that of uncollared panthers which may have been, or could be, present in the vicinity of the proposed action. The number of radio-collared panthers being monitored has increased from 8 in 1984 to 46 in 2001 (Land *et al.* 2001) (Figure 5). The present population is estimated at 78 panthers (McBride 2001) and is comprised of 38 females, 18 males, and 22 whose sex is unknown. Forty-five of the panthers are collared and 35 are uncollared. Based on information in Land *et al.* (2001) and McBride (2001) it appears that 43 panthers have home ranges entirely on public lands, 31 have home ranges partially on public lands, and four have home ranges entirely on private lands.

Figure 5. Trends in Number of Collared Panthers and Panther Habitat



Factors affecting the species environment within the action area

### Habitat trends

Habitat loss, habitat fragmentation, habitat degradation, and increased human disturbance resulting from agricultural and residential development are considered among the primary threats to long-term panther persistence. Continued development associated with the expansion of Florida's urbanized east coast, urban sprawl on the west coast, and the spread of agricultural development in the south Florida interior, have placed increasing pressure on panthers and panther habitat (Maehr 1990b, Maehr *et al.* 1991a, Maehr 1992b). Agricultural development continues to replace and fragment panther habitat. More than 83 percent of the 1.6 million acres (648,000 hectares) of agricultural land in southwest Florida is categorized as rangeland.

Between 1986 and 1990, row crop acreage increased by 8,990 acres (3,640 hectares) or 21 percent; sugarcane increased by 16,000 acres (6,475 hectares) or 21 percent; citrus increased by 54,000 acres (21,850 hectares) or 75 percent; and rangeland, much of it suitable for panther occupation, decreased by 160,000 acres (64,750 hectares) or 10 percent. Rangeland losses were about evenly divided between agricultural and urban development (Townsend 1991). The most recent information currently available from this area indicates that the amount of urban land and transitional land cleared and prepared for urban development between 1975 and 1993 increased from 641 square miles to 1,372 square miles; or 23 percent of Charlotte, Collier, Glades, Hendry, Lee, and Sarasota counties combined (Southwest Florida Regional Planning Council 1995).

Rapid development in southwest Florida has compromised the ability of landscapes to support a self-sustaining panther population (Maehr 1990b, 1992b). Maehr (1990a) reports that there are approximately 2.2 million acres (880,000 hectares) of occupied panther range in south Florida and that approximately 50 percent of the known breeding distribution is comprised of landscapes under private ownership. Maehr (1990a) indicated that development of private lands may limit panther habitat to landscapes under public stewardship.

Panthers consistently use large areas with few major highways (Maehr and Cox 1995). Belden and Hagedorn (1993) observed that Texas cougars used in a population reintroduction study established home ranges in areas with a road density that was 50 percent lower than general region in which the study was conducted. In particular, the study animals tended to avoid crossing more heavily traveled roads and favored crossing more lightly traveled roads. Female panthers rarely establish home ranges bisected by highways and maternal dens are located at distances of 0.62 mile (one kilometer) or more from highways (Maehr 1997).

Because of their wide-ranging movements and extensive spatial requirements, panthers are sensitive to habitat fragmentation (Harris 1985). Past land use activity, hydrologic alterations, road construction, and lack of fire management (Dees *et al.* 1999) have affected the quality and quantity of panther habitat. The effect of invasive plants on panther habitat utilization, particularly melaleuca, is unknown. As the remaining forested uplands are lost, sloughs

containing cypress, marsh, and shrub wetlands comprise a greater percentage of the remaining habitat available to panthers, relative to habitat historically available to the species.

One indicator of trends in panther habitat is the number of times the Service has provided technical assistance or consulted on projects that would affect panther habitat in the action area. Between June 24, 1977, and September 24, 2002, the Service provided technical assistance on 23 projects, concluded informal consultation on 36 projects and formal consultation on 55 projects in the action area. Not all of these actions have resulted in loss of all of the panther habitat under consideration. Between March 29, 1984, and August 31, 2001, Corps permit applicants have preserved and enhanced 9,066 acres of panther habitat to offset the direct and indirect effects of their projects. As of October 13, 2000, nonprofit organizations, local governments, state and federal agencies have protected approximately 2.8 million acres of habitat. These figures are likely a conservative estimate and subject to change as the Service updates the database.

Public lands available to the panther within the action area have increased from 2.3 million acres in 1984 to 2.8 million acres in 2001. Each agency is managing their property for panthers and panther prey (Logan *et al.* 1993). Due to habitat quality, not all publicly owned land is suitable for panther occupation (*e.g.* mangrove islands and open water habitats); however, although Maehr (1990b) and others postulated that publicly owned lands could not support additional panthers, expansion of panthers into those areas since 1995 has been dramatic. The present population is estimated at 78 panthers (McBride 2001) following implementation of the genetic restoration program.

#### Habitat management

Prescribed burning is probably the single most important habitat management tool available to public land stewards. Dees *et al.* (1999) examined panther use of habitat in response to prescribed burning at Florida Panther National Wildlife Refuge and Big Cypress National Preserve between 1989 and 1998. A positive temporal response to prescribed burns occurred in the year following the burn and is likely due to the rapid regrowth of vegetation, which in turn attracted white-tailed deer. Panther use of the burned area gradually declined after the first year and ended after four years. Prescribed burn rotations on both study sites is four years, but unfavorable weather conditions and logistics may sometimes extend the rotation.

Spatial responses to fire depended on scale. Panthers positioned their home ranges in areas more likely to be burned, whereas use of burned areas within the home range was less than non-burned areas. Although burnable habitats (pine) were not preferred within panther home ranges, they were used, with about 36 percent of the locations occurring in previously burned areas.

Dees *et al.* (1999) concluded that resource managers could improve panther habitat by reducing the proportion of area comprised of burns older than four years but cautioned that shorter burn rotations could alter vegetative patterns and have a negative impact at the landscape level.

## Mortality, trauma, and disturbance

Records of mortality on uncollared panthers have been kept since February 13, 1972. Records of mortality on radio-collared panthers have been kept since February 10, 1981. Documented mortality ( $n = 99$ ) of radio-collared and uncollared panthers averaged 3.4 per year through June 30, 2001. Male panthers accounted for 61 percent of mortality and females 38 percent. The sex of the remaining 1 percent could not be determined. Sub-adult panthers, up to three years of age, of both sexes accounted for 50 percent of mortality. Adult panthers of both sexes three years of age or older accounted for 50 percent of mortality. The causes of mortality were as follows: vehicular trauma - 44.4 percent; intraspecific aggression - 23.2 percent; unknown - 13.1 percent; old age, disease, etc. - 11.1 percent; shootings - 6.1 percent, and capture-related - 2.1 percent (Land *et al.* 2001). This summary includes only panthers endemic to south Florida for which sex and age was known and does not include introduced Texas cougars (*P. c. stanleyana*).

Florida panther vehicular trauma ( $n = 45$ ) between February 13, 1972, and June 30, 2001, averaged 1.5 panthers per year. Males ( $n = 25$ ) accounted for 56 percent of the vehicular trauma documented, and females ( $n = 19$ ) for 42 percent. The gender of one panther (2 percent) could not be determined (Land *et al.* 2001). Although the relative significance of vehicular trauma to other sources of mortality is not entirely known, it has been the most often documented source of mortality (Maehr 1989, Maehr *et al.* 1991b) because the death of uncollared panthers due to intraspecific aggression, old age, disease, etc. will often go undetected. Vehicular trauma in the panther population core has been eliminated on Interstate 75 and certain segments of U.S. Highway 29 through the use of wildlife underpasses and fencing (Lotz *et al.* 1996, Land *et al.* 2001). Vehicular trauma still occurs on outlying rural roads and efforts are underway to address the issue.

Florida panthers were hunted for bounty during the 1800s and for sport up until the 1950s. Seven panther shootings, six fatal and one non-fatal, occurred between 1978 and 1986. A female Texas puma introduced for genetic restoration was shot in 1998 (Land *et al.* 1999). Education, self-policing among hunters, and regulation are the tools by which shootings are minimized. All free-ranging pumas in the southeastern United States are protected by a "similarity of appearance" provision in the Endangered Species Act.

Janis and Clark (1999) compared the behavior of panthers before, during, and after the recreational deer and hog hunting season (October through December) on areas open (Big Cypress National Preserve) and closed (Florida Panther National Wildlife Refuge, Fakahatchee Strand State Preserve) to hunting. The variables examined were: (1) morning activity rates, (2) movement rates, (3) predation success, (4) home range size, (5) home range shifts, (6) habitat selection, (7) distance from panther locations to trails, and (8) frequency of panther use in the Bear Island Unit of Big Cypress National Preserve. The authors failed to detect any relationship between hunting and the first six variables. Of the last two variables they determined that the distance of panther locations from trails increased an average of 0.31 mile (180 meters) and that the frequency of panther use in the Bear Island Unit decreased from 30 up to 40 percent during the hunting season. An analysis of movement rates, a measure of energy expenditure, and

predation success, a measure of energy intake, do not indicate any direct, negative energetic responses to increased human activity during the hunting season. However, the increase in average distance from trails and decrease in panther use of the Bear Island Unit are indicative of a behavioral change. Janis and Clark (1999) surmise that the increase in the distance of panther locations from trails is "biologically minor" and probably related to prey behavior (*i.e.* white-tailed deer moving deeper into the forest to avoid hunters). The decrease in panther use of the Bear Island Unit is balanced by an increase in use of private lands north of Big Cypress National Preserve as "refugia." The authors assert that this pattern would be of serious concern if panther habitat on these private lands were lost.

#### Recovery actions

Early population viability analysis data suggested that the Florida panther could be considered recovered when the total number of adult panthers, in self-replacing populations of no less than 50, exceeds 500 individuals distributed among at least three independently fluctuating populations (Seal *et al.* 1989). Isolated populations of less than 50 adult panthers (about 80 adults, sub-adults, and juveniles) are not considered demographically stable even if the mean population growth rate is positive. However, habitats unable to support 50 adult panthers may be important to panther recovery. Natural or managed migration can be used to connect sub-populations to constitute a larger, stable population. Seal *et al.* (1989), based on existing genetic and demographic data, predicted a population decline of 6 to 10 percent a year, a loss of three to seven percent genetic diversity every generation (six years), and extinction within 25 to 40 years.

To restore health and viability, ten Florida panther kittens, five male and five female, were removed from the wild between February 1991 and August 1992 for captive breeding purposes. The kittens ranged in age from ten days to eight months and represented progeny of 11 different adult panthers. Two females died in captivity in 1992. One died after heart surgery in an attempt to correct an atrial septal heart defect and one died of unknown causes. Two captive males died of severe respiratory distress after being released to the wild in southern Big Cypress National Preserve in 1997. Six panthers remain in permanent captivity, one male and one female each, at White Oak Conservation Center in Yulee, Florida; Lowry Park Zoo in Tampa; and at the Jacksonville Zoo (Land and Taylor 1998).

To further restore health and viability, a genetic management program was implemented with the release of eight female Texas cougars into south Florida in 1995. This program was designed to mimic natural gene exchange between the two subspecies, without significant alteration in the basic genetic makeup of the panther or swamping the existing gene pool which may be adapted to local environmental conditions (Service 1994). The present population is estimated at 78 panthers (adults, sub-adults, and juveniles) following implementation of the genetic restoration program (McBride 2001).

Maehr *et al.* (2002) conducted a population viability analysis for the Florida panther and compared the results with Seal *et al.* (1989, 1992). Unlike Seal *et al.* (1989, 1992) which predicted extinction within 100 years, Maehr *et al.* (2002) concluded that the panther had a 98 percent probability of persisting for 100 years. However, Maehr *et al.* (2002) noted the potential for severe genetic problems beyond 100 years, that genetic erosion could be offset by population expansion, but that the conservation status of panther habitat in Florida was uncertain. Maehr *et al.* (2002) recommended a recovery strategy that would expand occupied panther range, impose stricter control on genetic introgression, reinstate the captive breeding program and generally embraced a landscape approach to conserving the panther genome.

However, concerns about model assumptions and data limitations make application of these results problematic. As a result, the Service has convened a panel of scientists tasked with completing a population viability analysis using a spatially explicit model known as RAMAS and updated demographic parameters. The results will be used to better guide recovery and regulatory decisions.

The Service and the FWC attempted to establish two additional populations within the historic range of the panther (Service 1987, 1995). Between 1988 and 1995, 26 Texas cougars were released near Okefenokee National Wildlife Refuge and Osceola National Forest. Studies have concluded that Florida panther reintroduction is biologically feasible (Belden and Hagedorn 1993, Belden and McCown 1996) based on available habitat in north Florida and south Georgia. However, complex social issues must be addressed prior to population reestablishment (Belden and McCown 1996).

#### Corps Action Area

The Geographic Information System database at the South Florida Ecological Services Office indicates that two radio-collared panthers (numbers 44 and 92) and two radio-collared Texas cougars (numbers 104 and 106) have been recorded on the project site. Two Florida panthers (numbers 30 and 60) and one Texas cougar (number 101) have also been recorded within two miles of the project site. The telemetry data generated by these Florida panthers and Texas cougars indicate that the project site is on the western edge of occupied panther habitat.

Florida panther 44, a 1.5-year-old dispersing sub-adult male, used the project site 15 times between April 17, 1992, and January 29, 1993. Florida panther 44 was also recorded within two miles of the project site 20 times from April 20, 1992, through January 25, 1993. Six months later Florida panther 44 died in a territorial dispute with another male.

Florida panther 92, a 1.5-year-old sub-adult male, used the project site five times between November 1, 2000, and December 8, 2000. Florida panther 92 was also recorded within two miles of the project site 15 times from October 30, 2000, through February 23, 2001. Florida panther 92 is now three years old and has established a home range in southern Big Cypress National Preserve about 30 to 35 miles east of the project site.

Texas cougar 104 used the project site three times between December 9, 1996, and April 3, 1998. Texas cougar 104 was also recorded within two miles of the project site 22 times from December 5, 1995, through April 20, 1998. Texas cougar 104 died in April 1998 before she had a chance to contribute offspring to the genetic restoration program.

Texas cougar 106, another of the eight females in the genetic restoration program, used the project site on December 10 and 17, 2001. Texas cougar 106 was also recorded within two miles of the project site on December 12, 2001, and January 18, 2002. Texas cougar 106 is still alive and has established a home range about 20 miles northeast of the project site that includes portions of Picayune Strand State Forest, Fakahatchee Strand State Preserve, and Florida Panther National Wildlife Refuge. Texas cougar 106 has produced six offspring, four female and two male, of which one female, Florida panther number 83, has been successfully recruited into the population.

Florida panther 30, a 1.5-year old male, was recorded within two miles of the project site ten times from November 6, 1989, through January 1, 1990. Florida panther 30 died in a territorial dispute with another male on, or around, January 29, 1990.

Florida panther 60, a 2.5-year-old male, was recorded within two miles of the project site on February 1 and 3, 1999. Florida panther 60, now seven years old, has established a home range in northern Big Cypress National Preserve about 35 miles northeast of the project site.

Texas cougar 101, the third of eight females in the genetic restoration program, was recorded within two miles of the project site four times from May 15, 1995, through May 22, 1995. Texas cougar 101 later established a home range on the Big Cypress Seminole Indian Reservation about 40 miles northeast of the project site. Texas cougar 101 has produced four offspring, two female and two male, of which three, Florida panthers 66, 73 and 79, have been successfully recruited into the population.

#### Red-cockaded Woodpecker

##### Consultation Action Area

There are an estimated 85 active red-cockaded woodpecker clusters in southwest Florida; 51 percent are on Federal lands, 35 percent are on State lands, and 14 percent are on private lands. All populations on State and Federal lands in south and central Florida are designated essential support populations and are included in criteria for delisting (Service 2000). However, the south and central Florida recovery unit are not likely to sustain viable populations and one or more of these populations may be lost to stochastic events.

The nearest essential support population to the project site is the Picayune Strand State Forest which contains three active and 11 inactive clusters. This population has been in decline for many years, due to lack of habitat management prior to acquisition by the State of Florida. Recent implementation of aggressive land management actions is likely to stabilize the population in the near future and result in long-term increases in the number of active clusters.

However, this population is small and may be vulnerable to stochastic events that could lead to extirpation despite the State's management efforts.

#### Corps Action Area

The Geographic Information System database at the South Florida Ecological Services Office indicates that red-cockaded woodpeckers were observed onsite in 1989. WilsonMiller first conducted red-cockaded woodpecker surveys on the project site between February 1995 and June 1998. The survey involved meandering transects, a tape recording of the species' vocalizations, and detailed inspections of the older, flat-topped trees. Survey results indicated that there is one inactive cavity tree located in the southeast corner of Section 26, Township 50 South, Range 26 East. However, no other cavity trees were observed and there were no sightings or vocalizations recorded from the site. An updated survey was conducted over a ten-day period between April 24 and May 7, 2002. The updated survey methodology and results were identical to those of the initial survey.

The cavity tree was likely abandoned due to the encroachment of melaleuca in the midstory of the pine flatwoods. According to WilsonMiller, melaleuca comprises 25 percent of the stems in the stand where the inactive cavity tree is located. The density of melaleuca in foraging habitat surrounding the cavity tree varies from 50 to 75 percent. Cavity tree abandonment due to lack of management and the subsequent encroachment of melaleuca is common in southwest Florida.

WilsonMiller reported 16 red-cockaded cavity trees, two active, and an unmated pair on Lely Resort one mile west of the project site in 1988. Red-cockaded woodpecker activity has not been recorded on Lely Resort since 1991. Unpublished FWC information from 1993 showed one inactive cluster located 0.25 mile northeast, one active cluster about 0.50 mile east, three clusters of undetermined status located one to two miles east, and five active clusters located three to six miles east of the project site in what is now known as the Belle Meade unit of the Picayune Strand State Forest. Today there are four active clusters, one located 0.50 mile east and three located three-to six miles east of the project site. There are also three active clusters on private lands in the vicinity of County Road 951 (Collier Boulevard) and Interstate 75 about five to seven miles north and northwest of the project site.

Given the location of clusters within the immediate area of the project, the distribution of remaining pinelands, and relatively large red-cockaded woodpecker territory sizes typically found in southwest Florida, the pine habitats, even in degraded condition, are likely to provide important and necessary foraging habitat for red-cockaded woodpeckers in the area. Foraging territories in southwest Florida's hydric slash pine flatwoods average about 350 acres per-cluster (Beever and Dryden 1992).

## EFFECTS OF THE ACTION

### Factors to be considered

#### Florida Panther

WilsonMiller has proposed a Florida Panther Habitat Assessment Methodology be used to quantify impacts to panther habitat. The methodology builds on a habitat quality assessment approach that the Service has applied to the review of Corps permits and other federal actions that may affect Florida panthers. The Service's approach consists of land cover indices derived from statistical analyses of panther telemetry data (Maehr *et al.* 1991, Maehr and Cox 1995). WilsonMiller acknowledges that other qualitative factors including but not limited to patch size, spatial distribution, landscape context, surrounding land use, prey density, road density, human population density, etc. are not part of the proposed methodology.

The methodology groups land use and habitat cover types on the impact site and offsite preserve into three categories; (1) land cover that provides multiple panther habitat needs, (2) land cover that provides limited panther habitat needs or indirect support, and (3) land cover that provides negligible or no panther habitat needs. Category one is comprised of upland forests, wetland forests, and shrub-scrub habitats. Category two is comprised of herbaceous wetlands, cypress savanna, dry prairie and agriculture. Category three is comprised of barren land, disturbed land, urban land, open water, mangrove swamp, and exotic monoculture. Habitat suitability scores are assigned to each cover type according to Maehr *et al.* (1991) and Maehr and Cox (1995). The scale ranges from a high of 1.0 for hardwood hammocks, to 0.5 for palmetto prairie, and a low of zero for all category three cover types. A 50 percent reduction is applied when exotic species comprise 50 percent or more of a category one or two cover type.

The 1,928-acre project site is comprised of 1,773.2 acres of category one cover types, 25.9 acres of category two cover types, and 128.9 acres of category three cover types. Using the WilsonMiller (2002) methodology the direct effects of the project are equivalent to 651.1 panther habitat units and the indirect effects of the project are equivalent to 18.3 panther habitat units. The combined score for direct and indirect effects is 669.5 panther habitat units.

The 1,030.4-acre offsite preserve is comprised of 950.4 acres of category one cover types, 66.9 acres of category two cover types, and 13.1 acres of category three cover types. Using the WilsonMiller (2002) methodology the offsite preserve, after enhancement, is equivalent to 672.2 panther habitat units. In terms of panther habitat units the 1,088 acres of habitat lost is nearly equivalent to the 1,030.4 acres of habitat preserved offsite.

WilsonMiller's methodology provides one method of evaluating a habitat's suitability for panther use. The Service has reviewed this methodology and recognizes its value as an important tool in the project assessment.

The direct effects include the permanent loss of 1,088 acres of melaleuca dominated native hydric pine and cypress habitat and upland pine flatwoods to roads, lakes, houses, the golf

course, the water management system, and other amenities associated with the proposed action. These lands will no longer support panther prey or be available for use by dispersing sub-adult panthers. As noted by WilsonMiller and the Service, the habitat quality of these lands for support of panther prey and use by dispersing sub-adult panthers has been influenced by the amount of exotic species present in the understory.

The project includes 105 acres of indirect effects. In particular, lights, noise, free-ranging dogs, and human activity will likely reduce the extent to which panthers will use 105 acres of habitat preserved onsite and located within 300 feet of the houses and roads. However, some of the indirect effects will be minimized by requiring that dogs and cats outside of residences be on a leash. Lighting on the project site will be directed away from the 840-acre onsite preserve.

The beneficial effects include the preservation and enhancement of 840 acres of native habitat onsite. Although it will be bordered by development and fragmented by interior access roads the onsite preserve is over one square mile in size and connected to Picayune Strand State Forest. The onsite preserve will be enhanced by the removal of exotic vegetation and placed under a conservation easement. Traffic-calming devices, wildlife warning signs, and a speed limit of 25 miles an hour will reduce the likelihood of wildlife injury or mortality on roads traversing the preserve.

The beneficial effects also include the preservation and enhancement of 1,030.4 acres offsite, which provide a direct corridor connection between Big Cypress National Preserve and Fakahatchee Strand State Preserve. The 1,030.4-acre tract is comprised of 95.4 acres of forested uplands, 855.3 acres of forested wetlands, 66.9 acres of non-forested wetlands, and 12.8 acres of disturbed uplands. The land will ultimately be transferred in fee title to the State of Florida. Preserving and enhancing 1,030.4 acres of panther habitat will secure an existing habitat connection between Big Cypress National Preserve and Fakahatchee Strand State Preserve, minimize adverse effects to the panther by protecting that land from future development, and improve conditions for feeding, breeding, and sheltering.

The amount of panther habitat affected by the footprint of the proposed action is 0.05 percent of an estimated 2.2 million acres occupied by the panther (Maehr 1990a). This is equivalent to 0.9 percent and 2.3 percent of the average home range of a male and female panther respectively.

#### Red-cockaded Woodpecker

In south Florida, the red-cockaded woodpecker is threatened by habitat loss and fragmentation and lack of fire or infrequent fire, which maintains habitat quality. Invasion by exotic vegetation is also a problem. Red-cockaded woodpeckers will abandon otherwise suitable nesting/roosting areas (including existing cavities) when the midstory approaches cavity height (midstory height

should generally be less than 12 feet with ample open grassy, savannah habitat). Growing season burns are recommended every three to five years to control the amount of young pine and hardwood midstory (Costa and Escano 1989, Walters 1991).

The 1,928-acre project site includes 455.6 acres of pine flatwoods with a palmetto understory, 485.2 acres of pine flatwoods with a graminoid understory, and 238.4 acres of mixed pine and cypress. Exotic species have encroached on 1,031.9 acres or 87.5 percent of the pine habitats therefore reducing the quality of the pine habitats for red-cockaded woodpecker nesting and foraging. The proposed action will result in 945.2 acres of direct effects and 548.7 acres of beneficial effects to red-cockaded woodpecker habitat.

The direct effects include the permanent loss of 945.2 acres of pine habitat to roads, lakes, houses, the golf course, the water management system, and other amenities associated with the proposed action. As noted by WilsonMiller and the Service, the habitat quality of these lands for support of red-cockaded woodpecker foraging has been influenced by the amount of exotic species present in the understory.

The beneficial effects include the preservation and enhancement of 234 acres of pine habitats onsite, which includes the abandoned cavity tree. The exotic vegetation will be removed from the midstory of these pine habitats therefore enhancing the potential for red-cockaded woodpecker nesting and foraging. The presence of the active clusters in the adjacent Picayune State Forest further enhances the potential for restored habitat to provide beneficial uses to red-cockaded woodpeckers. The onsite water management system will be used to maintain a clean understory. Approximately 66.1 acres of pine flatwoods with a graminoid understory and 167.9 acres of mixed pine and cypress will be preserved and enhanced.

The beneficial effects also include the preservation and enhancement of 314.7 acres of pine habitats offsite. The exotic vegetation will be removed from the midstory of these pine habitats therefore enhancing the potential for red-cockaded woodpecker nesting and foraging. Prescribed fire will be used to maintain a clean understory. Approximately 5.8 acres of pine flatwoods with a palmetto understory, 77.01 acres of pine flatwoods with a graminoid understory, and 231.9 acres of mixed pine, cypress, and cabbage palm will be preserved and enhanced as part of the 1,030.4-acre offsite preserve that will be transferred to the State of Florida.

#### Analyses for effects of the action

##### Florida Panther

The proposed action will provide both positive and negative effects to panthers and panther habitat. Positive effects include the preservation and enhancement of 840 acres of native habitat onsite and the preservation and enhancement of 1,030.4 acres of native habitat offsite.

The 840-acre onsite preserve's current value to panther and panther prey is negatively influenced by the amount of exotic species present on the property. Barron Collier Company proposes to remove the exotic species understory, thus providing higher quality habitat for panther prey.

Also, the onsite preserve is over one square mile in size and is directly connected to the Picayune State Forest Preserve. The preservation of this habitat will protect these lands from future development, provide habitat for dispersing sub-adult panthers, and habitat for panther prey.

The 1,030.4-acre offsite preserve's current value to panther and panther prey is also influenced by the amount of exotic species present in the understory. Barron Collier Company has proposed to remove the exotic species understory, which will improve the quality of the foraging habitat for panther prey species. The 1,030.4-acre tract also connects occupied panther habitat in Big Cypress National Preserve to occupied habitat in Fakahatchee Strand State Preserve. The preservation of this tract also provides a contiguous landscape for the panther to feed, breed, and find shelter, and provides opportunities for recovery-oriented research and management activities on publicly-owned lands.

Negative effects include the loss of 1,088 acres (residential development) of habitat and degradation of an additional 105 acres (upland buffer) of habitat. The 1,088 acres, although suitable habitat for panther and panther prey species, is negatively influenced by the presence of exotic species. The density of melaleuca in the understory has affected the quality and quantity of foraging habitat available for prey species. However, the loss of this habitat reduces dispersal opportunities for sub-adult males, which may force them to traverse occupied male panther territories, increasing the likelihood of intraspecific aggression. The 105-acre upland buffer, although enhanced through exotic species removal, is adjacent to the residential developments and will receive direct anthropogenic influences including, lights, noise, free-ranging dogs, and other human activities. These actions will have a negative indirect influence on panther use of the buffers. However, some of these indirect effects will be minimized by requiring that dogs and cats outside of residences be on a leash, and lighting on the project site will be directed away from the 840-acre onsite preserve.

#### Red-cockaded Woodpecker

The proposed action will also provide both positive and negative effects to red-cockaded woodpecker foraging habitat. Approximately 1,179.2 acres of the forested community on the project site are considered suitable red-cockaded woodpecker foraging habitat. Surveys of the property noted the presence of an abandoned cavity tree in the upland pine forest and that the forest habitat is heavily invaded by exotic species. The surveys also did not record any red-cockaded woodpecker foraging activities in the forested habitats.

One of the positive effects from the proposed action is the red-cockaded woodpecker habitat enhancements proposed in the 840-acre onsite preserve. The onsite preserve, which includes 234 acres of pine habitat, is proposed for exotic species removal. These actions will enhance the potential for recolonization of the forested habitat by red-cockaded woodpeckers from the adjacent Picayune Strand State Forest.

Positive effects to red-cockaded woodpeckers will also be realized from the preservation and enhancement of the 1,030.4-acre offsite preserve. This property, as previously discussed, contains approximately 314.7 acres of red-cockaded woodpecker habitat and is negatively

influenced by the amount of exotic species present in the understory. Barron Collier Company proposes to remove the exotic species understory, therefore enhancing the potential for red-cockaded woodpecker nesting and foraging.

Negative effects include the loss of 945.2 acres of potential red-cockaded woodpecker foraging habitat (1,179.2 acres of the forested community on the project site minus the 234 acres preserved). The loss of 945.2 acres of pine habitat will contribute to the loss and fragmentation of red-cockaded woodpecker habitat on private land in southwest Florida. However, due to the presence of exotic species in the midstory the quality of pine habitats onsite for foraging by red-cockaded woodpeckers is marginal.

## CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Anticipated future State actions in the action area that will eliminate, fragment, or degrade panther and red-cockaded woodpecker habitat include the issuance of SFWMD permits. The SFWMD is responsible for permitting the construction, alteration, operation, maintenance, removal and abandonment of surface water management systems within its jurisdictional boundaries (SFWMD 1996). The SFWMD has issued 382 surface water management and ground water use permits for agricultural projects covering 948,480 acres (384,000 hectares) of the Immokalee Rise Physiographic Region (Mazzotti *et al.* 1992). Many of the permits have not been executed and the Service is therefore unable to ascertain the extent and consequence of proposed agricultural developments.

## CONCLUSION

Occupied panther habitat in south Florida is about evenly divided between public and private lands. Soils on public lands are lower in quality than soils on private lands. Therefore, prey density and panther density, health, and reproduction tend to be lower in the southern portion of the breeding population than in the northern portion (Maehr 1992a). Current and historic rates of private land conversion to agricultural and urban development continue a trend of habitat loss, fragmentation, and degradation. The genetic restoration program appears to have improved the reproductive capability of the panther. The present population is estimated at 78 panthers (McBride 2001) and intercross progeny are rapidly multiplying, moving into formerly unoccupied habitats on public lands. The extent of population expansion on private lands is unknown. Efforts are underway to protect and better manage those private lands essential to panther recovery. The genetic restoration program has reversed the genetic decline to extinction and provided an important temporal buffer in which resource agencies can devise and implement a means to protect sufficient lands to support a minimum viable population. As

of October 13, 2000, nonprofit organizations, local governments, state and federal agencies have protected approximately 2.8 million acres of habitat. Due to habitat quality not all publicly owned land is suitable for panther occupation, *e.g.* mangrove islands and open water habitats. Studies have concluded that panther reintroduction in north Florida is biologically feasible but that complex social issues must first be addressed (Belden and Hagedorn 1993, Belden and McCown 1996).

The amount of panther habitat affected by the proposed action is 1,088 acres, or 0.05 percent, of an estimated 2.2 million acres occupied by the panther (Maehr 1990a). This amount of habitat is equivalent to 0.9 percent and 2.3 percent of the average home range of a male and female panther respectively. The amount of red-cockaded woodpecker habitat affected by the proposed action, 945.2 acres, is equivalent to the amount of habitat needed to sustain about one to two breeding pairs of red-cockaded woodpeckers.

After reviewing the current status of the panther and the red-cockaded woodpecker, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that development of *Winding Cypress* by the Barron Collier Company as proposed, is not likely to jeopardize the continued existence of the panther or the red-cockaded woodpecker. No critical habitat has been designated for these species, therefore, none will be affected.

#### INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The terms and conditions described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to Barron Collier Company as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require Barron Collier Company to adhere to the terms and conditions of the incidental take statement through

enforceable terms that are added to the permit or grant document, the protection coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or Barron Collier Company must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

#### Amount or extent of take anticipated

The Service anticipates incidental take of panthers associated with the direct effects to 1,088 acres and the indirect effects to 105 acres of panther habitat. The incidental take is expected to be in the form of harm and harassment.

The Service also anticipates incidental take of red-cockaded woodpeckers associated with the direct effects to 945.2 acres of red-cockaded woodpecker habitat (1,179.2 acres of the forested community on the project site minus the 234 acres preserved). The incidental take is expected to be in the form of harm or harrassment.

#### Effect of the take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to Florida panthers or red-cockaded woodpeckers.

#### Reasonable and prudent measure

The Service, working with the Corps and Barron Collier Company has minimized incidental take to the extent reasonable and prudent, therefore the Service is not aware of any reasonable and prudent measures. However, the Corps and Barron Collier Company must:

1. Provide a copy of the final Department of the Army (DA) permit to the Service upon issuance, monitor and ensure compliance with the DA permit conditions, and provide the Service a report on implementation and compliance within one year of the date of the DA permit.
2. Upon locating a dead, injured, or sick panther specimen, initial notification must be made to the nearest Service Law Enforcement Office (Mr. Vance M. Eaddy; Fish and Wildlife Service; 9549 Koger Blvd., Suite 111; St. Petersburg, Florida 33702; 727-570-5398). Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission; South Region, 3900 Drane Field Road, Lakeland, Florida, 33811-1299; 1-800-282-8002. Care should be taken in handling sick or injured specimens to ensure effective treatment and care, or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. In conjunction with the care of sick or injured panthers or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is unnecessarily disturbed.

If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measure.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends that Barron Collier Company:

1. develop and provide golfers and residents at *Winding Cypress* with an information pamphlet on the Picayune Strand State Forest and pertinent State laws regarding forest management at the urban-wildland interface,
2. develop and provide golfers and residents at *Winding Cypress* with an information pamphlet on Florida panther recovery efforts in cooperation with the FWC and the Service,
3. explore the feasibility of establishing a breeding red-cockaded woodpecker pair at *Winding Cypress* and on the 1,030.4-acre offsite preserve,
4. share the cost of habitat improvement for red-cockaded woodpeckers on the adjacent Picayune Strand State Forest, and
5. fund the cost of GPS collars for Florida panthers residing in the Belle Meade Ecological Unit (Logan *et al.* 1993) so that the FWC may develop information on the effects of urban sprawl to the species.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

## REINITIATION NOTICE

This concludes formal consultation on the Barron Collier Company development to be known as *Winding Cypress*. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded;

(2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have questions please contact the South Florida Ecological Services Office at (772) 562-3909.

Sincerely yours,



James J. Slack  
Field Supervisor  
South Florida Ecological Services Office

cc:

Corps, Ft. Myers, FL (Skip Bergman)  
EPA, West Palm Beach, FL (Richard Harvey)  
EPA, Ft. Myers, FL (Bruce Boler)  
FDOF, Naples, FL (Sonja Durrwachter)  
FWC, Tallahassee, FL (Brad Hartman)  
FWC, Punta Gorda, FL (Jim Beever)  
FWC, Naples, FL (Darrell Land)  
Collier County Planning, Naples, FL (Barbara Burgeson)  
SFWMD, Fort Myers, FL (Karen Johnson)  
Service, FPNWR, Naples, FL (Layne Hamilton)  
Service, Naples, FL (Dustin Perkins)  
Barron Collier Company, Naples, FL (Mark Morton)

## LITERATURE CITED

- Anderson, Allen E. 1983. A critical review of literature on puma (*Felis concolor*). Special report number 54. Colorado Division of Wildlife Research Section.
- Bangs, O. 1899. The Florida Puma. Proceedings of the Biological Society of Washington. 13:15-17.
- Beever, J.W. III, and K.A. Dryden. 1992. Red-cockaded woodpeckers and hydric slash pine flatwoods. Transactions of the 57<sup>th</sup> North American Wildlife and Natural Resources Conference. 57:693-700.
- Belden, R.C. 1986. "Florida Panther Recovery Plan Implementation - A 1983 Progress Report", pp. 159-172 in S.D. Miller and D.D. Everett (eds.), Cats of the world: Biology, Conservation and Management, Proceedings of the Second International Cat Symposium. Caesare Kleberg Wildlife Resercher Institute. Kingsville, Texas.
- Belden, R.C. 1988. "The Florida Panther" in Audubon Wildlife Report. 1988/1989. National Audubon Society, New York, NY. 515-532.
- Belden, R.C., W.B. Frankenberger, R.T. McBride, and S.T. Schwikert. 1988. Panther habitat use in southern Florida. Journal of Wildlife Management 52(4):660-663.
- Belden, R.C., and B.W. Hagedorn. 1993. Feasibility of translocating panthers into northeast Florida. Journal of Wildlife Management 57(2):338-397.
- Belden, R.C., and J.W. McCown. 1996. Florida panther reintroduction feasibility study. Final report, July 1, 1992 to June 30, 1995. Study Number 7507, Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Copeyon, C.K., J.R. Walters, and J.H. Carter, III. 1991. Induction of red-cockaded woodpecker group formation by artificial cavity construction. J.Wildl. Manage. 55(4):549-556.
- Cory, C.B. 1896. Hunting and fishing in Florida. Estes and Lauriat. Boston, Massachusetts.
- Costa, R.N. and R.E.F. Escano. 1989. Red-cockaded woodpecker status and management in the southern region in 1986. U.S. Forest Service. Southern Region Tech. Publ. R8-TP 12. 71 pp.
- Costa, R., and E.T. Kennedy. 1994. Red-cockaded woodpecker translocations 1989-1994: State-of-our-knowledge. In: American Zoo and Aquarium Association annual conference proceedings. Am. Zoo and Aquarium Association., Wheeling, WV.

- Dees, C.S., J.D. Clark and F. T. van Manen. 1999. Florida panther habitat use in response to prescribed fire at Florida Panther National Wildlife Refuge and Big Cypress National Preserve. Final Report. University of Tennessee, Knoxville, Tennessee.
- Dryden, K. 2001. Fish and Wildlife Biologist, Fish and Wildlife Service, personal communication, telephone conversation February 28, 2001.
- Duever, M.J., J.E. Carlson, J.F. Meeder, L.C. Duever, L.H. Gunderson, L.A. Riopelle, T.R. Alexander, R.F. Myers, and D.P. Spangler. 1979. Resource inventory and analysis of the Big Cypress National Preserve. Final Report to the National Park Service, University of Florida, Gainesville, and National Audubon Society Ecosystem Research Unit, Naples, Florida. 2 volumes.
- Hall, E.R. 1981. The mammals of North America Volume II. The Ronald Press Company; New York, New York.
- Harlow, R.F. 1959. An evaluation of white-tailed deer habitat in Florida. Florida Game and Fresh Water Fish Commission. Tech. Bull. 5:1-64.
- Harris, L.D. 1985. The fragmented forest. University of Chicago Press; Chicago, Illinois.
- Hooper, R.G., A.F. Robinson, Jr., and J.A. Jackson. 1980. The red-cockaded woodpecker: notes on life history and management. U.S. Forest Service. Southeastern Area, State and Private Forestry Gen. Rep. SA-GR 9.
- Janis, M.W. and J.D. Clark. 1999. The effects of public use on the behavior of Florida panthers at Big Cypress National Preserve. University of Tennessee, Knoxville, Tennessee.
- Jordan, D.B. 1997. Telephone communication. January 9, 1997.
- Land, E.D. 1994. Response of the wild Florida panther population to removals for captive breeding. Final Report, Study Number 7571. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Land, E.D. and S.K. Taylor. 1998. Florida panther genetic restoration and management. Annual report, Study Number 7508. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Land, E.D., M. Lotz, D. Shindle, and S.K. Taylor. 1999. Florida panther genetic restoration and management. Annual report, Study Number 7508. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

- Land, E.D., M. Cunningham, M. Lotz, and D. Shindle. 2001. Florida panther genetic restoration and management. Annual report, Study Number 7500. Florida Fish and Wildlife Conservation Commission; Tallahassee, Florida.
- Ligon, J.D., P.B. Stacey, R.N. Conner, C.E. Bock, and C.S. Adkisson. 1986. Report of the American Ornithologists' Union committee for the conservation of the Red-cockaded woodpecker. *Auk* 103:848-855.
- Logan, T.J., A.C. Eller, Jr., R. Morrell, D. Ruffner, and J. Sewell. 1993. Florida panther habitat preservation plan - south Florida population. Prepared for the Florida Panther Interagency Committee.
- Lotz, M.A., E.D. Land, and K.G. Johnson. 1996. Evaluation of State Road 29 wildlife crossings. Final Report, Study No. 7853. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Maehr, D.S. 1989. Florida panther road mortality prevention. Final Performance Report, Study No. 7502. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Maehr, D.S. 1990a. Florida panther movements, social organization, and habitat utilization. Final Performance Report, Study No. 7502. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Maehr, D.S. 1990b. The Florida panther and private lands. *Conservation Biology* 4 (2): 167-170.
- Maehr, D.S. 1992a. Florida panther. *In* Rare and Endangered Biota of Florida. Volume I: Mammals. S. R. Humphrey, (ed.). University Press of Florida, Gainesville, Florida.
- Maehr, D.S. 1992b. Florida panther distribution and conservation strategy. Final Report, Study No. 7572. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Maehr, D.S. 1993. Response to the wild Florida panther population to removals for captive breeding. Final Report, Study No. 7571. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Maehr, D.S. 1997. The comparative ecology of bobcat, black bear, and Florida panther in south Florida. *Bulletin of the Florida Museum of Natural History*. University of Florida, Gainesville, Florida.
- Maehr, D.S. and J.A. Cox. 1995. Landscape features and panthers in Florida. *Conservation Biology*: 9(5): 1008-1019.

- Maehr, D.S., J.C. Roof, E.D. Land, and J.W. McCown. 1989a. First reproduction of a panther (*Felis concolor coryi*) in Southwest Florida. U.S.A. Mammalia 25:37-38.
- Maehr, D.S., E.D. Land, J.C. Roof, and J.W. McCown. 1989b. Early maternal behavior in the Florida panther (*Felis concolor coryi*). Am. Midl. Nat. 122:34-43.
- Maehr, D.S., R.C. Belden, E.D. Land, and L. Wilkins. 1990a. Food habits of panthers in southwest Florida. Journal of Wildlife Management 54:420-423.
- Maehr, D.S., E.D. Land, J.C. Roof, and J.W. McCown. 1990b. Day beds, natal dens, and activity of Florida panthers. Proceedings of the Annual Conference of Southeast Fish and Wildlife Agencies 44:000-000.
- Maehr, D.S., E.D. Land, and J.C. Roof. 1991a. Social ecology of Florida panthers. National Geographic Research & Exploration 7 (4):414-431.
- Maehr, D.S., E.D. Land, and M.E. Roelke. 1991b. Mortality patterns of panthers in southwest Florida. Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies 45:201-207.
- Maehr, D. S., R. C. Lacy, E. D. Land, O. L. Bass Jr., and T. S. Hoctor. 2002. Evolution of population viability assessments for the Florida panther: a multi-perspective approach. Pages 284-311 in Beissinger, S. R., and D. R. McCullough, editors. Population viability analysis. University of Chicago Press, Chicago, IL.
- Mazzotti, F.J., L.A. Brandt, L.G. Pearlstine, W.M. Kitchens, T.A. Obreza, F.C. Depkin, N.E. Morris, and C.E. Arnold. 1992. An evaluation of the regional effects of new citrus development on the ecological integrity of wildlife resources in southwest Florida. Final report. South Florida Water Management District; West Palm Beach, Florida.
- McBride, R.T. 1976. The status and ecology of the mountain lion, *Felis concolor stanleyana*, of the Texas-Mexico border. M.S. Thesis, Sul Ross State University, Alpine; Texas.
- McBride, R.T. 2001. Current panther distribution, population trends, and habitat use. Report of field work: fall 2000 - winter 2001. Livestock Protection Company; Alpine, Texas.
- Roelke, M.E. 1990. Florida panther biomedical investigations. Final Performance Report, July 1, 1986 - June 30, 1990. Study No. 7506. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Roelke, M.E., J.S. Martenson, and S.J. O'Brien. 1993. The consequences of demographic reduction and genetic depletion in the endangered Florida panther. Current Biology 3:340-350.

- Schemnitz, S.D. 1972. Distribution and abundance of alligator, bear, deer, and panther in the Everglades Region of Florida. Report to the Florida Game and Fresh Water Fish Commission, Ft. Lauderdale, Florida in fulfillment of contract No. 14-16-0004-308.
- Seal, U.S., R.C. Lacy, and Workshop Participants. 1989. Florida panther viability analysis and species survival plan. Report to the U.S. Fish and Wildlife Service, by the Conservation Breeding Specialist Group, Species Survival Commission, IUCN; Apple Valley, Minnesota.
- Seal, U.S., R.C. Lacy, and Workshop Participants. 1992. Genetic management strategies and population viability of the Florid panther. Report to the U.S. Fish and Wildlife Service, by the Conservation Breeding Specialist Group, Species Survival Commission, IUCN; Apple Valley, Minnesota.
- Seal, U.S. and Workshop Participants. 1994. A plan for genetic restoration and management of the Florida panther (*Felis concolor coryi*). Report to the Florida Game and Fresh Water Fish Commission, by the Conservation Breeding Specialist Group, Species Survival Commission, IUCN; Apple Valley, Minnesota.
- Smith, G. 1970. Mystery cat. Florida Wildlife 24 (3):4-6.
- South Florida Water Management District (SFWMD). 1996. Basis of review for Environmental Resource Permit applications within the South Florida Water Management District. West Palm Beach, Florida.
- Southwest Florida Regional Planning Council (SWFRPC). 1995. Strategic Regional Policy Plan of the Southwest Florida Regional Planning Council. North Fort Myers, Florida.
- Tinsley, J.B. 1970. The Florida panther. Great Outdoors Publishing Company; St. Petersburg, Florida.
- Townsend, D. 1991. An economic overview of the agricultural expansion in southwest Florida. Unpublished report on file at South Florida Field Office, U.S. Fish and Wildlife Service, Vero Beach, Florida.
- U.S. Department of the Interior [DOI]. 1969. Environmental impact statement of the Big Cypress Swamp jetport. Washington, D.C.
- U.S. Fish and Wildlife Service (Service). 1967. Endangered and threatened wildlife. *Federal Register* Vol. 32: 4001. March 11, 1967.
- U.S. Fish and Wildlife Service (Service). 1985. Red-cockaded woodpecker recovery plan; Atlanta, Georgia.

U.S. Fish and Wildlife Service (Service). 1987. Florida Panther (*Felis concolor coryi*) recovery plan. Prepared by the Florida panther interagency committee for the U. S. Fish and Wildlife Service; Atlanta, Georgia.

U.S. Fish and Wildlife Service (Service). 1994. Final Environmental Assessment - Genetic restoration of the Florida panther; Atlanta, Georgia.

U.S. Fish and Wildlife Service (Service). 1995. Second revision Florida panther recovery plan; Atlanta, Georgia.

U.S. Fish and Wildlife Service (Service). 1999. Multi-species recovery plan for south Florida; Vero Beach, Florida.

U.S. Fish and Wildlife Service (Service). 2000. Technical/agency draft revised recovery plan for the red-cockaded woodpecker (*Picoides borealis*); Atlanta, GA.

Walters, J.R. 1990. Red-cockaded woodpeckers: a "primitive" cooperative breeder. Pages 69-101 in P.B. Stacey and W.D. Koenig, eds., Cooperative Breeding in Birds. Cambridge University Press, Cambridge, United Kingdom.

Walters, J.R. 1991. Application of ecological principles to the management of endangered species: the case of the red-cockaded woodpecker. Amer. Rev. Ecol. Syst. 22:505-523.

WilsonMiller. 2002. Panther mitigation assessment for the Winding Cypress project. WilsonMiller, Inc., Naples, Florida.

Young, S.P. and E.A. Goldman. 1946. The Puma - Mysterious American Cat. Dover Publications, Inc.. New York, New York.

bcc:Reading/Biological Opinion

AEller:alp:10/08/02(R:\2002\Biological Opinion CY2002\4102f014a.dft.wpd)

**FILE COPY**

Surname:      Date:

G. Weller	10-8
J. J. Muller	12-8-52
J. J. Muller	10/10