

## ANNUAL REPORT

### Bureau of Wildlife Diversity Conservation

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Project:	Florida Panther Research (93112503002)
Study:	<b>Florida Panther Genetic Restoration and Management</b>
Period Covered:	July 2002 – June 2003
Study Duration:	July 1995 – June 2003
Principal Investigators:	Darrell Land, Bureau of Wildlife Diversity Conservation, Florida Fish and Wildlife Conservation Commission, 566 Commercial Blvd., Naples, FL 34104  Mark Cunningham DVM, Bureau of Wildlife Diversity Conservation, Florida Fish and Wildlife Conservation Commission, 566 Commercial Blvd., Naples, FL 34104  Mark Lotz, Bureau of Wildlife Diversity Conservation, Florida Fish and Wildlife Conservation Commission, 566 Commercial Blvd., Naples, FL 34104  David Shindle, Bureau of Wildlife Diversity Conservation, Florida Fish and Wildlife Conservation Commission, 566 Commercial Blvd., Naples, FL 34104
Prepared By:	David Shindle, Mark Cunningham DVM, Darrell Land, Roy McBride, Mark Lotz, and Bambi Ferree
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*Abstract:* Telemetry data were collected on 41 radiocollared Florida panthers (*Puma concolor coryi*) and 3 Texas cougars (*P. c. stanleyana*) in southern Florida during the reporting period. Fifteen radiocollared panthers and 11 uncollared panthers died during the reporting period. Eleven panthers died from vehicular trauma and seven panthers, including 5 females, died from intraspecific aggression. Three dependent-aged kittens orphaned by the deaths of their mothers were captured and placed into temporary captivity. One radiocollared panther died of a septicemia that was likely secondary to concurrent feline leukemia virus and feline immunodeficiency virus. A 15 year-old radiocollared panther is suspected to have died from malnutrition. Six panthers died of unknown causes, 5 of which may have a common etiology. Six new panthers were added to the radiocollared population monitored by FWC this past capture season. Our current verifiable population count is 87 adult and subadult panthers and does not include kittens at dens. We documented 6 panther dens during the study period producing a total of 14 neonate kittens (8♀, 6♂). No Texas puma produced litters during the study period and the 3 remaining Texas puma were placed in permanent captivity per genetic restoration protocol. All of these kittens were handled successfully at their dens, permanently marked with subcutaneous transponder chips, and skin biopsies taken. We have radiocollared a total of 118 panthers since 1981 and handled 148 neonate kittens at dens since 1992. Apparently, genetic introgression is reducing the occurrence of kinked tails, cowlicks, and cryptorchidism. Preliminary analyses indicate that the likely representation of Texas puma genes is on target with the originally proposed introgression level of 20%.

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## INTRODUCTION

Florida panthers are endangered by a combination of population and habitat factors (USFWS 1987). Loss and fragmentation of habitat and unregulated killing over the past two centuries have reduced and isolated populations in the southeastern United States to the point where only one population, estimated in the late 1980's at 30-50 adults, exists on approximately 8,810 km<sup>2</sup> (2.2 million acres) of habitat in south Florida (Maehr 1990). Small population size and geographic isolation increase the chance for extinction of Florida panthers due to demographic instability inherent in small numbers and erosion of genetic diversity from restricted gene flow and inbreeding. Genetic diversity is the basis for production of fit individuals as well as providing population elasticity in order to respond to changing environmental and habitat conditions. Demographic variation has been considered important in regulating populations for many years, but the role of social and genetic factors has only recently begun to be examined as modern techniques from field biology and molecular genetics have become available. Recovery of the Florida panther is complex, but not an uncommon situation as many species face similar circumstances. A unique opportunity exists to implement conservation and management strategies for Florida panthers and evaluate results that will benefit Florida panthers as well as other imperiled species.

Natural exchange of genetic material occurred historically among the Florida panther population in the southeastern United States and contiguous populations of *P. c. cougar* to the north, *P. c. hippolestes* the northwest and *P. c. stanleyana* to the west (Young and Goldman 1946). Genetic exchange between populations ceased as the coastal plain was gradually cleared and settled. Florida panthers steadily declined in abundance and distribution as a result. Gene flow occurs as individuals disperse and breed, but habitat fragmentation disrupts dispersal and natural population processes. Dispersal is not only the natural mechanism for mixing the gene pool but also minimizes inbreeding within populations. Inbreeding increases when dispersing potential breeders can no longer move among fragmented populations, and declining population size compounds demographic and genetic factors. Implications include inbreeding depression, loss of genetic variation, declining health, reduced survivability, lower numbers, and eventual extinction. The compounding effects of these interrelated factors, perceived as an

inward spiral or vortex (Gilpin and Soule 1986), have become a cornerstone of conservation biology. A computer program (VORTEX) has been developed and widely used to predict extinction for numerous species under similar situations (see Grier 1980, Lacy and Clark 1990, and Seal and Lacy 1989).

Genetic diversity and health of the Florida panther population needs to be restored to ensure survival, even with adequate habitat conservation and other enhancement measures. The complex interplay of social, demographic, genetic, and health factors dictates that a timely and aggressive program be implemented to address the many problems faced by Florida panthers. A plan for genetic restoration and management of the Florida panther was developed in September 1994 (Seal 1994). Genetic restoration is a direct and immediate action that will restore genetic variability and vitality for a healthier, more resilient population. Results from genetic restoration will enable implementation and refinement of management strategies to maintain levels of genetic diversity historically present in the North American population.

Our objectives are to continue monitoring of released individuals and resident panthers to evaluate translocations, to compare reproductive performance and kitten health among Texas and Florida females, and to assess phenotypical and genotypical responses of genetic restoration. The final product will be the development of a long-term management plan based on study results to maintain genetic diversity, health, and long-term survival of the south Florida panther population.

We would like to acknowledge the following individuals and agencies for their assistance provided to this project. Rocky McBride and Rowdy McBride (Livestock Protection Company), Mario Alvarado, Sonny Bass, Deborah Jansen, Lori Oberhofer, Steve Schulze, and Bob Thomas (National Park Service) provided assistance with aerial telemetry and/or field support. We would also like to extend our appreciation to the staffs at Big Cypress National Preserve (BCNP), Everglades National Park (ENP), Florida Panther National Wildlife Refuge (FPNWR), Fakahatchee Strand State Preserve (FSSP), Picayune Strand State Forest (PSSF), Okaloacoochee Slough State Forest (OSSF), and the Big Cypress Seminole Indian Reservation (BCSIR) for their continued cooperation and support.

## STUDY AREA

The study area encompassed most of interior southern Florida south of Orlando and extending to southern ENP. The area includes large blocks of low-lying public lands such as ENP, BCNP, FSSP, and the FPNWR. Significant private lands, primarily used for cattle and crop production, lie on higher and more productive ground to the north of the public lands and constitute some of the most important habitat for Florida panthers.

## METHODS

Adult and juvenile Florida panthers and Texas cougars were captured using trained hounds, chemically immobilized, and fitted with radio-collars. A combination of medetomidine HCl (12-20 µg/kg), ketamine HCl (7 mg/kg), and Telazol® (tiletamine HCl and zolazepam HCl, 0.8 mg/kg) was used for immobilization. Propofol was administered intravenously (IV) either as a bolus or continuous drip to maintain anesthesia. Butorphanol tartrate (0.1-0.4 mg/kg) was administered intramuscularly to smooth recovery.

Vital signs (temperature, heart rate, respiration rate, and capillary refill time) and depth of anesthesia were monitored and recorded. All animals underwent a physical examination to assess general health and physical condition. Sterile isotonic fluids were administered either subcutaneously (SQ) or IV to counteract hyperthermia, maintain blood pressure and expedite clearance of drug metabolites (Shindle et al. 2001). Panthers >4 months old were vaccinated against feline viral rhinotracheitis (FVR), feline calicivirus (FCV), and feline panleukopenia (FPV) (Fel-o-vax®, 3 ml), and rabies (Imrab®, 1 ml). Additionally, these animals were dewormed with injectable ivermectin (Ivomec®, 0.2 mg/kg) and praziquantel (Droncit®, 3.75 mg/kg) administered SQ. Panthers were implanted with a SQ transponder identification chip (Trovan®), ear-tattooed, measured, and weighed. Biomedical samples collected from panthers included whole blood, skin biopsies, and hair. Other samples, such as bacterial cultures, skin scrapings, and diagnostic biopsies were taken as indicated. Panthers were left to recover from anesthesia

in a dry, shaded area away from open water and were visually monitored until they attained a sufficient state of consciousness.

Whole blood in EDTA, serum, and diagnostic samples were shipped overnight to Antech Diagnostics, Farmingdale, NY for a complete blood count (CBC), serum chemistry profile, and appropriate diagnostic procedures (culture, histopathology). Full thickness skin biopsies (2-4 mm) were collected from the medial thigh, placed in sterile cell medium, and shipped overnight to the Laboratory of Viral Carcinogenesis, National Cancer Institute (Frederick, Maryland) for genetic analyses. Reciprocal antibody titers and/or presence of antigen in serum were determined for feline leukemia virus (FeLV, ELISA antigen), feline immunodeficiency virus/puma lentivirus (FIV/PLV; Western Blot, Kinetics ELISA, and peptide ELISA), feline enteric coronavirus/feline infectious peritonitis (FECV/FIP), feline rhinotracheitis virus (FVR, serum neutralization [SN]), feline calicivirus (FCV, SN), West Nile Virus (WNV, SN) and feline panleukopenia virus (FPL, SN) at the New York State Diagnostic Laboratory (Cornell University, Ithaca, New York). Reciprocal serum antibody titers to FeLV were performed at Hansen Veterinary Immunology (Dixon, California). Hair and heparinized whole blood were analyzed for total mercury (Hg) concentration by cold vapor atomic absorption spectrophotometry (Hatch and Ott, 1968).

Semen was collected by electroejaculation using a model 303 electroejaculator (P-T Electronics, Boring, Oregon, USA) and 26-mm probe. Ejaculate was analyzed in the field for volume, sperm concentration, forward progression, total sperm count, and sperm motility. A semen sample was also stored in 0.3% glutaraldehyde fixative for later morphological examination at White Oak Plantation. Semen from testes collected at necropsy was similarly analyzed.

Neonate kittens <6 weeks-of-age were handled according to Land et al. (1998) and marked with a SQ transponder identification chip. Pyrantel pamoate (10 mg/lb) was administered orally, and blood was collected from the jugular vein for CBC and serum chemistry. Feces was collected and placed in individual open topped containers in a 2% solution of potassium dichromate. Samples were allowed to

aerate for 14 to 30 days to allow any coccidia present to sporulate. Samples were then analyzed for coccidia and helminth eggs using a saturated sugar fecal flotation method.

Dead Florida panthers and Texas cougars were subjected to complete post-mortem examination by board-certified pathologists at the University of Florida Veterinary Medical Teaching Hospital (VMTH), Gainesville, Florida; Disney's Animal Kingdom; or were necropsied by the Panther Section veterinarian at the Wildlife Research Laboratory (WRL; Gainesville, Florida).

All tissues from live-captured and necropsied panthers not immediately analyzed were archived at  $-20^{\circ}$  to  $-70^{\circ}\text{C}$  at the WRL. Hides and skeletal remains were deposited in the Florida Museum of Natural History (Gainesville).

Instrumented animals were monitored approximately every other day (M, W, F) from fixed-wing aircraft. Locations were plotted on 7.5 minute USGS topographic maps and recorded as Universal Transverse Mercator points. Mating and denning behavior, aggressive encounters among panthers, movements and home range shifts, dispersal, survival, recruitment, displacements and replacements of individuals, and other social and ecological interactions were interpreted from radiotelemetry data and field investigations.

The following nomenclature will be used to identify Florida panthers, Texas cougars, and their associated intercross progeny: "FP" denotes panthers captured for radiocollaring; "K" denotes kittens handled at panther or Texas cougar dens; TX denotes Texas cougars used for Panther Genetic Restoration; "F1" denotes Florida panther x Texas cougar offspring; "F2" denotes offspring of F1 x F1 mating; "B-FL" denotes offspring of F1 x Florida panther mating; and "B-TX" denotes offspring of F1 x Texas cougar mating.

## **RESULTS AND DISCUSSION**

### **2002-2003 Capture Season Summary**

Our capture efforts began 23 October 2002 and continued through 06 May 2003. The primary objectives of our capture work this season were to pursue panthers for 1) routine radiocollar replacement,



2) recovery of GPS radiocollars, 3) replacement of radiocollars equipped with break-away devices, and 4) removal of remaining Texas cougars as per *Genetic Restoration and Management* protocol. We chose to maintain the status quo with respect to capture activities this season and did not make a concerted effort to expand the radiocollared sample.

Nineteen panthers and 3 Texas cougars were scheduled for capture prior to the start of the 2002-2003 capture season for the reasons explained above. We successfully captured 9 of the panthers scheduled and successfully removed the 3 Texas cougars. The BCNP capture team successfully captured 3 additional panthers (FP55, FP86, and FP91) scheduled for recollaring. Four panthers (FP99, FP108, FP111, and FP112) died prior to the start of the season. Two panthers were not captured due to premature radiocollar failure (FP81 and FP88) and 1 panther (FP61) was not captured due to the presence of dependent-aged kittens < 1 yr of age.

Three dependent-aged kittens were captured and placed in temporary captivity after adult male panthers killed their mothers. Siblings FP113♀ and FP114♂ were captured on the FPNWR in October 2002 after FP78 was killed by an uncollared male. FP116 was captured on private land in Hendry County subsequent to the death of FP67 by FP65. Details of these mortality events can be found in “Florida Panther Mortality” section. We opportunistically captured panthers FP115, FP117, and FP118 during activities associated with the recollarings of FP109 and FP73.

### **Status of Radiocollared Florida Panthers**

FWC and NPS monitored 41 radiocollared panthers this reporting period. A complete listing of radiocollared panthers can be found in Appendix I. Locations of radio-instrumented Florida panthers showed spatial use patterns similar to previous years (Appendix II, Figs. 1-6). Home range sizes (minimum convex polygon method) for established, non-dispersing adult panthers averaged 149.1 km<sup>2</sup> for females ( $n = 25$ ) and 458.7 km<sup>2</sup> for males ( $n = 11$ ) (Appendix II, Figs. 2-6).

### **Status of Female Texas Cougars**

The study period began with 3 Texas cougar females that were subsequently removed from the wild and placed in permanent captivity as per *Genetic Restoration and Management* protocol. Locations of the 3 translocated Texas cougar during the reporting period (Appendix II, Fig. 7) showed movements that were within Florida panther habitat; however, no displacement of Florida panthers occurred and no disruptions to the existing social organization were observed. No Texas cougars exhibited aberrant behaviors or unacceptable human interactions. None of the 3 Texas cougars produced litters during the past year. Current status and reproductive contributions of all translocated Texas cougar are described in Appendix III.

### **Current Documented Panther Population and Distribution**

See Appendix IV for the documented panther population and distribution from 01 July 2002 - 30 June 2003 as reported by Roy McBride, Livestock Protection Company.

### **Biomedical Summaries of Florida Panthers and Texas Cougars Handled in 2002-2003**

*Capture summary.*—We captured 15 adult or juvenile panthers, three Texas cougars, and 14 neonatal kittens during this study period. Capture date; capture location; age; weight; presence of kinked tail, cowlick, and retained testes; and significant medical findings and procedures were recorded for each animal and are summarized in Tables 1 and 2.

*Capture related injuries.*—Capture-related injuries were categorized as moderate or severe. Moderate injuries were defined as those that were not life-threatening and could be treated in the field (e.g., mild to moderate hyperthermia [ $<108^{\circ}\text{F}$ ], lacerations, dog-bite wounds, hypoxia [lack of oxygen] without respiratory arrest). Severe injuries were defined as those that were life-threatening but treated in the field (e.g., severe hyperthermia [ $\geq 108^{\circ}\text{F}$ ], respiratory arrest, penetration of abdomen or thorax with dart, fractures of non-weight-bearing bones) or injuries that required removal from the wild for treatment (e.g., fractures of weight-bearing bones).

One of 18 (6%) captures of adult or juvenile panthers resulted in severe injury (see Table 3 for injuries by year since 1990). This was an adult Texas cougar female (TX106) that was captured in PSSF 8 January 2003 for removal to captivity. At the original tree the net and crash bag were deployed and the cougar darted; however, immediately after darting the cougar jumped and ran – treeing approximately 60 ft up a second tree. Following immobilization the cougar fell from the tree and was caught in the net. However, impact with a small stump beneath the net resulted in a closed abdominal hernia approximately 4 inches in length in the lower right quadrant. Surgical repair was performed at St. Francis Animal Hospital (Naples, Florida). No internal injuries were observed and the cougar was transported to White Oak Plantation for convalescence.

One 1-year-old panther (FP118) was found to have healed rib fractures when necropsied one month after initial capture. The cause of these injuries is unknown but may have resulted from the panther hitting the edge of the net during capture.

*Physical examination.*—All panthers captured were in good to excellent body condition with the exception of FP85 (fair to poor condition). FP85 had a hair Hg concentration of 72 ppm which may have affected his condition. FP114 had a healed coccygeal vertebrae fracture approximately 8 cm caudal to the sacrum.

Four of 15 (27%) neonatal kittens (FP61's K139-K142) had a crusting, scabbing dermatitis on the crown; the etiology is unknown. Two sibling neonatal kittens of FP107 (K135 and K136) were in poor condition on physical examination. Subsequent analysis of samples collected at handling revealed severe anemia and high hair Hg concentrations. The mother, FP107, apparently abandoned the den approximately 2 weeks after handling and the kittens are assumed to have died. No carcasses were found following a search of the den.

At necropsy, mild ASDs were found in FP67 and UCFP54. A small defect, which was not patent, was also found at the site of the foramen ovale in FP98. Unilateral cryptorchidism was observed in 6 of 13 (46%) male Florida panthers live-captured or necropsied this FY (for whom examination was possible). FP114 was bilaterally cryptorchid when captured at 7 mo of age, however, one testis had

descended by the time of re-examination at 9 mo of age. Cryptorchidism was not observed in introgressed panthers. Numerous small vaginal papillomas were seen in FP67.

*Clinical pathology.*—Hematology and serum chemistry results for adult and juvenile Florida panthers and Texas cougars were similar to Florida panther reference intervals reported by Dunbar et al. (1997) (Tables 4 and 5). Kitten hematological and serum chemistry values are presented in Tables 6 and 7. FP109 had a nonregenerative anemia which may have been related to FeLV infection. Severe regenerative anemia was present in littermates K135 and K136, which was most likely due to excessive blood loss due to mosquito parasitism. Possible mercury toxicity, as evidenced by elevated hair Hg concentrations, may also have contributed to the anemia. Severely elevated creatine phosphokinase levels in TX106 and FP119 may have been due to injury and/or exertion during capture.

*Infectious disease serology.*—All Florida panthers sampled from 01 July 2002 – 30 June 2003 were negative for exposure to FECV/FIP based on ELISA tests. Results of serological testing for exposure to FPV, FCV, FVR, FIV, and FeLV, and presence of FeLV antigen are summarized in Table 8. Of greatest significance was positive FeLV ELISA antigen findings for FP109 and FP115 – which were confirmed by PCR. FP115 was also positive for FIV by ELISA and Western Blot, and the concurrent infection may have resulted in a fatal opportunistic *E. coli* septicemia. Two dependent sibling kittens (FP113 and FP114) were FIV positive by ELISA and Western Blot; their mother (FP78) was FIV-positive by Western Blot (equivocal by ELISA) when sampled December 2001. Two of three Texas cougars removed to captivity were also FIV positive by both tests. Other panthers positive by both methods were FP55, FP104, and FP119. Seven of 8 (88%) panthers not previously vaccinated had positive antibody titers to FPV and FCV, and all were negative for FVR. Twenty-three of 24 (96%) panthers/Texas cougars sampled during the 2002-2003 study period were positive for WNV by SN. The significance of this is under investigation as a certain proportion of these are likely to be false positives. Testing of archived serum collected before the arrival of WNV in North America in 1999 also had a high rate of positive findings. Cross reactivity with related virus(es) may explain these findings, and further testing is necessary. West Nile Virus was not isolated from three panthers that died of unknown causes this FY.

*Virology.*—Fluorescent antibody tests for rabies were negative for UCFP49, UCFP50, UCFP51, UCFP58, FP108, and FP118, and were unsatisfactory for UCFP57. Viral isolation and PCR for WNV, canine distemper virus, Eastern Equine Encephalitis virus, and pseudorabies virus was negative for FP105 (FY01-02), FP108, FP118, TX107 (FY00-01), and UCFP57. Results of the FeLV investigation will be summarized in a separate report.

*Serum progesterone.*—Serum progesterone concentrations were determined for 15 female Florida panthers/Texas cougars this capture season (Table 5). All panthers with values  $<10$  ng/ml ( $n = 12$ ) did not have kittens within 90 days (gestation period) of sampling. Three panthers had serum progesterone concentrations  $\geq 10$  ng/ml (range 14.6 – 32.7 ng/ml), suggesting pregnancy, yet failed to have kittens. This may have been due to pseudopregnancy, loss of pregnancy, or early loss of kittens. Serum progesterone concentrations have heretofore been a reliable indicator of pregnancy in Florida panthers.

*Semen analysis.*—Semen characteristics of Florida panthers examined this study period and pure Florida panthers (Barone et al., 1994) are presented in Table 9. One Florida panther (FP85) was electroejaculated at capture, and post-mortem semen evaluation was conducted on three (FP98, FP99, and FP108). Semen characteristics varied among pure and introgressed Florida panthers and was likely affected by genetics, age, collection method, and degree of autolysis. Interestingly, FP108, a back-cross Florida panther- $F_1$ , had a much greater sperm concentration (subjectively assessed) and greater proportion of normal sperm when examined post-mortem at 2 yr-of-age than FP99, a pure Florida panther, examined similarly at almost 3 yr-of-age. In general, introgressed panthers (FP85 and FP108) had improved semen characteristics compared to pure Florida panthers.

*Parasitology.*—Four kitten fecal samples from two litters were negative for coccidian (G. Foster, unpubl. data). Two panther gastrointestinal (GI) tracts were examined for helminthes this FY for a total of 21 tracts examined since 2000 (G. Foster, unpubl. data). Approximately 95% of the parasites recovered, except for the *Ancylostoma* spp., have been identified to species. Analysis is pending completion of GI tract examinations.

*Mercury.*—Whole blood and/or hair Hg concentrations for Florida panthers and Texas cougars live-captured or necropsied this FY are listed in Tables 10 and 11; these data and mercury concentrations for panthers and Texas cougars sampled in previous FYs will be presented in a separate report. FP85 had hair Hg rise from 12 ppm in FY99-00 to 22 ppm in FY00-01 to 72 ppm this FY. Hair Hg values for all other adult panthers or Texas cougars sampled 1999-2003 from ENP were  $\leq 7.5$  ppm; however, kittens of FP61 (K139-142) had values between 11 and 13 ppm. Two other neonatal kittens of FP107 (K135 and K136) sampled in FPNWR had hair Hg values of 40 and 35 ppm respectively.

### **Florida Panther and Texas Cougar Reproduction**

Seven female panther dens were documented from 01 July 2002 – 30 June 2003 producing 17 neonate kittens (7♂, 10♀). No Texas cougars denned during the same period. All of the neonate kittens were handled successfully at their dens, permanently marked with subcutaneous transponder chips, and, with the exception of K145, skin biopsies taken. BCNP personnel handled the kittens of FP87 (K143, K144, and K145). A description of Florida panther litters handled during the reporting period can be found in Table 2 and lists of all known panther and Texas cougar dens and kittens handled can be found in Appendices V and VI.

Female Florida panthers and Texas cougars have produced litters throughout the year; however, there is a decided peak of Florida panther denning from March – July (Fig. 1). Female panthers have bred as young as 18 months-of-age (Maehr et al. 1989) and successful reproduction has occurred up to 11 years-of-age (Fig. 2). Mean age of denning females was 5.7 years. Age at first reproduction for 17 known-aged female Florida panthers averaged  $2.2 \pm 0.47$  years and ranged from 1.8 to 3.2 years (Table 12). Three known-aged females are  $> 4$  years-of-age and have not produced kittens (FP86, FP91, FP94). There was no difference ( $t_{15} = -0.57$ ,  $P = 0.57$ ) between ages of first reproduction for original Florida panthers ( $2.2 \text{ yrs.} \pm 0.44$ ;  $n = 9$ ) and panthers with Texas ancestry ( $2.3 \text{ yrs.} \pm 0.53$ ;  $n = 8$ ).

Average litter size for all panthers was  $2.4 \pm 0.94$  kittens. Nearly 70% of all litters were comprised of either 2 or 3 kittens (Fig. 3). Frequencies were 17.2%, 36.2%, 32.8%, and 13.8% for litter

sizes of 1, 2, 3, and 4 kittens, respectively. Mean birth intervals (elapsed time between successive litters) were  $19.7 \pm 9.31$  months for female panthers ( $n = 24$ ) and  $22.3 \pm 6.67$  months for female Texas puma ( $n = 5$ ). From 1990-2003, the number of births in the radiocollared population has exceeded the number of radiocollared panther deaths (Fig. 4).

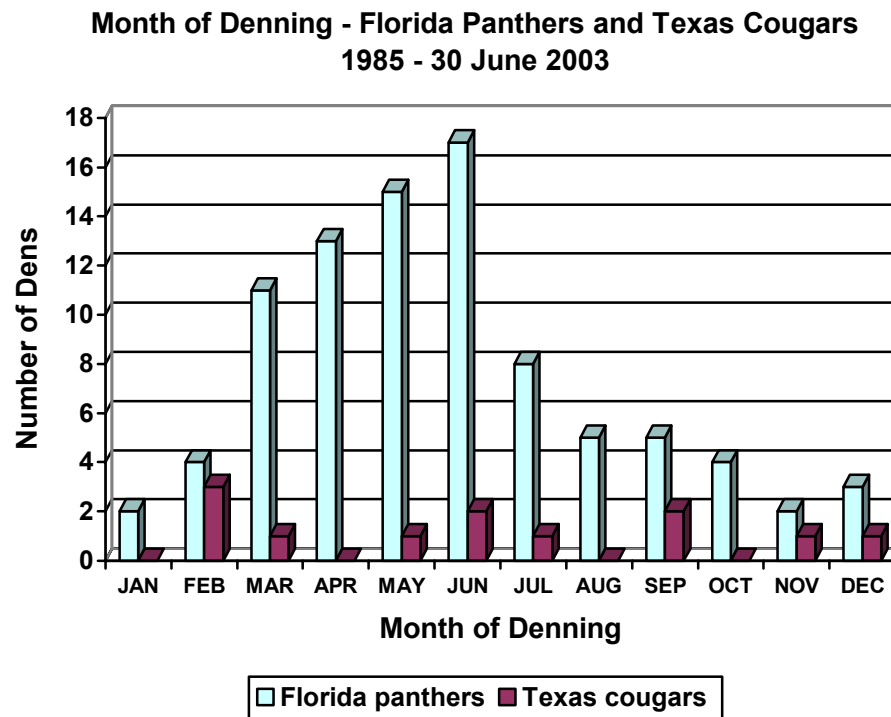


Figure 1

### Ages of Denning Florida Panthers 1985 - 2003

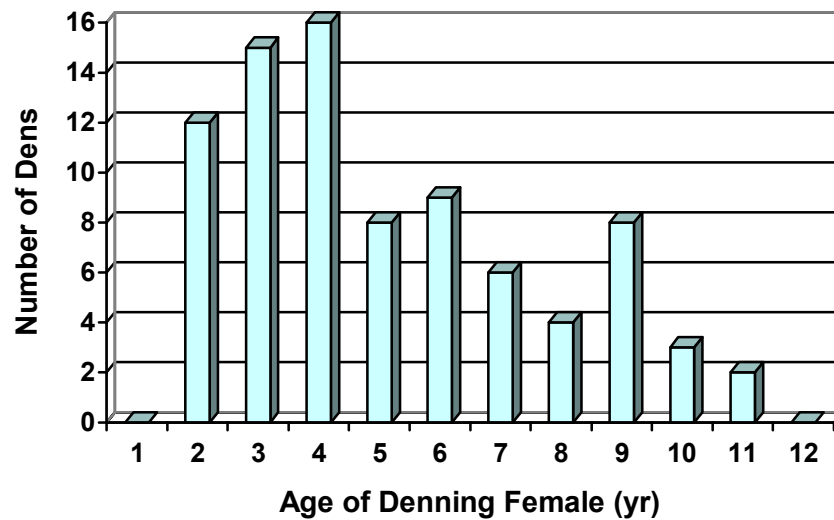


Figure 2

### Litter Sizes of Radiocollared Female Florida Panthers

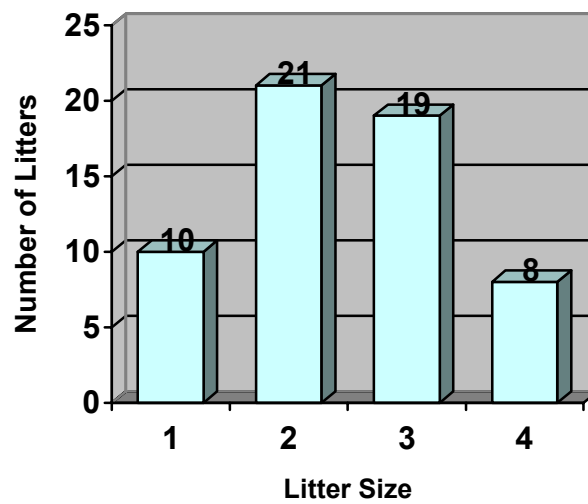


Figure 3



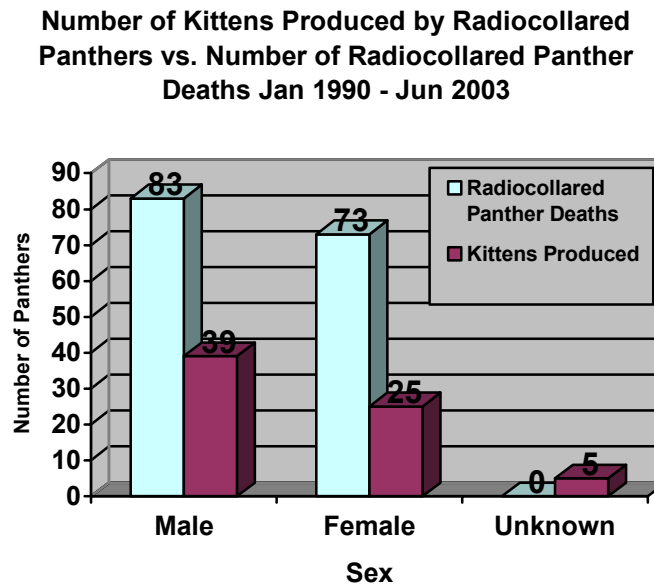


Figure 4

### Florida Panther and Texas Cougar Descendant Kitten Survival

We have visited 65 den sites of female Florida panthers and Texas cougar females since 1992 and have documented the number of kittens that survived to 6 months-of-age for 38 of these litters (Table 13). Florida panther and Texas cougar kitten survival to 6 months-of-age were estimated to be 52 and 72%, respectively, but were not significantly different ( $P = 0.2776$ ; Appendix VII). Average kitten survival, therefore, was 62% from birth to 6 months-of-age. Survival of kittens > 6 months-of-age was determined by following the fates of 46 radiocollared dependent-aged kittens, including 17 Texas cougar descendants from 1985-2003 (Table 14). Only 1 of these 46 kittens (FP53) died before reaching independence for a 97.8% survival rate. All 22 female panthers, first captured as kittens, became residents and 17 (77.3%) produced litters (Table 14). Female panthers were considered as adult residents if they were older than 18 months-of-age, established home ranges, and have bred, or if they were older than 3 years-of-age and established a home range (Maehr et al. 1991). Twenty-six male panthers were captured as kittens and 11 (42.3%) of these cats eventually became residents (Table 14). Male panthers were considered as residents if they were older than three years-of-age and established a home range that overlapped with females.

Successful male recruitment appears to depend on the death, or home range shift, of a resident adult male (Maehr *et al.* 1991a).

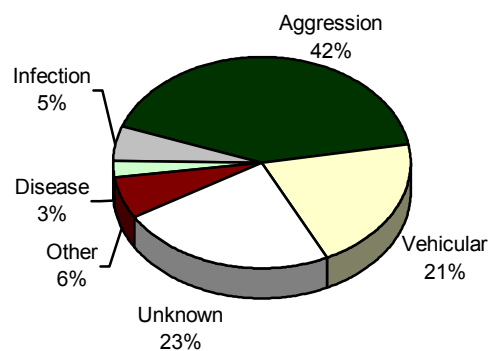
### **Florida Panther Mortality**

Twenty-six (15 radiocollared, 11 uncollared) free-ranging Florida panther mortalities were recorded between 1 July 2002 and 30 June 2003. Three radiocollared panthers (FP98, FP99, and FP106) and eight uncollared panthers died from vehicular trauma, including panther UCFP49 (K98) who was marked as a neonate kitten of FP67 in May 2001 and panther UCFP50 (K33) who was marked as a neonate kitten of FP48 in September 1996. The majority of road-kills occurred on SR29 ( $n = 4$ ) or CR846 ( $n = 4$ ) and no panthers died in areas with wildlife underpasses and fencing. Seven radiocollared panthers (2 male, 5 female) died from intraspecific aggression. Females FP78 and FP67 had dependent-aged kittens that survived the encounters and were subsequently captured and temporarily placed in captivity. Females FP112 and FP87 had given birth to 3 kittens each approximately 3 months prior to their death. No evidence was found indicating either litter was alive prior to or subsequent to the fatal encounters. Females FP112, FP78, FP82, FP87 and males FP109 and FP111 were killed by unknown males. Female panther FP67 was killed by male FP65. One radiocollared panther (FP115) died of an *E. coli* septicemia that was likely secondary to concurrent FeLV and FIV infections. One 15-yr-old panther (FP32) is believed to have died from malnutrition as she was severely emaciated and all canines were fractured or missing. Six panthers died of unknown causes – five of which may have a common etiology. The cause of these five mortalities is under investigation. A brief description of these mortalities can be found in Appendix VIII. All documented Florida panther and Texas cougar mortalities occurring in South Florida since 1972 are listed chronologically by cause of death in Appendix IX.

Seventy-seven free-roaming radiocollared panthers have died since 1981 and intraspecific aggression has accounted for 42% of these mortalities (Fig. 5). Unknown causes and collisions with vehicles accounted for 23% and 21% of mortalities, respectively. Various diseases, infections, and other

factors caused the remaining mortalities. The causes of mortality were independent of gender ( $\chi^2 = 8.59$ ,  $df = 5$ ,  $P = 0.1882$ ).

**Causes of Mortality for Radiocollared Florida Panthers  
( $n = 77$ ) 1981 - June 2003**

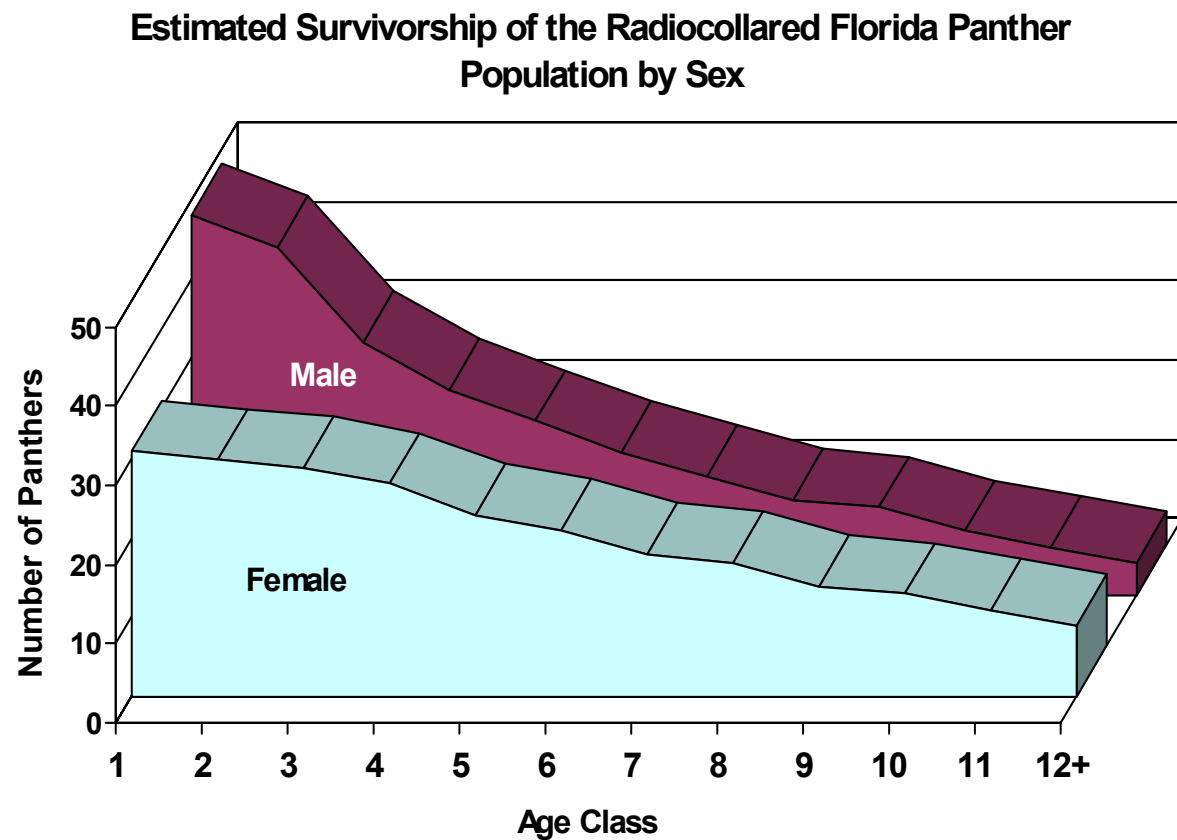


**Figure 5**

There has been a popular misconception that vehicular trauma causes most panther mortalities, but this is the result of sampling bias because uncollared panther mortalities are, with the rare exception, only found if they are caused by humans (e.g., vehicular trauma and the rare instances of illegal shootings). This bias is evident when 52 uncollared panther deaths (42 vehicular traumas, 5 illegal shootings, and 5 unknowns) are added to the above tallies, thereby artificially and incorrectly switching the 2 most important mortality sources. No panthers have been killed by vehicles in areas protected with wildlife underpasses; locations of road-killed panthers since 1972 can be found in Appendix X.

We estimated survivorship curves (the probability of surviving from 1 time interval to the next) based on ages-at-death for 31 female and 48 male panthers (Fig. 6). Female panthers exhibited low mortality rates throughout their lives as indicated by the gradual slope of the survivorship curve. Male panthers, conversely, exhibited a much steeper slope in their survivorship curve, with higher rates of

mortality from 1 to 6 years-of-age, followed by more gradual mortality rates up to 12 years-of-age. From 1990-2003, mean annual survivorship of radiocollared adult panthers was greater for females ( $0.915 \pm 0.073$ ; Table 15) than males ( $0.786 \pm 0.130$ ; Table 16). These survivorship patterns were consistent with panther ecology where males compete for large home ranges that overlap with females and where females are more tolerant of overlap with other females (Maehr et al. 1991).



**Figure 6**

### **Status of Genetic Restoration**

As of 27 January 2003, none of the 8 female Texas cougars introduced in 1995 remain in the wild. Five Texas cougars died in the wild and the remaining 3 were removed during this study period and

placed into permanent captivity (Appendix III). Five Texas cougars contributed 20 first-generation offspring, whereas the remaining 3 died prior to successful reproduction. A minimum of 84 intercross animals spanning 3 generations has been produced (Appendix III). We have handled and marked with transponders 83 of 84 (98.8%) known intercross progeny. We have obtained genetic samples from 68 of 84 (81%) Texas cougar descendants and of the remaining 16 descendants, 7 are presumed dead (Appendix III).

Genetic analyses are progressing with genotypes completed at 23 microsatellite loci for 175 panthers (Johnson et al. 2002, Update of genetic analysis of Florida panther recovery efforts, Appendix XI). Comparisons between field observations and genetic analyses continue and initial results indicate an increase in observed panther population genetic heterozygosity since the release of Texas cougar females in 1995. Various inbreeding loops have also been identified within the panther population and there is evidence that certain matrilineages are being lost as well.

Apparently, genetic introgression is reducing the occurrence of kinked tails (Table 17). Since October 1995, 42 of 66 (64%) kittens produced by Florida panthers had kinked tails (Table 18). In contrast, only 4 of 76 (5%) progeny produced by Texas cougars or their offspring had kinked tails (Table 19-20).

Unlike the presence of kinked tails, which can be assessed at any age (including as neonates handled at the den), the presence of cowlicks cannot be assessed until panthers are old enough to be radiocollared (> 6 months-of-age). However, preliminary assessments suggest that genetic introgression is also reducing the occurrence of cowlicks (Table 17). Forty-eight panthers estimated to have been born since October 1995 have been handled at >6 months-of-age during capture or during carcass recovery and 28 (58%) had cowlicks. In contrast, 24 panthers with Texas cougar ancestry have been handled at > 6 months-of-age and only 8 (33%) had a cowlick. The reduction in occurrence of kinked tails and cowlicks in the intercrossed progeny mirrors what was observed in panthers sampled from ENP that were descendants of the introduced "Piper Stock".

No Texas puma descendants in the Florida panther population have exhibited cryptorchidism (Mansfield and Land 2002). Expression of cryptorchidism among original stock Florida panthers was increasing over time with an overall prevalence rate of 49%. Unilaterally cryptorchid males were capable of siring offspring, but no bilaterally cryptorchid males were known to reproduce. Furthermore, Mansfield and Land (2002) offered more evidence to corroborate the findings of O'Brien et al. (1990) and Barone et al. (1994) that cryptorchidism is caused by genetic factors, and that genetic restoration holds promise in reducing or eliminating occurrence of this trait.

Other morphological traits such as sperm deformities, atrial septal defects, and skull morphology can only be scored once the animal reaches maturity or at necropsy after death. The FWC Genetic Restoration Final Report will provide summaries of the occurrence of these traits to date, but the full extent of genetic restoration on panther morphology may only become apparent over the next decade.

The likely representation of Texas cougar genes in the southern Florida population is probably close to the original genetic restoration program goal of 20%. However, more than 40% of the TX genes are derived from TX101 with much of the remaining TX genes derived from TX107 (both now deceased); this unequal representation in the intercross descendants reduces the genetic diversity inserted into the population. Although 5 of the original 8 Texas cougars have contributed some descendants, the diversity contributed by those five is equivalent to about 3 founders that have contributed equally to the population. Therefore, the reversal of prior inbreeding attributed to genetic restoration may be a relatively short-term benefit. To counter a resumption of inbreeding and loss of genetic diversity, further releases of non-local cats may be considered as part of ongoing management of the genetic restoration. The preceding summary was excerpted and paraphrased from Land and Lacy 2001.

## **SUMMARY**

This is the eighth year of our study to evaluate Florida panther genetic restoration. Originally, the study was scheduled for completion in five years, but we have since discovered that schedule to have been naively optimistic. Collection and analyses of genetic samples continue and many of the latest

samples are critical for evaluation of genetic restoration. Dr. Stephen O'Brien and his staff at the National Cancer Institute are culturing, analyzing, and archiving these samples. The importance of including samples from second and third generation Texas cougar descendants gathered recently outweighed a premature end to the study. Preliminary analyses indicate that the likely representation of Texas cougar genes is on target with the originally proposed introgression level of 20%. Our goal is to complete genetic analyses by year's end (2003) and these analyses should provide measures of how we have altered the panther's genetic complement as well as providing insight into panther pedigree. This information should provide us the means to fully evaluate the success of the genetic restoration program and to enable us to develop a management strategy to preserve wild Florida panthers into the foreseeable future. In terms of population size and occupied range, the Florida panther population has increased in size since initiation of genetic restoration. From 1990-2003, the number of births in the radiocollared population has exceeded the number of deaths by a factor of 3 and the primary cause of panther mortality from 1979-2003 was intraspecific aggression.

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*An extensive bibliography of Florida panther literature can be found in Appendix XII.*

**Table 1. Summary of Florida panther captures during the 2002-2003 Florida Fish and Wildlife Conservation Commission's capture season (October 2002 – May 2003).**

Cat ID <sup>a</sup>	Sex	Capture Date	Capture Location <sup>b</sup>	Age	Weight (lb.)	Kinked Tail	Cowlick	Descended Testicles	Capture Comments and Medical Notes
FP113	F	23 Oct 2002	FPNWR	6.5 mo	25	Y	Y	N/A	Orphaned due to FP78's death. Placed into temporary captivity.
FP114	M	23 Oct 2002	FPNWR	6.5 mo	27	Y	N	1 <sup>c</sup>	Orphaned due to FP78's death. Placed into temporary captivity.
TX108	F	18 Nov 2002	ENP		75	N	N	N/A	Removed and placed into permanent captivity.
FP110	F	25 Nov 2002	OKSSF	22 mo	90	N	Y	N/A	Replaced failed GPS radiocollar with VHF radiocollar.
FP115	F	26 Nov 2002	OKSSF	~4.5 yr	113	Y	N?	N/A	Initial radiocollaring. Opportunistic capture. FeLV positive.
FP82	F	06 Dec 2002	OKSSF	~6 yr	129	Y	N	N/A	Replaced failed VHF radiocollar.
FP104	M	13 Dec 2002	BCNP	~2 yr	133	N	N	2	Replaced "break-away" collar with standard VHF radiocollar.
TX106	F	08 Jan 2003	PSSF		96	N	N	N/A	Removed and placed into permanent captivity.
FP116	F	20 Jan 2003	Private	7.5 mo	36	Y	Y	N/A	Orphaned due to FP67's death. Placed into temporary captivity.
FP109	M	24 Jan 2003	OKSSF	~11 yr	157	N/A	Y	1	Replaced failed GPS radiocollar with VHF radiocollar. FeLV positive.
TX105	F	27 Jan 2003	ENP	~11 yr	87	N	N	N/A	Removed and placed into permanent captivity.
FP94	F	30 Jan 2003	ENP	3.5 yr	85.5	N	N	N/A	Routine radiocollar replacement. Pregnant at capture.
FP85	M	18 Feb 2003	ENP	4 yr	97	N	N	2	Replaced radiocollar and electroejaculated.
FP117	M	25 Feb 2003	BCNP	~11 mo	67	N	N	2	Initial radiocollaring. Fitted with "break-away".
FP73	F	27 Feb 2003	BCNP	6 yr	112.5	N	Y	N/A	Routine radiocollar replacement.
FP118	F	05 Mar 2003	BCSIR	~11 mo	62.5	N	Y	N/A	Initial radiocollaring.
FP95	F	24 Mar 2003	ENP	5 yr	90	N	N	N/A	Routine radiocollar replacement. 2 dependent 1 yr-old kittens.
FP75	F	06 May 2003	BCNP	5 yr	67	Y	N	N/A	Routine radiocollar replacement. 2 dependent 11.5 mo-old kittens treed.

<sup>a</sup>FP denotes panthers captured for radiocollaring; TX denotes Texas cougars used for Panther Genetic Restoration.

<sup>b</sup>ENP = Everglades National Park; BCSIR = Big Cypress Seminole Indian Reservation; FPNWR = Florida Panther National Wildlife Refuge; BCNP = Big Cypress National Preserve; FSSP = Fakahatchee Strand State Preserve; OKSSF = Okaloacoochee Slough State Forest; PL = private lands north of Bear Island.

<sup>x</sup>Testicle descended while in captivity.

**Table 2. Summary of neonate kittens handled at Florida panther dens 01 July 2002 – 30 June 2003.**

**Skin biopsies were obtained from all kittens and all kittens were marked with subcutaneous transponder identification chips.**

Dam ID <sup>a</sup>	Kitten ID	Sex	Location <sup>b</sup>	Date Handled	~ Age	Weight	Kinked Tail	Comments
FP107	K135	M	FPNWR	07 Jul 2002	10 days	1 lb 1 oz	Yes	Poor condition. Severe anemia.
	K136	F	FPNWR	07 Jul 2002	10 days	1 lb 6 oz	Yes	Poor condition. Severe anemia.
FP102	K137	F	BCNP	19 Jul 2002	15 days	2 lb 6 oz	No	No significant observations when handled. Kitten appeared in good health.
	K138	M	BCNP	19 Jul 2002	15 days	2 lb 9 oz	No	No significant observations when handled. Kitten appeared in good health.
FP61 <sub>F1</sub>	K139	F	ENP	07 Sep 2002	10 days	2 lb 6 oz	No	Palpated onset of dermatitis on crown, but not visible.
	K140	M	ENP	07 Sep 2002	10 days	2 lb 2 oz	No	Palpated onset of dermatitis on crown, but not visible.
	K141	M	ENP	07 Sep 2002	10 days	2 lb 0 oz	No	Dermatitis on crown.
	K142	F	ENP	07 Sep 2002	10 days	1 lb 7 oz	No	Severe dermatitis on crown. Dehydrated and obviously runt of litter.
FP87 <sub>B-FL</sub> <sup>c</sup>	K143	F	BCNP	25 Mar 2003	15 days	2 lb 8 oz	No	No significant observations when handled. Kitten appeared in good health.
	K144	M	BCNP	25 Mar 2003	15 days	3 lb 1 oz	No	Transponder number unknown.
	K145	F	BCNP	25 Mar 2003	15 days	3 lb 0 oz	Unk	Transponder number unknown.
FP101	K146	F	Gum Swamp	19 Apr 2003	10 days	2 lb 10 oz	No	No significant observations when handled. Kitten appeared in good health. Eyes halfway open.
	K147	M	Gum Swamp	19 Apr 2003	10 days	2 lb 10 oz	No	No significant observations when handled. Kitten appeared in good health.
	K148	F	Gum Swamp	19 Apr 2003	10 days	2 lb 1 oz	No	No significant observations when handled. Kitten appeared in good health.
FP110 <sub>B-FL</sub>	K149	F	OKSSF	03 Jun 2003	9 days	2 lb 0 oz	No	No significant observations when handled. Kitten appeared in good health.
	K150	M	OKSSF	03 Jun 2003	9 days	2 lb 2 oz	No	No significant observations when handled. Kitten appeared in good health.
	K151	F	OKSSF	03 Jun 2003	9 days	2 lb 0 oz	No	No significant observations when handled. Kitten appeared in good health.

<sup>a</sup>FP denotes panthers captured for radiocollaring; K denotes kittens handled at panther dens; F1 subscript denotes Florida panther x Texas cougar offspring; B-FL subscript denotes offspring of F1 x Florida panther mating.

<sup>b</sup>FPNWR = Florida Panther National Wildlife Refuge; BCNP = Big Cypress National Preserve; ENP = Everglades National Park; OKSSF = Okaloacoochee Slough State Forest.

<sup>c</sup>Kittens handled by BCNP personnel.

**Table 3. Summary of Florida panther capture-related injuries by year (1990-2003)**

Year	Moderate (%) <sup>a</sup>	Severe (%) <sup>b</sup>		Mortality (%)
		Treated in the Field	Removed for Treatment <sup>c</sup>	
1990	2 (12.5)	0	0	1 (6)
1991	5 (33.3)	0	0	0
1992	3 (16.6)	0	0	0
1993	4 (25)	1 (6.3)	0	0
1994	1 (9.1)	1 (9.1)	0	0
1995	2 (15.4)	0	0	0
1996	0	0	0	0
1997	2 (14.3)	0	0	0
1998	3 (18.8)	0	0	0
1999	3 (33.3)	0	0	0
2000	10 (33.3)	0	2 (6.7)	0
2001	2 (11.8)	0	1 (5.6)	0
2002	1 (6.7)	0	0	0
2003	0	0	1 (9) <sup>d</sup>	0
<b>Total</b>	<b>38 (16.9%)</b>	<b>2 (0.9%)</b>	<b>4 (1.8%)</b>	<b>1 (0.5%)</b>

<sup>a</sup>Moderate injuries: Injuries or conditions that were not life-threatening and were treated in the field (e.g., dog-bite wounds, lacerations, moderate hyperthermia [ $106^{\circ}$  to  $<108^{\circ}$ F], hypoxia [lack of oxygen] without respiratory arrest).

<sup>b</sup>Severe injuries: Injuries or conditions that were life-threatening but treated in the field (e.g., severe hyperthermia [ $\geq 108^{\circ}$ F], respiratory arrest, fractures, penetration of thorax or abdomen with dart).

<sup>c</sup>Injuries necessitating removal for treatment/evaluation: Fractures, hernia, dart-needle injury.

<sup>d</sup>Injury occurred during capture for permanent removal of TX106.

**Table 4. Individual and mean hematological values for adult and juvenile Florida panthers and Texas cougars captured 01 July 2002 to 30 June 2003.**

Cat ID <sup>a</sup>	Hb <sup>b</sup> g/dl	HCT <sup>c</sup> %	WBC <sup>d</sup> 10 <sup>3</sup> /μl	RBC <sup>e</sup> 10 <sup>6</sup> /μl	MCV <sup>f</sup> fl	MCH <sup>g</sup> pg	MCHC <sup>h</sup> g/dl	polys <sup>i</sup> /μl	polys %	bands <sup>j</sup> /μl	bands %	lymphs <sup>k</sup> /μl	lymphs %	monos <sup>l</sup> /μl	monos %	eos <sup>m</sup> /μl	eos %	basos <sup>n</sup> /μl	basos %
FP55	9.4	30.4	5.5	5.8	52	16.2	30.9	4950	90	0	0	385	7	110	2	55	1	0	0
FP70	10.7	35.8	10.7	6.91	52	15.5	29.9	7490	70	0	0	2568	24	321	3	321	3	0	0
FP73	9.2	32.7	4.2	6.57	50	14	28.1	2940	70	0	0	882	21	42	1	336	8	0	0
FP75	10	31.5	5.9	6.47	49	15.5	31.7	4543	77	0	0	472	8	295	5	590	10	0	0
FP82	10.2	34.5	12.1	6.94	50	14.7	29.6	10527	87	0	0	1331	11	242	2	0	0	0	0
FP85	8.2	24.5	11.6	5.41	45	15.2	33.5	10324	89	0	0	464	4	464	4	348	3	0	0
FP86	9.8	31.9	6.6	6.34	50	15.5	30.7	5148	78	0	0	792	12	198	3	462	7	0	0
FP91	8.5	27	5.6	5.37	50	15.8	31.5	4256	76	0	0	672	12	224	4	448	8	0	0
FP94	8	24.7	4.6	5.27	47	15.2	32.4	3220	70	0	0	874	19	368	8	138	3	0	0
FP95	10.8	34.5	7.4	6.44	54	16.8	31.3	5846	79	0	0	666	9	370	5	518	7	0	0
FP104	10.5	33.6	15	6.98	48	15	31.3	10800	72	0	0	3150	21	450	3	600	4	0	0
FP109	7.5	23.8	4.9	4.91	48	15.3	31.5	4165	85	0	0	490	10	245	5	0	0	0	0
FP110	9.5	30.9	10.3	6.83	45	13.9	30.7	7416	72	0	0	1957	19	309	3	618	6	0	0
FP113	7.5	25.4	4.1	5.25	48	14.3	29.5	2870	70	0	0	574	14	287	7	369	9	0	0
FP114	9.7	32.9	7.4	7.11	46	13.6	29.5	5846	79	0	0	814	11	296	4	444	6	0	0
FP115	9.2	28.4	9.2	6.85	41	13.4	32.4	7360	80	0	0	736	8	368	4	736	8	0	0
FP116	9	28	7.7	6.44	43	14	32.1	5621	73	0	0	1386	18	154	2	539	7	0	0
FP117	9.8	29.7	5.8	6.73	44	14.6	33	4814	83	0	0	580	10	290	5	116	2	0	0
FP118	9	26.3	5.3	5.78	46	15.6	34.2	3021	57	0	0	1537	29	371	7	371	7	0	0
FP119	10.8	35.9	6.5	6.97	52	15.5	30.1	4160	64	0	0	1950	30	260	4	130	2	0	0
FP120	9.4	30.3	7.8	6.08	50	15.5	31	6162	79	0	0	1092	14	468	6	78	1	0	0
TX105	10.8	32.4	5.5	6.64	49	16.3	33.3	4180	76	0	0	770	14	275	5	275	5	0	0
TX106	10.4	31.7	6.1	6.75	47	15.4	32.8	5490	90	0	0	366	6	183	3	61	1	0	0
TX108	7.3	23.2	6.3	4.6	50	15.9	31.5	4914	78	0	0	756	12	252	4	378	6	0	0
Mean	<b>9.4</b>	<b>30.0</b>	<b>7.3</b>	<b>6.2</b>	<b>48.2</b>	<b>15.1</b>	<b>31.4</b>	<b>5669.3</b>	<b>76.8</b>	<b>0.0</b>	<b>0.0</b>	<b>1052.7</b>	<b>14.3</b>	<b>285.1</b>	<b>4.1</b>	<b>330.5</b>	<b>4.8</b>	<b>0.0</b>	<b>0.0</b>
STD	<b>1.1</b>	<b>3.8</b>	<b>2.7</b>	<b>0.7</b>	<b>3.1</b>	<b>0.9</b>	<b>1.4</b>	<b>2250.6</b>	<b>8.0</b>	<b>0.0</b>	<b>0.0</b>	<b>703.0</b>	<b>6.8</b>	<b>103.5</b>	<b>1.7</b>	<b>211.4</b>	<b>3.0</b>	<b>0.0</b>	<b>0.0</b>

<sup>a</sup>FP denotes panthers captured for radiocollaring; TX denotes Texas cougars used for Panther Genetic Restoration; F1 subscript denotes Florida panther x Texas cougar offspring; F2 subscript denotes offspring of F1 x F1 mating; B-FL subscript denotes offspring of F1 x Florida panther mating; B-TX subscript denotes offspring of F1 x Texas cougar mating.

<sup>b</sup>Hb = hemoglobin; <sup>c</sup>HCT = hematocrit; <sup>d</sup>WBC = white blood cells; <sup>e</sup>RBC = red blood cells; <sup>f</sup>MCV = mean red cell volume; <sup>g</sup>MCH = mean red cell hemoglobin; <sup>h</sup>MCHC = mean red cell hemoglobin concentration; <sup>i</sup>polys = polymorphonucleocytes; <sup>j</sup>bands = band cells; <sup>k</sup>lymphs = lymphocytes; <sup>l</sup>monos = monocytes; <sup>m</sup>eos = eosinophils; <sup>n</sup>basos = basophils.

**Table 5. Individual and mean serum biochemical values for adult and juvenile Florida panthers and Texas cougars captured 01 July 2002 to 30 June 2003.**

Cat ID <sup>a</sup>	P4 ng/ml	BUN <sup>b</sup> mg/dl	creat <sup>c</sup> mg/dl	TP <sup>d</sup> g/dl	alb <sup>e</sup> g/dl	bili <sup>f</sup> mg/dl	ALP <sup>g</sup> u/l	ALT <sup>h</sup> u/l	AST <sup>i</sup> u/l	cho <sup>j</sup> mg/dl	Ca <sup>k</sup> mg/dl	P <sup>l</sup> mg/dl	Na <sup>m</sup> meq/ml	K <sup>n</sup> meq/ml	Cl <sup>o</sup> meq/ml	Glob <sup>p</sup> g/dl	trig <sup>q</sup> mg/dl	CPK <sup>r</sup> u/l	Mg <sup>s</sup> meq/ml	Osm. <sup>t</sup> mosm/l
FP55	8.7	25	2.2	5.3	2.3	0.2	7	51	43	105	8	4.2	136	4.3	126	3	17	228	1.4	277
FP70	1.9	75	2.4	6.6	3.1	0.1	8	68	136	152	8.9	7.2	160	5.3	120	3.5	57	632	1.7	343
FP73	15.7	54	2.8	6.2	2.8	0.1	8	35	50	71	8.8	6.9	156	5.1	121	3.4	48	1027	1.9	323
FP75	1.6	31	2.5	6.3	2.9	0.1	6	27	55	90	8.6	5.1	158	5.3	117	3.4	21	1155	1.4	317
FP82	2	33	2.5	7	3.1	0.1	6	67	82	140	9.2	5.9	161	5.3	120	3.9	23	438	1.9	332
FP85		22	2	8.2	3.5	0.2	<3	75	122	146	9.7	5.5	150	4.6	111	4.7	12	285	2.3	308
FP86	2	23	2.7	5.8	2.4	0.1	12	48	96	99	8.6	4.7	153	4.6	118	3.4	46	211	1.6	310
FP91	7.5	33	3.3	6.9	2.9	0.2	5	19	27	91	9.2	4.5	152	4.6	116	4	4	490	1.6	307
FP94	14.6	34	1.9	5.2	2.6	0.1	10	59	50	97	8.9	4.6	152	4.4	116	2.6	15	809	1.5	311
FP95	4.4	78	2.8	7.3	3.7	0.1	10	114	214	169	10.3	10.9	168	5.8	111	3.6	32	1255	2.1	365
FP104		58	1.8	6.8	3.4	0.1	7	53	82	157	9.8	6.2	156	4.2	116	3.4	36	856	1.7	329
FP109		22	2	8	3.4	0.1	7	45	24	89	10.4	3.6	153	3.7	124	4.6	10	223	2.5	310
FP110	2	42	2.2	7.1	3.2	0.1	18	38	32	142	10	8.5	154	5.4	114	3.9	22	233	1.8	320
FP113		15	1	5.6	2.9	0.1	103	19	28	114	11.2	7.1	154	4.3	116	2.7	36	202	1.9	305
FP114		19	1.5	7.1	3.3	0.1	68	19	37	103	11	7.1	153	4.1	117	3.8	1	217	2	304
FP115	1.9	57	2.1	6.6	3.2	0.2	12	36	36	139	9.3	4.8	153	3.7	115	3.4	41	609	1.7	322
FP116		54	1	5.3	3.1	0.2	148	30	44	102	9.8	7.1	156	4	115	2.2	164	390	1.8	327
FP117		21	2.3	5.8	3.3	0.1	147	21	31	138	8.6	7.9	155	4.6	117	2.5	6	330	1.8	318
FP118	1.7	38	1.6	6.4	3.6	0.1	76	30	32	192	11.3	7.9	150	4.2	120	2.8	11	509	1.7	308
FP119		65	1.4	6.5	3.3	0.2	82	65	56	197	10.1	7.7	155	5.3	115	3.2	45	2720	1.9	329
FP120	2.6	32	2.4	5.7	3	0.2	20	53	81	134	8.6	4.9	157	5.9	117	2.7	8	535	1.6	324
TX105	4.1	30	2.2	7.7	3.4	0.1	<3	95	53	140	10.1	6.7	155	5.1	116	4.3	31	798	1.9	313
TX106	32.7	68	2.4	6.6	3.1	0.1	14	42	82	151	9.4	7.8	157	5	116	3.5	125	2055	1.9	331
TX108		31	2.9	5.9	2.5	0.1	5	28	47	62	8.9	5.2	150	4.7	122	3.4	10	482	2	302
<b>Mean</b>	<b>6.9</b>	<b>40.0</b>	<b>2.2</b>	<b>6.5</b>	<b>3.1</b>	<b>0.1</b>	<b>32.5</b>	<b>47.4</b>	<b>64.2</b>	<b>125.8</b>	<b>9.5</b>	<b>6.3</b>	<b>154.3</b>	<b>4.7</b>	<b>117.3</b>	<b>3.4</b>	<b>34.2</b>	<b>695.4</b>	<b>1.8</b>	<b>318.1</b>
<b>STD</b>	<b>8.2</b>	<b>18.4</b>	<b>0.6</b>	<b>0.8</b>	<b>0.4</b>	<b>0.0</b>	<b>44.6</b>	<b>23.9</b>	<b>42.8</b>	<b>34.9</b>	<b>0.9</b>	<b>1.7</b>	<b>5.4</b>	<b>0.6</b>	<b>3.5</b>	<b>0.6</b>	<b>37.0</b>	<b>599.1</b>	<b>0.3</b>	<b>16.4</b>

<sup>a</sup>FP denotes panthers captured for radiocollaring; TX denotes Texas cougars used for Panther Genetic Restoration.

<sup>b</sup>P4 = progesterone; <sup>c</sup>BUN = blood urea nitrogen; <sup>d</sup>creat = creatinine; <sup>e</sup>TP = total protein; <sup>f</sup>alb = albumin; <sup>g</sup>bili = bilirubin; <sup>h</sup>ALP = alkaline phosphatase; <sup>i</sup>ALT = alanine aminotransferase; <sup>j</sup>AST = aspartate aminotransferase; <sup>k</sup>chol = cholesterol; <sup>l</sup>Ca = calcium; <sup>m</sup>P = phosphorus; <sup>n</sup>Na = sodium; <sup>o</sup>K = potassium; <sup>p</sup>Cl = chloride; <sup>q</sup>Glob = globulin; <sup>r</sup>trig = triglyceride; <sup>s</sup>CPK = creatine kinase; <sup>t</sup>Mg = magnesium; <sup>u</sup>Osm = osmolality.

**Table 6. Individual and mean hematological values for neonatal (<3 wks) Florida panthers captured 01 July 2002 to 30 June 2003.**

Kitten <sup>a</sup>	Hb <sup>b</sup> g/dl	HCT <sup>c</sup> %	WBC <sup>d</sup> 10 <sup>3</sup> /μl	RBC <sup>e</sup> 10 <sup>6</sup> /μl	MCV <sup>f</sup> fl	MCH <sup>g</sup> pg	MCHC <sup>h</sup> g/dl	polys <sup>i</sup> /μl	polys %	bands <sup>j</sup> /μl	bands %	lymphs <sup>k</sup> /μl	lymphs %	monos /μl	monos %	eos <sup>l</sup> /μl	eos %	basos <sup>m</sup> /μl	basos %
K135	3.5	11.5	6.9	1.88	61	18.6	30.4	5796	84	0	0	966	14	69	1	0	0	69	1
K136	4.1	13.1	4.4	2.45	53	16.7	31.3	3344	76	0	0	616	14	352	8	0	0	88	2
K137	10.2	28.4	4.7	4.93	58	20.7	35.9												
K138	10.2	28	6	4.95	57	20.6	36.4	3000	50	0	0	2040	34	240	4	720	12	0	0
K139	8.6	23.2	4.4	4.32	54	19.9	37.1	4136	94	0	0	88	2	176	4	0	0	0	0
K140	11.8	36.9	5.3	5.34	69	22.1	32	4081	77	0	0	477	9	0	0	742	14	0	0
K141	11.4	30.5	9.6	5.39	57	21.2	37.4	6816	71	0	0	1248	13	1056	11	384	4	96	1
K149	9	27.2	4.9	4.59	59	19.6	33.1	2695	55	0	0	1421	29	343	7	441	9	0	0
K150	8.9	28.1	3.7	4.76	59	18.7	31.7	1295	35	0	0	2294	62	111	3	0	0	0	0
K151	9.7	29.5	5	4.85	61	20	32.9	2650	53	0	0	1400	28	500	10	450	9	0	0
<b>Mean</b>	<b>8.7</b>	<b>25.6</b>	<b>5.5</b>	<b>4.3</b>	<b>58.8</b>	<b>19.8</b>	<b>33.8</b>	<b>3757.0</b>	<b>66.1</b>	<b>0.0</b>	<b>0.0</b>	<b>1172.2</b>	<b>22.8</b>	<b>316.3</b>	<b>5.3</b>	<b>304.1</b>	<b>5.3</b>	<b>28.1</b>	<b>0.4</b>
<b>STD</b>	<b>2.7</b>	<b>7.4</b>	<b>1.6</b>	<b>1.1</b>	<b>4.2</b>	<b>1.5</b>	<b>2.5</b>	<b>1595.9</b>	<b>17.8</b>	<b>0.0</b>	<b>0.0</b>	<b>678.4</b>	<b>17.0</b>	<b>300.3</b>	<b>3.7</b>	<b>294.6</b>	<b>5.4</b>	<b>40.3</b>	<b>0.7</b>

<sup>a</sup>K denotes kitten, <sup>b</sup>Hb = hemoglobin; <sup>c</sup>HCT = hematocrit; <sup>d</sup>WBC = white blood cells; <sup>e</sup>RBC = red blood cells; <sup>f</sup>MCV = mean red cell volume; <sup>g</sup>MCH = mean red cell hemoglobin; <sup>h</sup>MCHC =

mean red cell hemoglobin concentration; <sup>i</sup>polys = polymorphonucleocytes; <sup>j</sup>bands = band cells; <sup>k</sup>lymphs = lymphocytes; <sup>l</sup>monos = monocytes; <sup>m</sup>eos = eosinophils; <sup>n</sup>basos = basophils.

**Table 7. Individual and mean serum biochemical values for neonatal (<3 wks) Florida panthers captured 01 July 2002 to 30 June 2003.**

Kitten <sup>a</sup>	BUN <sup>b</sup> mg/dl	creat <sup>c</sup> mg/dl	TP <sup>d</sup> g/dl	alb <sup>e</sup> g/dl	bili <sup>f</sup> mg/dl	ALP <sup>g</sup> u/l	ALT <sup>h</sup> u/l	AST <sup>i</sup> u/l	chol <sup>j</sup> mg/dl	Ca <sup>k</sup> mg/dl	P <sup>l</sup> mg/dl	Na <sup>m</sup> meq/ml	K <sup>n</sup> meq/ml	Cl <sup>o</sup> meq/ml	Glo <sup>p</sup> g/dl	trig <sup>q</sup> mg/dl	CPK <sup>r</sup> u/l	Mg <sup>s</sup> meq/ml	Osm. <sup>t</sup> mosm/l
K135	84	0	6	3	0.1	24	24	48	252	8.4	9.6	126	4.2	84	3	138	174	2.1	280
K136	36	0.5	5.9	2.9	0.2	79	20	46	218	11.1	8.3	138	5.3	104	3	168	396	2.4	289
K137	27	0.5	5	2.5	0.1	164	13	75	198	10	9.1	139	5.5	100	2.5	109	600	2	287
K138	29	0.4	5.1	2.6	0.1	225	6	51	200	10.5	8.9	131	5.1	98	2.5	86	445	2	273
K139	27	0.6	4.8	2.4	0.1	163	26	64	156	11.5	9.7	138	5.7	106	2.4	146	261	2.1	282
K140	24	0.3	4.2	2.4	0.3	105	24	78	159	8.4	7.2	123	4.8	87	1.8	171	222	2.1	253
K141	27	0.5	5.2	2.5	0.1	101	23	80	176	10.6	9	141	6.1	108	2.7	393	566	2.5	288
K149	22	0.2	5.4	2.8	0.6	182	12	36	182	9.8	9.8	154	5.8	102	2.6	92	260	2	314
K150	20	0.2	5.4	3	0.4	246	22	56	194	10.2	10.4	158	5.8	106	2.4	158	522	2	319
K151	30	0.6	6.3	3.3	0.3	258	21	48	210	12.9	12.3	168	6.9	129	3	318	237	2.7	346
<b>Mean</b>	<b>32.6</b>	<b>0.4</b>	<b>5.3</b>	<b>2.7</b>	<b>0.2</b>	<b>155</b>	<b>19.1</b>	<b>58.2</b>	<b>194.5</b>	<b>10.3</b>	<b>9.4</b>	<b>141.6</b>	<b>5.5</b>	<b>102.4</b>	<b>2.6</b>	<b>177.9</b>	<b>368</b>	<b>2.2</b>	<b>293.1</b>
<b>STD</b>	<b>17.6</b>	<b>0.1</b>	<b>0.6</b>	<b>0.3</b>	<b>0.2</b>	<b>73</b>	<b>6.2</b>	<b>14.5</b>	<b>27.2</b>	<b>1.3</b>	<b>1.3</b>	<b>13.6</b>	<b>0.7</b>	<b>11.7</b>	<b>0.4</b>	<b>94.7</b>	<b>149</b>	<b>0.2</b>	<b>25.1</b>

<sup>a</sup>K denotes kitten, <sup>b</sup>BUN = blood urea nitrogen; <sup>c</sup>creat = creatinine; <sup>d</sup>TP = total protein; <sup>e</sup>alb = albumin; <sup>f</sup>bili = bilirubin; <sup>g</sup>ALP = alkaline phosphatase; <sup>h</sup>ALT = alanine aminotransferase; <sup>i</sup>AST

= aspartate aminotransferase; <sup>j</sup>chol = cholesterol; <sup>k</sup>Ca = calcium; <sup>l</sup>P = phosphorus; <sup>m</sup>Na = sodium; <sup>n</sup>K = potassium; <sup>o</sup>Cl = chloride; <sup>p</sup>Glo = globulin; <sup>q</sup>trig = triglyceride; <sup>r</sup>CPK = creatine kinase; <sup>s</sup>Mg = magnesium; <sup>t</sup>Osm = osmolality.



**Table 8. Reciprocal antibody titers to feline panleukopenia virus (FPV), feline calicivirus (FCV), and feline viral rhinotracheitis virus (FVR), presence of antibody to feline immunodeficiency virus (FIV), presence of feline leukemia virus (FeLV) antigen (ag), and reciprocal antibody (ab) titers to FeLV in Florida panthers sampled in south Florida, 2002-2003. Positive titers are indicated by (P).**

Cat ID <sup>a</sup>	Previously Vaccinated	FPV	FCV	FVR	FIV (kela) <sup>b,d</sup>	FIV (wblot) <sup>c,d</sup>	FeLV (ELISA ag)	FeLV (ELISA ab)	WNV
FP55	Y	640 (P)	12 (P)	8 (P)	P	P	N	0.188	128 (P)
FP70	Y	640 (P)	48 (P)	8	N	N	N	0.131	128 (P)
FP73	Y	320 (P)	8 (P)	8	N	N	N	0.17	256 (P)
FP75	Y	10	12 (P)	8 (P)	N	N	N	0.184	256 (P)
FP82	Y	160 (P)	16 (P)	8	N	N	N	0.262 (L)	1024 (P)
FP85	Y	640 (P)	96 (P)	8 (P)	N	N	N	0.165	128 (P)
FP86	Y	80 (P)	32 (P)	8 (P)	N	N	N	0.165	64 (P)
FP91	Y	5120 (P)	16 (P)	8 (P)	N	N	N	0.216	256 (P)
FP94	Y	10	16 (P)	8	N	N	N	0.141	128 (P)
FP95	Y	10 (P)	12 (P)	8	E	N	N	0.168	64 (P)
FP104	Y	160 (P)	64 (P)	8	P	P	N	0.132	256 (P)
FP109	Y	1280 (P)	96 (P)	8	N	N	P	0.546 (H)	512 (P)
FP110	Y	20 (P)	32 (P)	8	N	E	N	0.196	256 (P)
FP113	N	10 (P)	16 (P)	8	P	P	N	0.183	256 (P)
FP114	N	10 (P)	12 (P)	8	P	P	N	0.242	256 (P)
FP115	N	640 (P)	32 (P)	8	P	P	P	0.499 (M)	512 (P)
FP116	N	10	384 (P)	8	P	N	N	0.149	512 (P)
FP117	N	10240 (>=)	8	8	N	N	N	0.17	1024 (P)
FP118	N	2560 (P)	12 (P)	8	N	N	N	0.157	512 (P)
FP119	N	10 (P)	96 (P)	8	P	P	N	0.125	32
FP120	N	2560 (P)	8 (P)	8	N	N	N	0.193	256 (P)
TX105	Y	1280 (P)	48 (P)	8	P	P	N	0.161	256 (P)
TX106	Y	320 (P)	12 (P)	8 (P)	P	P	N	0.129	512 (P)
TX108	Y	320 (P)	32 (P)	8	N	N	N	0.189	1024 (P)

<sup>a</sup>FP denotes panther captured for radiocollaring; <sup>b</sup>presence of antibodies determined by ELISA; <sup>c</sup>presence of antibodies determined by Western Blot; <sup>d</sup> P=positive, N=negative, E=equivocal.

**Table 9. Semen characteristics for panthers examined 01 July 2002 to 30 June 2003 (L. Penfold, unpubl. data).**

	FP85 <sub>F1</sub> <sup>1</sup>	FP108 <sub>BFP-F1</sub> <sup>2</sup>	FP98 <sup>2</sup>	FP99 <sup>2</sup>	Florida Panthers ( <i>n</i> = 16) <sup>3</sup>
Ejaculate volume (ml)	1.25	NA	NA	NA	0.7 ± 0.1
Sperm concentration/ml (x 10 <sup>6</sup> )	31.25	ND	8	<0.001	4.8 ± 1.4
Sperm motility (%)	30	NA	NA	NA	38.2 ± 6.7
Sperm progression (0-5, 5=best)	3.25	NA	NA	NA	2.3 ± 0.3
Normal sperm (%)	6	42	7	0	6.5 ± 0.7
Abnormal acrosome (%)	27	19	8	13	41.8 ± 2.2

<sup>1</sup>Electroejaculated at capture.

<sup>2</sup>Testes collected and examined post-mortem.

<sup>3</sup>Barone et al., 1994

**Table 10. Hair and blood mercury concentrations in adult and juvenile Florida panthers and Texas cougars live-captured 01 July 2002 – 30 June 2003.**

Cat ID <sup>a</sup>	Date	Sex	Age (yr)	Location	Hair 96-97	Hair 97-98	Hair 98-99	Hair 99-00	Hair 00-01	Hair 01-02	Hair 02-03	Blood 02-03
FP55	04/04/03	F	10	BCNP-ML	4.3			3.7			0.56	0.063
FP70	3/10/03	F	6	BCNP-TR		1.7					1.6	0.086
FP73	2/27/03	F	6	BCNP-AL			0.99				0.8	0.029
FP82	12/6/02	F	6	OKS				0.7			0.93	0.017
FP85	2/18/03	M	4	ENP				12	22		72	5.3
FP86	4/1/03	F	3.5	BCNP-ML				0.89	12		4	0.15
FP91	3/18/03	F	3.5	BCNP-ML				0.81	30		11	0.5
FP94	1/30/03	F	3.5	ENP				0.13			6.9	0.15
FP95	3/24/03	F	5.1	ENP					3.3		1.4	0.12
FP104	12/13/02	M	2.1	BCNP-AL					0.32		1.3	0.051
FP109	1/24/03	M	11	OKS						0.44	0.34	0.02
FP110	11/25/02	F	1.8	OKS						1.2	1.4	0.048
FP113	10/23/02	F	0.5	FPNWR							9.7	0.36
FP114	10/23/02	M	0.5	FPNWR							10	0.36
FP115	11/26/02	F	4.5	OKS							0.98	0.03
FP116	1/20/03	F	0.6	PL							1.7	0.071
FP117	2/25/03	M	0.9	BCNP-AL							0.71	0.035
FP118	3/5/03	F	0.9	BC-SIR							10	0.055
FP119	4/2/03	M	1	BCNP-TR							0.3	0.013
FP120	4/8/03	F	3	BCNP-TR							3.5	0.16
TX105	1/27/03	F	11	ENP					6		3.8	0.29
TX106	1/8/03	F	10	PSSP				2.9			2.4	0.093
TX108	11/18/02	F	10	ENP				7.5			7.5	0.29

<sup>a</sup>BCNP = Big Cypress National Preserve (AL = Addition Lands, BI = Bear Island Unit, ML = Monument Lake Unit, TR = Turner River Unit), BC-SIR = Big Cypress Seminole Indian Reservation, ENP = Everglades National Park, FPNWR = Florida Panther National Wildlife Refuge, OKS = Okaloacoochee Slough Wildlife Management Area, PSSP = Picayune Strand State Preserve, PL = Private Lands north of FPNWR and BCNP-BI.

**Table 11. Hair mercury concentrations in neonatal Florida panther kittens and hair and blood mercury concentrations in adult and juvenile Florida panthers and Texas cougars necropsied 01 July 2002 – 30 June 2003.**

Cat ID <sup>a</sup>	Date	Sex	Age (yr)	Location	Hair 96-97	Hair 97-98	Hair 98-99	Hair 99-00	Hair 00-01	Hair 01-02	Hair 02-03	Blood 02-03
K 135	7/7/02	M	0.03	FPNWR							40	
K 136	7/7/02	F	0.03	FPNWR							35	
K 137	7/19/02	F	0.04	BCNP-ML							0.58	
K 138	7/19/02	M	0.04	BCNP-ML							0.81	
K 139	9/27/02	F	0.03	ENP							12	
K 140	9/27/02	M	0.03	ENP							11	
K 141	9/27/02	M	0.03	ENP							13	
K 142	9/27/02	F	0.03	ENP							12	
K 143	3/26/03	F	0.04	BCNP-ML							1.1	
K 144	3/26/03	M	0.04	BCNP-ML							2.6	
FP 32	10/4/02	F	15	FPNWR				7.8			5.4	
FP 67	3/27/03	F	5.5	PL			13			7.3	2	
FP 78	3/10/03	F	6	FPNWR			9.5			9.3	9.5	
FP 98	7/12/02	M	4.5	BCNP-BI							5.9	
FP 99	3/12/03	M	2.75	PL					2.5	3.7	1.2	
FP 106	3/20/03	F	3	FPNWR					2.6		7.6	
FP 108	11/19/02	M	1.8	BCNP-ML						0.4	3.9	
FP 112	10/7/02	F	4	BCNP-BI						7.7	2.4	
UCFP 48	3/26/03	F	0.8	PL							0.26	
UCFP49	3/13/03	F	1.5	PL							4.7	
UCFP 50	3/11/03	M	6.5	PL							0.39	
UCFP 51	3/10/03	M	2	Hillsborough Co.							2.2	
UCFP 52	3/25/03	M	1.5-3	PL							6.8	

<sup>a</sup>BCNP = Big Cypress National Preserve (AL = Addition Lands, BI = Bear Island Unit, ML = Monument Lake Unit, TR = Turner River Unit), BC-SIR = Big Cypress Seminole Indian Reservation, ENP = Everglades National Park, FPNWR = Florida Panther National Wildlife Refuge, OKS = Okaloacoochee Slough Wildlife Management Area, PSSP = Picayune Strand State Preserve, PL = Private Lands north of FPNWR and BCNP-BI.

**Table 12. Age at first reproduction for radiocollared Florida panthers from May 1986 – June 2003.**

Panther ID	Birth Date	Date of First Litter	Age (years)	Texas Genes
FP19	5/1986	3/1988	1.8	NO
FP48	10/1991	10/1993	2.0	NO
FP52	10/1991	7/1993	1.8	NO
FP55	12/1992	4/1995	2.3	NO
FP61	7/1996	3/1999	2.7	YES
FP66	12/1996	9/1998	1.8	YES
FP67	6/1997	8/2000	3.2	NO
FP69	5/1997	7/1999	2.2	NO
FP70	5/1997	6/1999	2.1	YES
FP71	5/1997	6/1999	2.1	YES
FP75	6/1998	3/2000	1.8	NO
FP83	6/1999	4/2002	2.8	YES
FP87	4/1999	1/2001	1.8	YES
FP88	6/1999	5/2001	1.9	YES
FP93	2/1999	4/2002	3.2	YES
FP106	2/2000	5/2002	2.2	NO
FP107	4/2000	6/2002	2.2	NO

**Table 13. Litter size at birth and at 6 months-of-age for select female Florida panthers and Texas cougar descendants.**

Dam ID <sup>a</sup>	Ancestry	Den year	Litter size	# Alive at 6 mos.
FP32	FLA	1996	1	0
FP40	FLA	1992	2	2
FP40	FLA	1993	3	2
FP48	FLA	1995	2	2
FP48	FLA	1996	3	2
FP48	FLA	1998	2	2
FP48	FLA	1999	2	0
FP49	FLA	1999	1	0
FP56	FLA	1995	3	0
FP56	FLA	1996	2	0
FP56	FLA	1997	4	2
FP67	FLA	2002	3	1
FP69	FLA	1999	3	2
FP75	FLA	2002	2	2
FP78	FLA	2000	2	2
FP78	FLA	2002	4	2
FP101	FLA	2002	2	0
FP106	FLA	2002	3	1
FP107	FLA	2002	2	0
FP55 <sub>B-FL</sub>	TX	2002	1	0
FP61 <sub>F1</sub>	TX	1999	1	1
FP61 <sub>F1</sub>	TX	2002	4	2
FP66 <sub>F1</sub>	TX	1998	3	0
FP66 <sub>F1</sub>	TX	1999	3	2
FP70 <sub>B-TX</sub>	TX	1999	3	3
FP71 <sub>B-TX</sub>	TX	1999	4	3

Dam ID <sup>a</sup>	Ancestry	Den year	Litter size	# Alive at 6 mos.
FP73 <sub>F1</sub>	TX	2002	3	2
FP77	TX	2000	3	1
FP77	TX	2001	1	
FP83 <sub>F1</sub>	TX	2002	1	1
FP93 <sub>B-TX</sub>	TX	2002	4	3
FP95 <sub>F1</sub>	TX	2002	2	2
FP102 <sub>B-FL</sub>	TX	2002	2	2
TX101	TX	1995	2	2
TX101	TX	1996	2	2
TX106	TX	1998	1	0
TX106	TX	1999	2	1
TX107	TX	1997	2	2
TX108	TX	1998	2	1

<sup>a</sup>FP denotes panthers captured for radiocollaring; TX denotes Texas cougars used for Panther Genetic Restoration; F1 subscript denotes Florida panther x Texas cougar offspring; B-FL subscript denotes offspring of F1 x Florida panther; B-TX subscript denotes offspring of F1 x Texas cougar mating.

**Table 14. Survival to independence and established residency of radiocollared Florida panther and Texas cougar descendant kittens in southern Florida, 1985-2003.**

Panther ID	Sex	Ancestry	Capture Age (months)	Death Age (years)	Reached Independence	Established Residency	Date Born	Date Died
FP10	M	FLA	5	1.5	TRUE	FALSE	8/1985	1/27/1987
FP16	M	FLA	13	14.1	TRUE	TRUE	12/1985	1/3/2000
FP19	F	FLA	9	11.6	TRUE	TRUE	5/1986	12/2/1997
FP22	F	FLA	5	4.8	TRUE	TRUE	10/1986	7/20/1991
FP29	M	FLA	6	4.0	TRUE	TRUE	5/1988	5/27/1992
FP30	M	FLA	9	1.9	TRUE	FALSE	3/1988	1/29/1990
FP34	M	FLA	10	5.7	TRUE	TRUE	3/1988	11/15/1993
FP42	M	FLA	11	6.1	TRUE	TRUE	5/1989	6/22/1995
FP43	M	FLA	9	2.3	TRUE	FALSE	7/1989	10/31/1991
FP44	M	FLA	6	2.6	TRUE	FALSE	11/1990	7/6/1993
FP45	M	FLA	6	7.7	TRUE	TRUE	11/1990	8/2/1998
FP47	M	FLA	6	1.6	TRUE	FALSE	7/1991	2/19/1993
FP48	F	FLA	4		TRUE	TRUE	10/1991	
FP50	M	FLA	8	2.6	TRUE	FALSE	5/1991	12/6/1993
FP52	F	FLA	6	3.3	TRUE	TRUE	10/1991	1/14/1995
FP53	M	FLA	10	0.9	FALSE	N/A	4/1992	2/26/1993
FP54	M	FLA	10		TRUE	TRUE	4/1992	
FP58	M	FLA	8	3.0	TRUE	FALSE	4/1994	3/30/1997
FP59	M	FLA	6		TRUE	TRUE	6/1995	
FP60	M	FLA	5		TRUE	TRUE	10/1995	
FP61	F	TX	8		TRUE	TRUE	7/1996	
FP62	M	FLA	6		TRUE	FALSE	9/1996	
FP64	M	FLA	8	2.5	TRUE	FALSE	9/1996	3/26/1999
FP65	M	TX	11		TRUE	TRUE	12/1996	
FP66	F	TX	12		TRUE	TRUE	12/1996	
FP67	F	FLA	8	5.5	TRUE	TRUE	6/1997	1/15/2003
FP69	F	FLA	9		TRUE	TRUE	5/1997	
FP70	F	TX	10		TRUE	TRUE	5/1997	
FP71	F	TX	10		TRUE	TRUE	5/1997	
FP75	F	FLA	7		TRUE	TRUE	6/1998	
FP83	F	TX	8		TRUE	TRUE	6/1999	
FP85	M	TX	10		TRUE	TRUE	3/1999	
FP86	F	TX	8		TRUE	TRUE	6/1999	
FP87	F	TX	10		TRUE	TRUE	4/1999	
FP88	F	TX	9		TRUE	TRUE	6/1999	
FP90	M	TX	9	1.9	TRUE	FALSE	6/1999	4/26/2001
FP91	F	TX	9		TRUE	TRUE	6/1999	
FP92	M	TX	10		TRUE	FALSE	6/1999	9/2001



Panther ID	Sex	Ancestry	Capture Age (months)	Death Age (years)	Reached Independence	Established Residency	Date Born	Date Died
FP93	F	TX	14		TRUE	TRUE	2/1999	
FP94	F	TX	10		TRUE	TRUE	7/1999	
FP96	M	FLA	9	1.7	TRUE	FALSE	4/2000	1/17/2002
FP97	M	FLA	~11	1.7	TRUE	FALSE	UNK	12/02/2001
FP99	M	FLA	~11	2.7	TRUE	TRUE	UNK	11/28/2002
FP103	F	TX	~7		TRUE	TRUE	UNK	
FP104	M	TX	~7		N/A	TRUE	9/2000	
FP106	F	FLA	~13		TRUE	TRUE	UNK	
FP107	F	FLA	19		N/A	TRUE	4/2000	
FP108	M	TX	~11	1.8	TRUE	FALSE	1/2001	11/18/2002

**Table 15. Estimated annual survival rates (Heisey and Fuller 1985) for adult female Florida panthers in southern Florida based on radiocollared panthers from 1990-2002.**

Year	No. of panthers	Radio-days	Total deaths	Mortality cause			Radio failure	Interval survival rate
				Aggression	Roadkill	Other		
1990	13	4374	2	2	0	0	0	0.846
1991	11	3656	2	0	0	2	0	0.811
1992	12	4158	0	0	0	0	0	1.000
1993	12	4380	0	0	0	0	0	1.000
1994	14	4599	2	0	1	1	0	0.853
1995	13	4363	1	0	1	0	0	0.920
1996	12	4392	0	0	0	0	0	1.000
1997	14	4533	1	0	0	1	1	0.922
1998	17	4990	2	1	0	1	1	0.864
1999	17	5878	0	0	0	0	1	1.000
2000	26	7675	2	0	1	1	3	0.909
2001	27	8470	1	1	0	0	2	0.958
2002	27	8473	5	3	0	2	0	0.806
							<i>n</i>	13
							Mean ± SD	0.915 ± 0.073
							95% CI	0.875 to 0.955

**Table 16. Estimated annual survival rates (Heisey and Fuller 1985) for adult male Florida panthers in southern Florida based on radiocollared panthers from 1990-2002.**

Year	No. of panthers	Radio-days	Total deaths	Mortality cause			Radio failure	Interval survival rate
				Aggression	Roadkill	Other		
1991	9	2977	1	1	0	0	0	0.885
1992	12	3847	2	1	0	1	0	0.827
1993	11	3270	4	2	1	1	0	0.640
1994	7	2324	2	2	0	0	0	0.730
1995	6	2152	0	0	0	0	0	1.000
1996	8	2860	0	0	0	0	0	1.000
1997	11	3171	1	1	0	0	0	0.891
1998	13	3966	3	2	1	0	0	0.759
1999	12	3530	4	3	1	0	0	0.661
2000	14	3353	5	2	1	2	1	0.646
2001	14	3986	3	1	1	1	0	0.833
2002	14	4209	5	3	2	0	1	0.648
								<i>n</i> 13
								Mean $\pm$ SD 0.786 $\pm$ 0.130
								95% CI 0.715 $\pm$ 0.857

**Table 17. Occurrence of kinked tails and cowlicks among Florida panthers and Texas cougar descendents.**

Ancestry	N	Kink			Cowlick		
		Yes	No	Unk	Yes	No	Unk
FLA	186	135 (72.6%)	42 (22.6%)	9 (4.8%)	93 (50.0%)	27 (14.5%)	66 (35.5%)
TEX	76	3 (3.9%)	71 (93.4%)	2 (2.6%)	8 (10.5%)	19 (25.0%)	49 (64.5%)
EVER	18	5 (27.8%)	13 (72.2%)	0 (0.0%)	1 (5.6%)	11 (61.1%)	6 (33.3%)
Unknown	16	2 (12.5%)	13 (81.3%)	1 (6.3%)	1 (6.3%)	12 (75.0%)	3 (18.7%)

**Table 18. Kittens produced by female Florida panthers from October 1995 to 20 June 2003.**

Panther ID	Den Date	Litter Size	Sex Ratio	Prevalence of Kinked Tail
FP19	Apr 1996	2	2♀:0♂	2 Yes:0 No
FP32	Apr 1996	1	0♀:1♂	1 Yes:0 No
FP36	Feb 1996	3	1♀:2♂	3 Yes:0 No
FP40	May 1997	2 (?)	1♀:1♂	2 Yes:0 No
FP48	Sep 1996	3	0♀:3♂	2 Yes:1 No
	Jun 1998	2	1♀:1♂	2 Yes:0 No
	Oct 1999	2	2♀:0♂	0 Yes: 1 No:1 UNK
FP49	Jan 1999	1	0♀:1♂	0 Yes:1 No
	Aug 2001	1	0♀:1♂	0 Yes: 1 No
FP55	Sep 1997	3	2♀:1♂	0 Yes:3 No
	Feb 1998	2	1♀:1♂	1 Yes:1 No
	June 2001	1	0♀:1♂	0 Yes:1 No
FP56	Oct 1995	3	0♀:3♂	3 Yes:0 No
	Aug 1996	2	2 UNK	2 Yes:0 No
	Jun 1997	4	2♀:2♂	3 Yes:1 No
FP67	August 2000	2	1♀:1♂	1 Yes: 1 No
	May 2001	4	1♀:3♂	0 Yes: 4 No
	June 2002	3	1♀:2♂	3 Yes: 0 No
FP69	Jul 1999	3	2♀:1♂	1 Yes: 2 No
FP75	June 2001	2	0♀:2♂	1 Yes: 1 No
	May 2002	2	0♀:2♂	2 Yes: 0 No
FP78	Apr 2000	2	1♀:1♂	2 Yes: 0 No
	Apr 2002	4	3♀:1♂	4 Yes: 0 No
FP101	Apr 2002	2	1♀:1♂	0 Yes: 2 No
	Apr 2003	3	2♀:1♂	0 Yes: 3 No
FP106	May 2002	3	1♀:2♂	3 Yes: 0 No
FP107	June 2002	2	1♀:1♂	2 Yes: 0 No
FP112	June 2002	2	0♀:2♂	2 Yes: 0 No
Mean/Total		2.4/66	26♀:38♂:2 UNK	Yes: 42 No: 23 UNK: 1

**Table 19. F1 kittens produced by female Texas cougars from October 1995 to 30 June 2003.**

Cat ID	Den Date	Liter Size	Sex Ratio	Prevalence of Kinked Tail
TX101	Sep 1995	2	1 ♀:1 ♂	2 No
TX101	Dec 1996	2	1 ♀:1 ♂	2 No
TX105	Sep 1996(?)	1	1 ♀:0 ♂	1 No
TX105	Jul 1999	1(?)	1 ♀:0 ♂	1 No
TX106	Nov 1995	1	1 ♀:0 ♂	1 No
TX106	Feb 1998	1	0 ♀:1 ♂	1 No
TX106	Jun 1999	2	2 ♀:0 ♂	2 No
TX106	Mar 2001	2	1 ♀:1 ♂	2 No
TX107	May 1997	2	2 ♀:0 ♂	2 No
TX108	Jun 1996	1	1 ♀:0 ♂	1 No
TX108	Feb 1998	2	1 ♀:1 ♂	2 No
<b>Mean/Total</b>		<b>1.5/17</b>	<b>12 ♀: 5 ♂</b>	<b>0 Yes: 17 No</b>

**Table 20. Documented litters with Texas cougar ancestry produced from October 1995 – June 2003, excluding F1 generation.**

Panther ID	Den Date	Litter Size	Sex Ratio	Prevalence of Kinked Tail	Pedigree/Suspected Sire
FP55	Apr 1999	2	1♀:1♂	1 Yes:1 No	Florida backcross / FP79 <sub>F1</sub>
	May 2002	1	1♀:0♂	0 Yes: 1 No	Florida backcross / FP79 <sub>F1</sub>
FP61 <sub>F1</sub>	Mar 1999	1	0♀:1♂	0 Yes:1 No	Florida backcross / FP16
	Aug 2002	4	2♀:2♂	0 Yes; 4 No	Unclassified <sup>b</sup> / Unknown
FP66 <sub>F1</sub>	Sep 1998	3	1♀:2♂	0 Yes:3 No	Florida backcross / FP72
	Dec 1999	3	2♀:1♂	0 Yes:3 No	Florida backcross / FP59
FP70 <sub>F1</sub>	Jun 1999	3	2♀:1♂	0 Yes:3 No	F2 / FP79 <sub>F1</sub>
FP71 <sub>F1</sub>	Jun 1999	4	2♀:2♂	0 Yes:4 No	F2 / FP79 <sub>F1</sub>
FP73 <sub>F1</sub>	?	1 (?)	0♀:1♂	1 Yes:0 No	Florida backcross / Unknown
	Apr 1999(?)	1(?)	0♀:1♂	0 Yes:1 No	Florida backcross / Unknown
	Feb 2002	3	1♀:2♂	0 Yes: 3 No	F1/ Unknown
FP77	May 2000	3	1♀:2♂	0 Yes: 3 No	Florida backcross / Unknown
	Aug 2001	1	0♀:1♂	1 Yes: 0 No	Florida backcross / Unknown
FP82	Dec 2000	3	2♀: 1♂	1 Yes: 2 No	Florida backcross / FP65 <sub>F1</sub>
FP83 <sub>F1</sub>	Apr 2002	1	0♀:1♂	0 Yes: 1 No	F1 / Unknown
FP87 <sub>B-FL</sub>	Jan 2001	3	1♀: 2♂	0 Yes: 3 No	Unclassified / FP79 <sub>F1</sub>
	Mar 2003	3	2♀:1♂	0 Yes: 2 No: 1 Unk	
FP88 <sub>F2</sub>	May 2001	4	2♀: 2♂	0 Yes: 4 No	Unclassified / Unknown
FP93	Apr 2002	4	3♀:1♂	0 Yes: 4 No	Texas backcross / FP79 <sub>F1</sub>
FP95 <sub>F1</sub>	Mar 2002	1	1♀:0♂	0 Yes: 1 No	F1 (ENP) / FP85 <sub>B-FL</sub>
FP102	Jun 2001	2	0♀:2♂	0 Yes: 2 No	Unclassified/ FP79 <sub>F1</sub>
	Jul 2002	2	1♀:1♂	0 Yes: 2 No	Unclassified/FP79 <sub>F1</sub>
FP110 <sub>B-FL</sub>	May 2003	3	2♀:1♂	0 Yes: 3 No	Unclassified / Unknown
TX107	Mar 1999	3	2♀:1♂	0 Yes:3 No	Texas backcross / FP79 <sub>F1</sub>
<b>Mean/Total</b>		<b>2.7/59<sup>c</sup></b>	<b>29♀:30♂</b>	<b>4 Yes: 54 No: 1 Unk</b>	

<sup>a</sup> FP denotes panthers captured for radiocollaring; F1 subscript denotes Florida panther x Texas cougar offspring; F2 subscript denotes offspring of F1 x F1 mating; B-FL subscript denotes offspring of F1 x Florida panther mating.

<sup>b</sup> Descendant of Texas cougar, however, ancestry cannot be classified.

<sup>c</sup> Mean and Total does not include dens of FP73<sub>F1</sub> that were not visited.

## APPENDICES

Appendix I. List of radio-instrumented Florida panthers and Texas cougars in southern Florida from 10 February 1981 to 30 June 2003.

Appendix II. Figures (1-7) of radiotelemetry locations and home ranges of Florida panthers and Texas cougars in southern Florida 1 July 2002 to 30 June 2003.

Appendix III. Texas cougars and known intercross *Puma concolor* (through 3 generations) in the south Florida population.

Appendix IV. McBride 2003- Documented panther population and its current distribution.

Appendix V. List of panther kittens, including Texas intercrosses, handled at dens from 1992-30 June 2003.

Appendix VI. List of all known dens of radio-instrumented female Florida panthers and Texas cougars in southern Florida from June 1985 to June 2003. Kitten numbers preceded with K indicate natal den was visited.

Appendix VII. Analysis of panther survival data.

Appendix VIII. Summary of Florida panther mortalities in southern Florida from 01 July 2002 to 30 June 2003.

Appendix IX. Summary of Florida panther mortalities and injuries in southern Florida from 8 March 1978 to 30 June 2003.

Appendix X. Locations of vehicular-related mortalities of Florida panthers from February 1972 – June 2003.

Appendix XI. Update of genetic analyses of Florida panther recovery efforts.

Appendix XII. Bibliography of Florida panther literature.

**Appendix I. List of radio-instrumented Florida panthers and Texas cougars in southern Florida from 10 February 1981 to 30 June 2003.**

Cat ID <sup>a</sup>	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area <sup>b</sup>	Death Date	Cause of Death
FP01	M	10 Feb 1981	10	-	-	-	Fakahatchee	14 Dec 1983	Vehicle (SR 84 mm 18)
FP02	M	20 Feb 1981	10	-	-	-	Fakahatchee	29 Nov 1984	Intraspecific aggression
FP03	F	23 Jan 1982	9	-	-	-	Fakahatchee	17 Jan 1983	Capture
FP04	M	27 Jan 1982	7-8	-	-	-	Fakahatchee	18 Apr 1985	Vehicle (SR 84 mm17)
FP05	F	23 Feb 1982	7-8	-	-	-	FPNWR	23 Nov 1982	Unknown
FP06	M	27 Feb 1982	6-8	-	-	-	Raccoon Pt. (North Swamp)	16 Apr 1982	Unknown
FP07	M	02 Mar 1982	6-7	-	-	-	Raccoon Pt.- Fakahatchee	26 Oct 1985	Vehicle (SR 29 C. prison)
FP08	F	25 Mar 1984	9-10	-	-	-	Fakahatchee	20 Aug 1988	Liver failure, old age
FP09	F	26 Jan 1985	3-4	-	-	-	Fakahatchee	-	-
FP10	M	15 Jan 1986	5 mos.	Aug 1985	FP09	-	GG Estates, Fakahatchee	27 Jan 1987	Intraspecific aggression
FP11	F	21 Jan 1986	4-5	-	-	-	Bear Island, Price's	25 Feb 2001	Intraspecific aggression
FP12	M	28 Jan 1986	5	-	-	-	Bear Is., FPNWR, FSSP	08 Nov 1994	Intraspecific aggression
FP13	M	27 Feb 1986	4-5	-	-	-	Bear Is. To Alico	14 Dec 1987	Vehicle (SR 29 Sunniland)
FP14	F	07 Dec 1986	5-6	-	-	-	Everglades	21 Jun 1991	unknown
FP15	F	13 Dec 1986	5-6	-	-	-	Everglades	10 Jun 1988	unknown
FP16	M	12 Jan 1987	12-14 mos.	-	FP14	-	Everglades to Stairsteps	3 Jan 2000	Unknown
FP17	M	20 Jan 1987	6-7	-	-	-	Gum Swamp to Nobles	20 Jul 1990	Unknown
FP18	F	22 Jan 1987	7-8	-	-	-	Gum Swamp, Scofield's, BCSIR	01 Oct 1990	Intraspecific aggression
FP19	F	09 Feb 1987	9 mos.	May 1986	FP11	FP12	Bear Is., Prices, FPNWR	02 Dec 1997	Aortic aneurysm
FP20	M	10 Mar 1987	3-4	-	-	-	Alico to Bear Island	24 Aug 1988	Heart defect
FP21	F	16 Mar 1987	12-14 mos.	-	FP14	-	Everglades/White Oak	26 Dec 1997	Euthanasia



Cat ID <sup>a</sup>	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area <sup>b</sup>	Death Date	Cause of Death
FP22	F	18 Mar 1987	5-6 mos.	-	FP15	-	Everglades	20 Jul 1991	Infection
FP23	F	18 Mar 1987	5-6 mos.	-	FP15	-	ENP, SBCNP	25-26 Nov 2000	Unknown
FP24	M	30 Jan 1988	3-4	-	-	-	Highlands Co.	22 Aug 1988	Unknown
FP25	M	16 Feb 1988	4-5	-	-	-	FPNWR	26 Aug 1988	Intraspecific aggression
FP26	M	01 Mar 1988	5-6	-	-	-	BCSIR, NBCNP	08 Jul 1994	Intraspecific aggression
FP27	F	11 Apr 1988	2-3	-	-	-	Everglades	23 Jul 1989	Unknown
FP28	M	29 Nov 1988	1.5	-	-	-	Ft. Myers, Lake Hicpochee, Gum Swamp to Nobles	25 Sep 1992	Intraspecific aggression
FP29	M	03 Jan 1989	6.5 mos.	May 1988	FP11	FP20	Bear Island, Gum Swamp	27 May 1992	Pseudorabies
FP30	M	06 Jan 1989	9 mos.	Mar 1988	FP19	FP13	Bear Is., Prices, FPNWR, FSSP	29 Jan 1990	Intraspecific aggression
FP31	F	12 Jan 1989	7-9	-	-	-	FPNWR	03 Mar 1994	Vehicle (SR 29 Sunniland)
FP32	F	03 Feb 1989	2-2.5	-	-	-	FPNWR	12 Sep 2002	Unknown (old age?)
FP33	M	05 Mar 1989	1.5-2	-	-	-	Loop Rd. to Gum Swamp	23 Nov 1989	Rabies
FP34	M	08 Jan 1990	10 mos.	Mar 1989	FP31	FP12	FPNWR, BCSIR, Gum Swamp	15 Nov 1993	Esophageal puncture
FP35	M	15 Jan 1990	10 mos.	Mar 1989	FP31	FP12	Regency Farms	24 Jan 1990	Bacterial infection from capture
FP36	F	27 Jan 1990	4-5	-	-	-	Nobles	10 Oct 1998	Unknown natural causes
FP37	M	30 Jan 1990	3-4	-	-	-	FSSP, FPNWR, Bear Is.	26 Nov 1990	Vehicle (SR 29 Miles City)
FP38	F	08 Feb 1990	4.5	-	-	-	Raccoon Pt., Cons. Area 3a	04 Aug 1994	pleuritis in chest
FP39	M	19 Feb 1990	3-4	-	-	-	ENP	18 May 1990	Pyrothorax
FP40	F	26 Feb 1990	1.5-2	-	-	-	Nobles, Bear Island	01 Feb 1998	Intraspecific aggression
FP41	F	28 Feb 1990	1.5-2	-	-	-	Nobles, BCSIR	22 Sep 1990	Intraspecific aggression
FP42	M	06 Mar 1990	11 mos.	May 1989	FP14	FP16	Everglades, Raccoon Pt.	22 Jun 1995	Unknown
FP43	M	01 May 1990	9.5 mos.	Jul 1989	FP19	FP12	FPNWR, Nobles	31 Oct 1991	Intraspecific aggression

Cat ID <sup>a</sup>	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area <sup>b</sup>	Death Date	Cause of Death
FP44	M	30 Apr 1991	6 mos.	Nov 1990	FP40	FP26	Bakers, Naples, ENP, SBCNP	06 Jul 1993	Intraspecific aggression
FP45	M	08 May 1991	6 mos.	Nov 1990	FP19	FP12	FPNWR, NBCNP, BCSIR	02 Aug 1998	Intraspecific aggression
FP46	M	30 Jan 1992	2-2.5	-	-	-	Bear Island, Gum Swamp, Okaloacoochee Slough	03 Feb 1999	Intraspecific aggression
FP47	M	21 Feb 1992	6 mos.	Jul 1991	FP11	FP12	Bear Island, Belle Meade, FSSP	19 Feb 1993	Intraspecific aggression
FP48	F	24 Feb 1992	4 mos.	Oct 1991	FP31	FP12	NBCNP	-	-
FP49	F	25 Feb 1992	2	-	-	-	NBCNP	03 Jan 2002	Intraspecific aggression
FP50	M	04 Mar 1992	8 mos.	May 1991	FP36	FP26	Nobles, Alico, Devils Garden	06 Dec 1993	Vehicle (CR 846 5 mi E of Immokalee)
FP51	M	26 Mar 1992	3	-	-	-	FSSP, FPNWR	17 Jul 1998	Vehicle (SR 29)
FP52	F	05 May 1992	6 mos.	Oct 1991	FP31	FP12	FPNWR, Sadie Cypress	14 Jan 1995	vehicle (CR 846 & Dupree Rd)
FP53	M	10 Feb 1993	10 mos.	Apr 1992	FP19	FP12	FPNWR	26 Feb 1993	Intraspecific aggression
FP54	M	10 Feb 1993	10 mos.	Apr 1992	FP40	-	FSSP, FPNWR	-	-
FP55	F	25 Jan 1994	2 yrs.	Dec 1992	FP23	FP42	SBCNP	-	-
FP56	F	03 Feb 1994	2-3	-	-	-	NBCNP	-	-
FP57	F	31 Jan 1995	3	-	-	-	FPNWR, FSSP	-	-
FP58	M	08 Feb 1995	8 mos.	Apr 1994	FP56	-	NBCNP, FPNWR, FSSP	30 Mar 1997	Intraspecific aggression
FP59	M	04 Jan 1996	6 mos.	Jun 1995	FP48	-	NBCNP.FPNWR, FSSP	-	-
FP60	M	06 Mar 1996	5 mos.	Oct 1995	FP40	-	NBCNP, FSSP, FPNWR, Turner River	-	-
TX101	F	05 Apr 1995	-	-	-	-	BCSIR	29 Mar 2000	Unknown
TX102	F	05 Apr 1995	-	-	-	-	E. Hendry County	22 Sep 1995	Vehicle (CR833 5 mi. N BCSIR)
TX103	F	04 May 1995	-	-	-	-	SBCNP	19 Aug 1999	Metabolic complications from pregnancy
TX104	F	24 Mar 1995	-	-	-	-	Fakahatchee Strand, Belle Meade	18 Apr 1998	Gunshot
TX105	F	05 Jul 1995	-	-	-	-	ENP	-	Removed from wild 1/27/2003

Cat ID <sup>a</sup>	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area <sup>b</sup>	Death Date	Cause of Death
TX106	F	09 Apr 1995	-	-	-	-	PSSF, FPNWR, FSSP	-	Removed from wild 1/8/2003
TX107	F	04 May 1995	-	-	-	-	SBCNP	18 Jan 2001	Pneumonia
TX108	F	26 Jul 1995	-	-	-	-	ENP	-	Removed from wild 11/18/2003
FP61 <sub>F1</sub>	F	04 Mar 1997	8 mos.	Jul 1996	TX108	FP16	ENP	-	-
FP62	M	18 Mar 1997	6.5 mos.	Sep 1996	FP48	-	Catfish Creek, Polk Co.	-	-
FP63	M	13 Apr 1997	2	-	-	-	BCSIR, NBCNP, Private Lands	15 Jan 2000	Vehicular trauma / Drowning
FP64	M	24 May 1997	8 mos.	Sep 1996	FP48	-	Corkscrew Marsh	26 Mar 1999	Intraspecific aggression
FP65 <sub>F1</sub>	M	19 Nov 1997	11 mos.	Dec 1996	TX101	FP45	Okaloacoochee Slough	-	-
FP66 <sub>F1</sub>	F	09 Dec 1997	1	Dec 1996	TX101	FP45	Belle Meade, FPNWR, Private Lands	-	-
FP67	F	19 Jan 1998	8 mos.	Jun 1997	FP56	FP45	BCSIR, Private Lands	15 Jan 2003	Intraspecific aggression (FP65)
FP68	M	23 Jan 1998	4.5	-	-	-	NBCNP	01 Mar 2000	Unknown (likely intraspecific aggression )
FP69	F	05 Feb 1998	9 mos.	May 1997	FP40	FP45	NBCNP	-	-
FP70 <sub>F1</sub>	F	25 Feb 1998	10 mos.	May 1997	TX107	-	SBCNP	-	-
FP71 <sub>F1</sub>	F	05 Mar 1998	10 mos.	May 1997	TX107	-	SBCNP	-	-
FP72	M	24 Apr 1998	2.5	-	-	-	BCSIR	23 Dec 1998	Intraspecific aggression
FP73 <sub>F1</sub>	F	12 Nov 1998	3	Sep 1995	TX101	-	BCSIR	-	-
FP74	M	12 Nov 1998	1.5	-	FP73 <sub>F1</sub>	-	Fisheating Creek, Glades and Highlands Co.	08 Sep 1999	Vehicle (SR 27 north of Palmdale)
FP75	F	11 Jan 1999	7 mos.	Jun 1998	FP48	FP68	NBCNP	-	-
FP76	M	13 Jan 1999	22 mos	-	-	-	FPNWR, SBCNP	13 Nov 1999	Intraspecific aggression (FP54)
FP77	F	22 Jan 1999	1.5-2	-	-	-	NBCNP, BCSIR	-	-
FP78	F	16 Feb 1999	2.0	-	-	-	FPNWR	17 Oct 2002	Intraspecific aggression
FP79 <sub>F1</sub>	M	03 Mar 1999	3.5	Sep 1995	TX101	-	BCNP	-	-

Cat ID <sup>a</sup>	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area <sup>b</sup>	Death Date	Cause of Death
FP80	F	14 Jan 2000	4.0	-	-	-	BCSIR	10 Feb 2000	Vehicle (BCSIR)
FP81	M	14 Jan 2000	4.0	-	-	-	BCSIR, Hendry Co. private lands	-	-
FP82	F	25 Jan 2000	3.0	-	-	-	Okaloacoochee Slough	9 May 2003	Unknown (possible IA)
FP83 <sub>F1</sub>	F	24 Feb 2000	8 mos.	Jun 1999	TX106	FP54	FSSP	-	-
FP84 <sub>B-FL</sub>	M	11 Feb 2000	1.0	-	FP73 <sub>F1</sub>	-	Dispersed from BCSIR to Fisheating Creek	20 Apr 2000	Unknown
FP85 <sub>B-FL</sub>	M	17 Feb 2000	10-11 mos.	Mar 1999	FP61 <sub>F1</sub>	FP16	ENP	-	-
FP86 <sub>F2</sub>	F	21 Feb 2000	8 mos.	Jun 1999	FP71 <sub>F1</sub>	FP79 <sub>F1</sub>	SBCNP	-	-
FP87 <sub>B-FL</sub>	F	28 Feb 2000	10 mos.	Apr 1999	FP55	FP79 <sub>F1</sub>	SBCNP	-	-
FP88 <sub>F2</sub>	F	02 Mar 2000	9 mos.	Jun 1999	FP70 <sub>F1</sub>	FP79 <sub>F1</sub>	SBCNP	-	-
FP89	M	02 Mar 2000	2.5	-	-	-	SBCNP	9 Nov 2000	Intraspecific aggression
FP90 <sub>F2</sub>	M	08 Mar 2000	9 mos.	Jun 1999	FP71 <sub>F1</sub>	FP79 <sub>F1</sub>	SBCNP	26 April 2001	Vehicle (US27 Terrytown)
FP91 <sub>F2</sub>	F	17 Mar 2000	9 mos.	Jun 1999	FP70 <sub>F1</sub>	FP79 <sub>F1</sub>	SBCNP	-	-
FP92 <sub>F2</sub>	M	06 Apr 2000	10 mos.	Jun 1999	FP70 <sub>F1</sub>	FP79 <sub>F1</sub>	SBCNP	Sep 2001	Unknown
FP93 <sub>B-TX</sub>	F	10 Apr 2000	14 mos.	Feb 1999	TX107	FP79 <sub>F1</sub>	SBCNP	-	-
FP94 <sub>F1</sub>	F	01 May 2000	10 mos.	Jul 1999	TX105	FP16	ENP	-	-
FP95 <sub>F1</sub>	F	07 Nov 2000	2.8 yrs.	Nov 1998	TX108	FP16	ENP	-	-
FP96	M	07 Jan 2001	9 mos.	Apr 2000	FP78	FP59	FPNWR	17 Jan 2002	Intraspecific aggression
FP97	M	19 Jan 2001	11 mos.	-	FP105	-	FPNWR	2 Dec 2001	Intraspecific aggression
FP98	M	25 Jan 2001	3	-	-	-	Bear Island, Hendry Co. private lands	1 July 2002	Vehicle (SR29 N of Pistol Pond)
FP99	M	26 Jan 2001	11 mos.	-	FP105	-	FPNWR	28 Nov 2002	Vehicle (CR846 Collier fairgrounds)
FP100	M	31 Jan 2001	4	-	-	-	NBCNP, BCSIR	-	-
FP101	F	5 Feb 2001	2	-	-	-	NBCNP, BCSIR	-	-

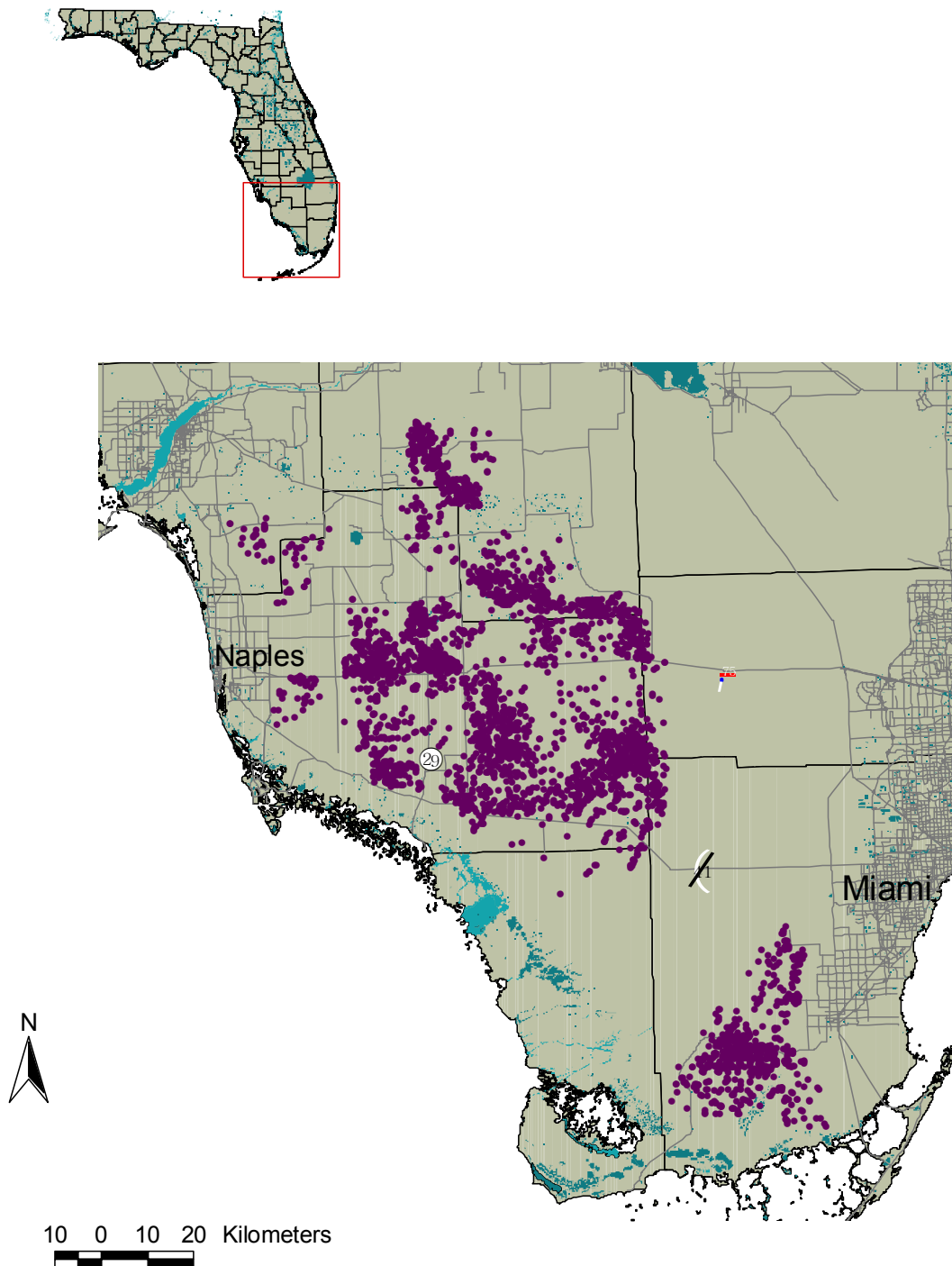
Cat ID <sup>a</sup>	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area <sup>b</sup>	Death Date	Cause of Death
FP102	F	20 Feb 2001	3	Feb 1998	FP55	-	Turner River	-	-
FP103	F	13 Mar 2001	7 mos.	Aug 2000	FP102	-	BCNP-Sandy Road	-	-
FP104	M	2 Apr 2001	6-7 mos.	-	-	-	Turner River	-	-
FP105	F	12 Apr 2001	6	-	-	-	FPNWR	1/15/2002	Unknown
FP106	F	12 Apr 2001	13 mos.	-	FP105	-	FPNWR	20 Feb 2003	Vehicle (SR29 Sunniland)
FP107	F	01 Nov 2001	19 mos.	Apr 2000	FP78	FP59	FPNWR	-	-
FP108	M	03 Nov 2001	11 mos.	Jan 2001	FP87 <sub>B-FL</sub>	FP79 <sub>F1</sub>	BCNP-N of Oasis	16 Nov 2002	Intraspecific aggression
FP109	M	02 Feb 2002	10+	-	-	-	OK Slough	~23 Feb 2003	Unknown
FP110	F	13 Feb 2002	13 mos.	Dec 2000	FP82	FP65 <sub>F1</sub>	OK Slough	-	-
FP111	M	14 Feb 2002	10	-	-	-	OK Slough	4 Sep 2002	Intraspecific aggression
FP112	F	25 Feb 2002	3-4	-	-	-	Bear Island	11 Sep 2002	Intraspecific aggression
FP113	F	23 Oct 2002	6 mos.	Apr 2002	FP78	FP59	FPNWR, White Oak	-	-
FP114	M	23 Oct 2002	6 mos.	Apr 2002	FP78	FP59	FPNWR, White Oak	-	-
FP115	F	26 Nov 2002	4-5	-	-	-	OK Slough	17 May 2003	Pneumonia (FeLV positive)
FP116	F	20 Jan 2003	7 mos.	Jun 2002	FP67	-	Hendry Co. private lands	-	-
FP117	M	25 Feb 2003	11 mos.	-	-	-	BCSIR Game Pen	-	-
FP118	F	5 Mar 2003	11 mos.	-	-	-	BCSIR Game Pen	3 Apr 2003	Unknown
FP119 <sup>c</sup>	M	2 Apr 2003	1	Apr 2002	FP93	FP79	BCNP – East Crossing Strand	-	-
FP120 <sup>c</sup>	F	8 Apr 2003	3	-	-	-	BCNP – W Turner River Rd.	-	-

<sup>a</sup>FP denotes panthers captured for radiocollaring; K denotes kittens handled at panther or Texas cougar dens; TX denotes Texas cougars used for Panther Genetic Restoration; F1 subscript denotes Florida panther x Texas cougar offspring; F2 subscript denotes offspring of F1 x F1 mating; B-FL subscript denotes offspring of F1 x Florida panther mating; B-TX subscript denotes offspring of F1 x Texas cougar mating.

<sup>b</sup>ENP = Everglades National Park; BCSIR = Big Cypress Seminole Indian Reservation; PSSF = Picayune Strand State Forest; FPNWR = Florida Panther National Wildlife Refuge; OSSF = Okaloacoochee Slough State Forest; NBCNP = Big Cypress National Preserve north of Interstate 75; FSSP = Fakahatchee Strand State Preserve; SBCNP = Big Cypress National Preserve south of Interstate 75.

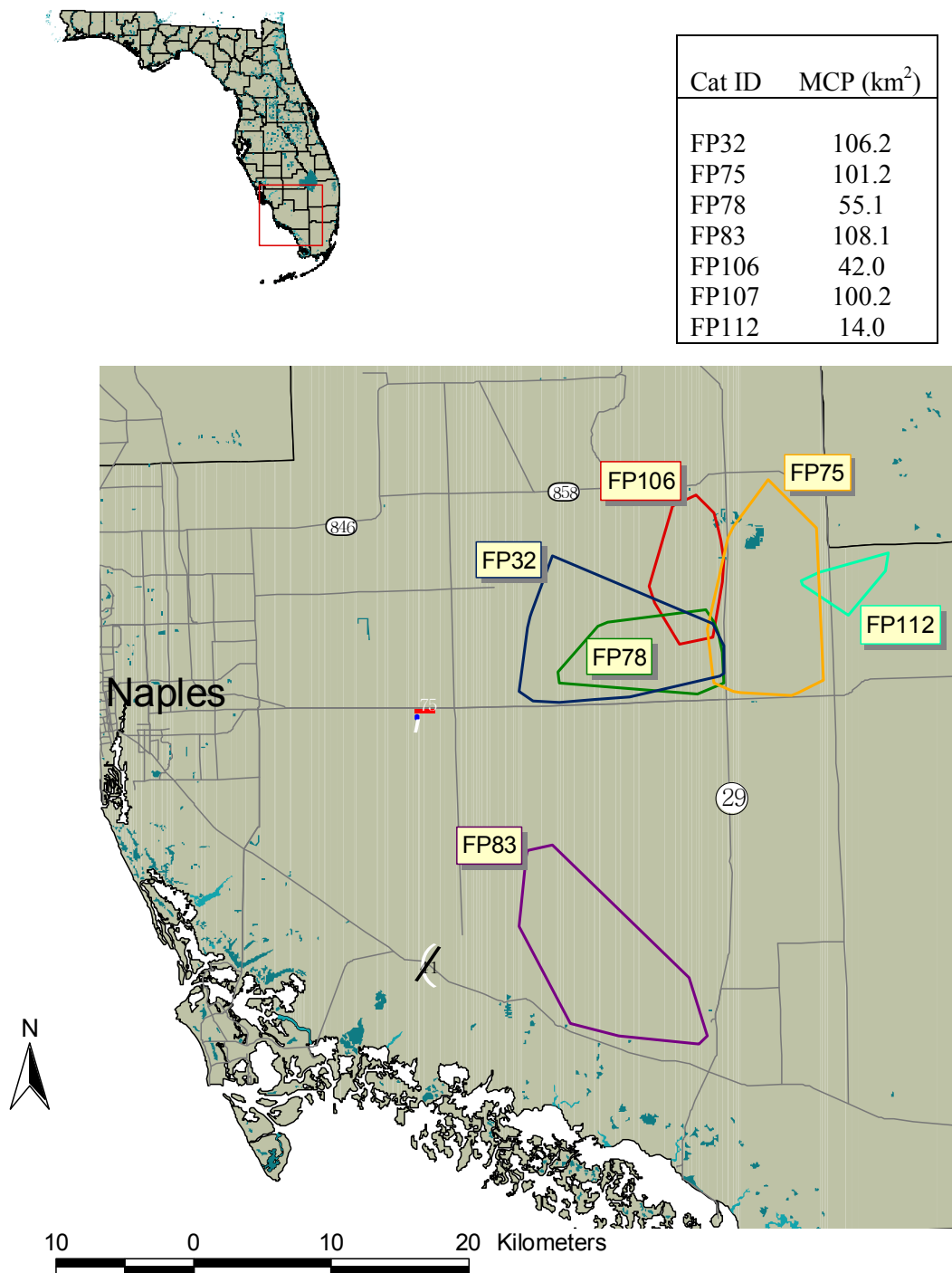
<sup>c</sup>Captured by BCNP personnel.

**Locations of all Radiocollared Florida Panthers in Southern Florida  
01 July 2002 – 30 June 2003**



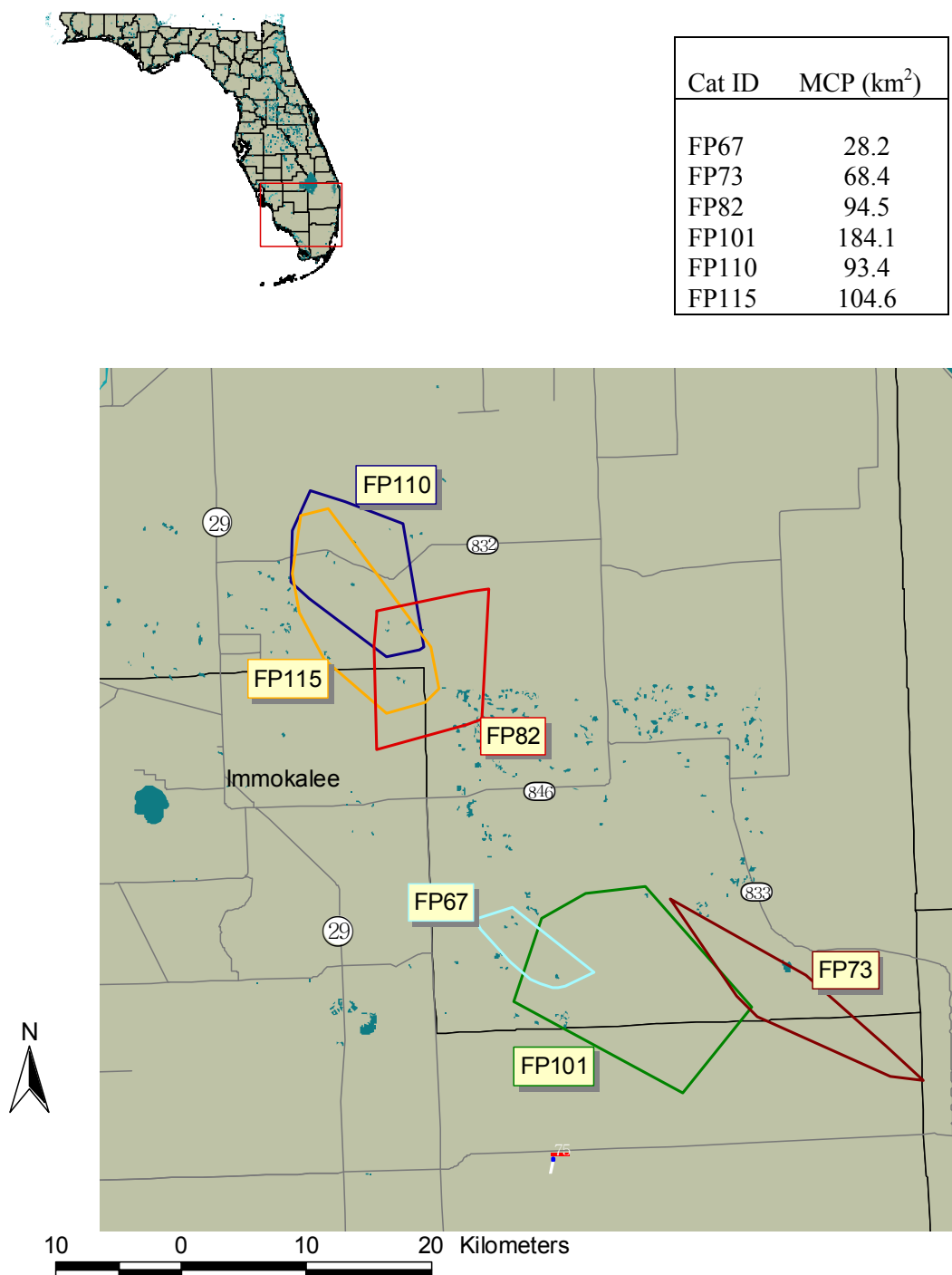
**Appendix II, Figure 1**

# **Minimum Convex Polygon Home Ranges of Radiocollared Adult Female Florida Panthers in Southern Florida from 01 July 2002 – 30 June 2003**



Appendix II, Figure 2

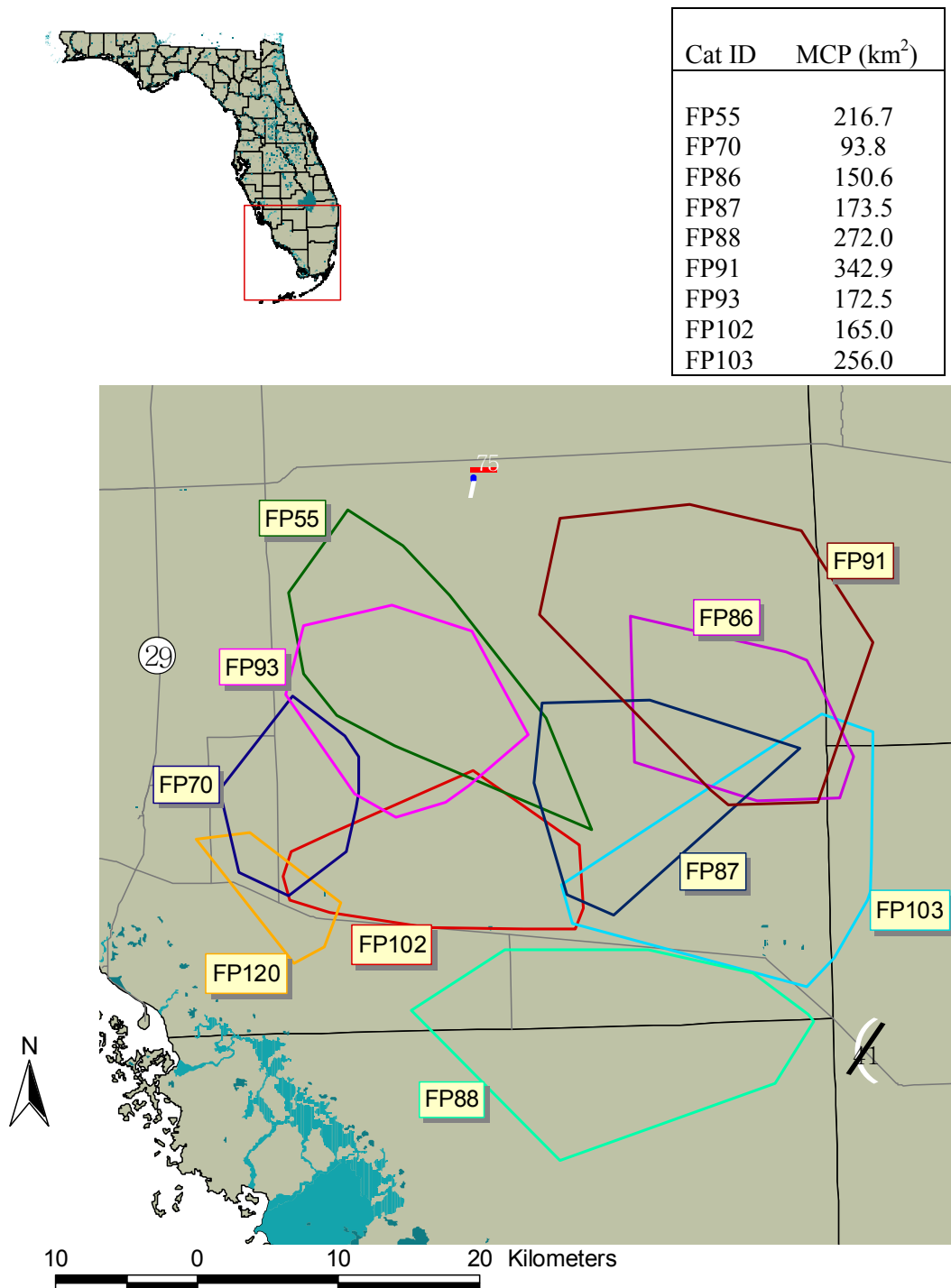
# **Minimum Convex Polygon Home Ranges of Radiocollared Adult Female Florida Panthers in Southern Florida from 01 July 2002 – 30 June 2003**



Appendix II, Figure 3

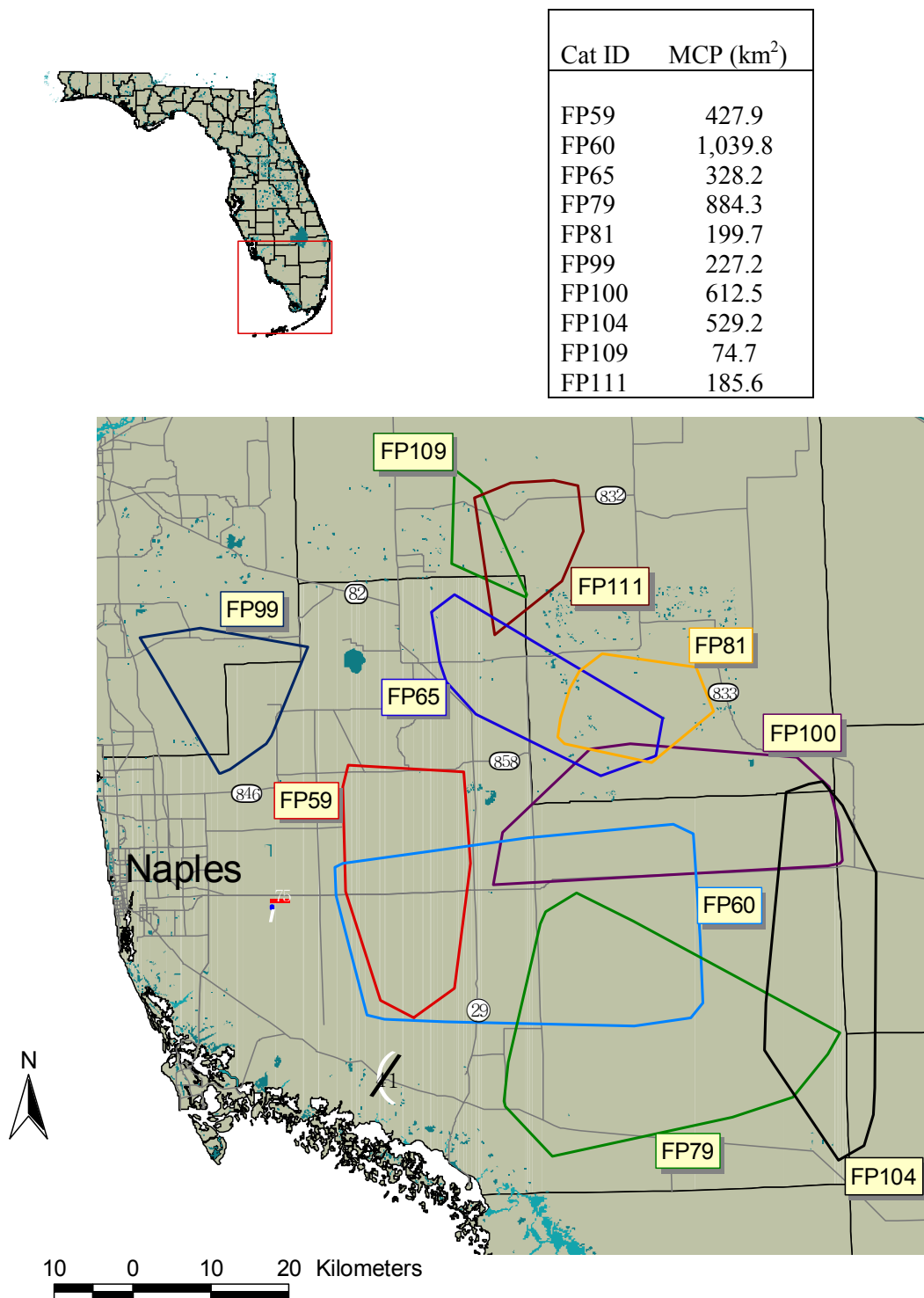


# **Minimum Convex Polygon Home Ranges of Radiocollared Adult Female Florida Panthers in Southern Florida from 01 July 2002 – 30 June 2003**



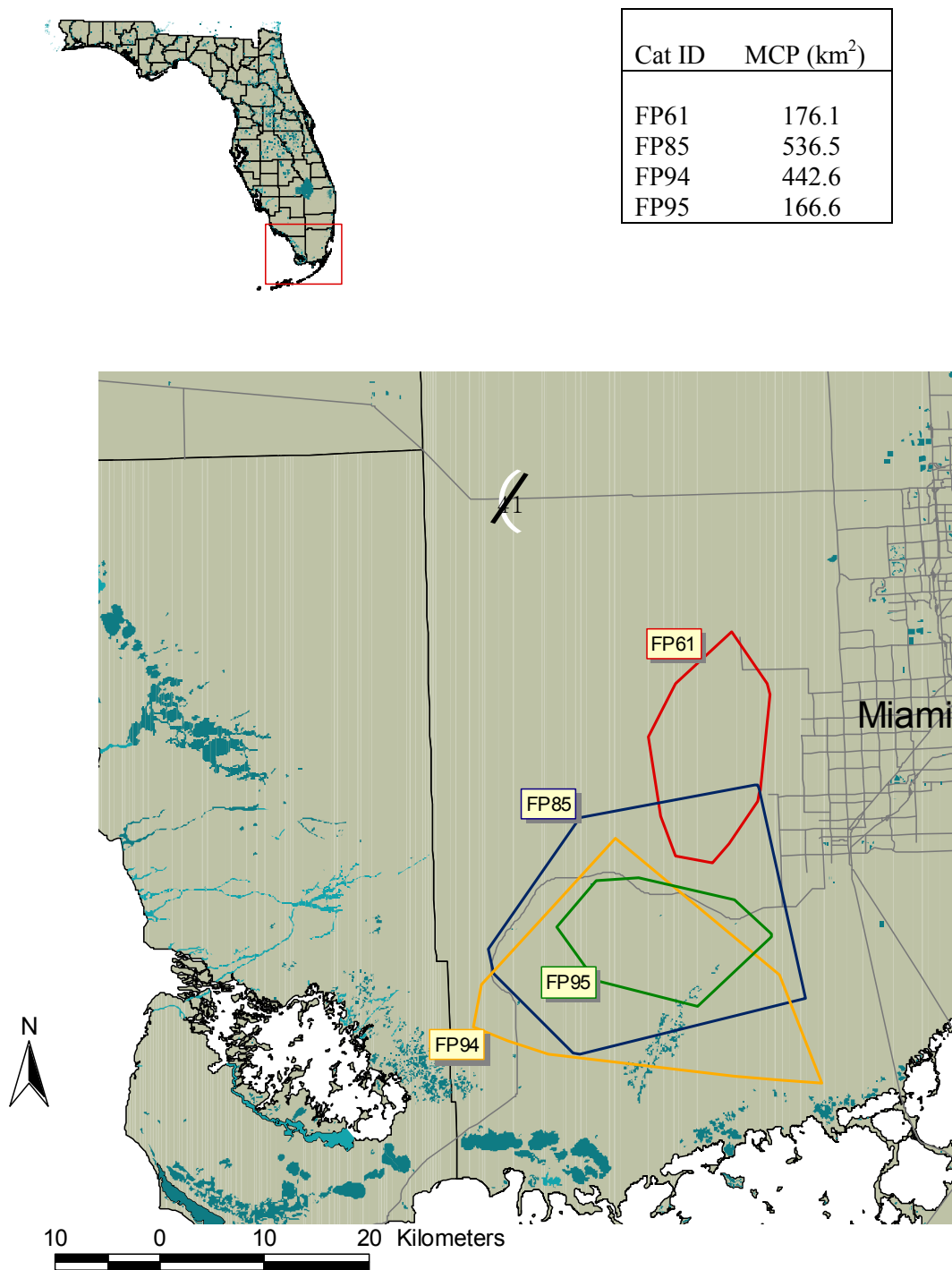
Appendix II, Figure 4

# **Minimum Convex Polygon Home Ranges of Radiocollared Adult Male Florida Panthers in Southern Florida from 01 July 2002– 30 June 2003**



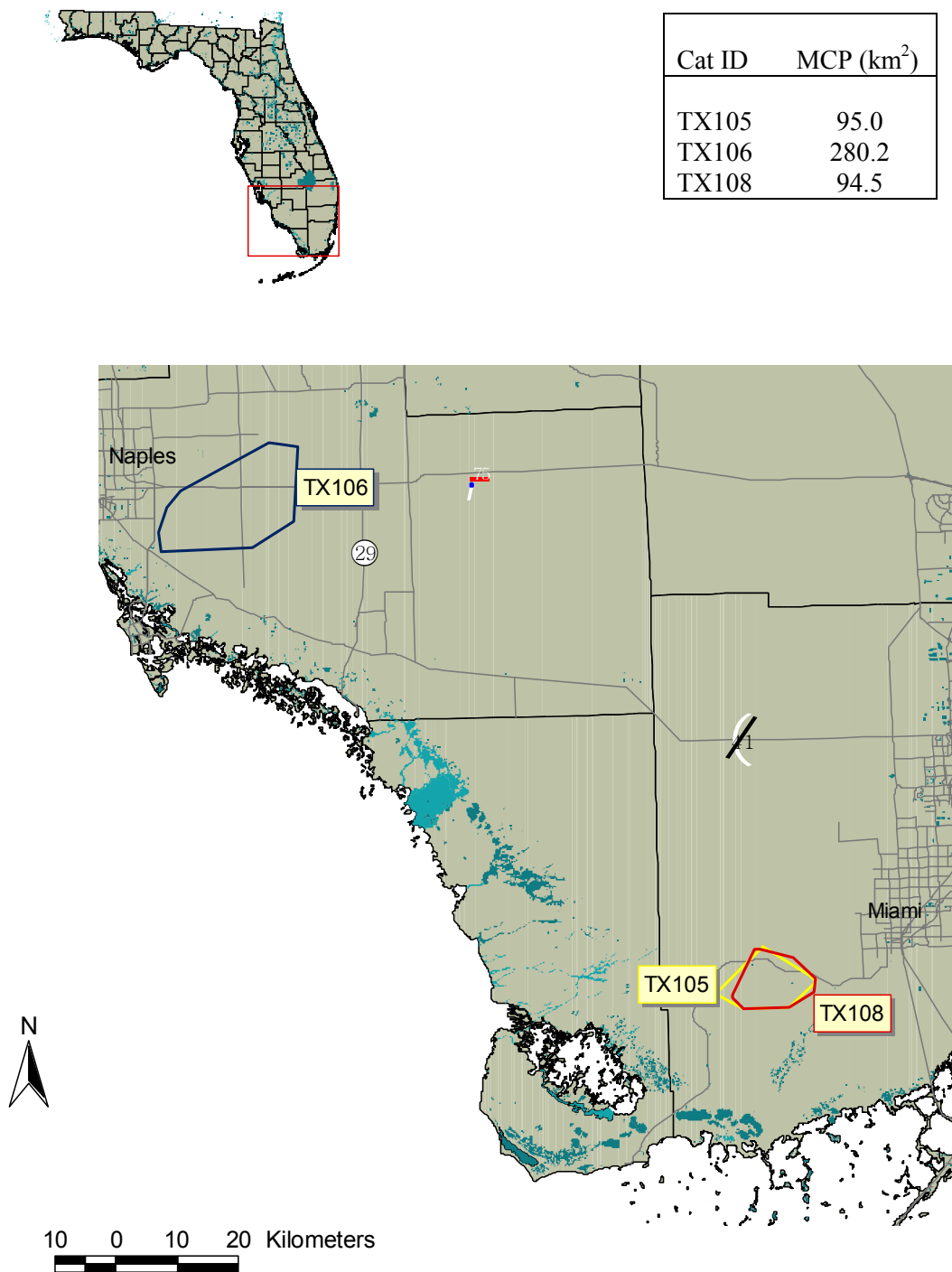
Appendix II, Figure 5

# **Minimum Convex Polygon Home Ranges of Radiocollared Florida Panthers in Everglades National Park from 01 July 2002 – 30 June 2003**



Appendix II, Figure 6

### Minimum Convex Polygon Home Ranges for Remaining Female Texas Puma from 01 July 2002 – 31 January 2003



Appendix II, Figure 7

**Appendix III. Texas cougars and known intercross *Puma concolor* (through 3 generations) in the south Florida population, 1995 - 2003.**

ID	Sex	Dam	Sire <sup>1</sup>	Birth	Gen.	Status <sup>2</sup>	Notes	Collared	Genetic Samples
TX101	F			1991±2y	TX	D	4 offspring; contracepted; died 3/00	Y(Dead)	Y
FP65	M	TX101	FP45	12/96	F <sub>1</sub>	A	Released after rehab 1/24/2002	Y	Y
FP110	F	FP82	FP65	12/00	B-FL	A		Y	Y
K149	F	FP110	FPx	5/03	X	a		N	Y
K150	M	FP110	FPx	5/03	X	a		N	Y
K151	F	FP110	FPx	5/03	X	a		N	Y
K87	F	FP82	FP65	12/00	B-FL	?		N	Y
K88	M	FP82	FP65	12/00	B-FL	?		N	Y
FP66	F	TX101	FP45	12/96	F <sub>1</sub>	a	Photographed Spring 2003	Y <sup>3</sup>	Y
K52	M	FP66	FP72	9/98	B-FL	d	Not observed after handled at den.	N	N
K53	F	FP66	FP72	9/98	B-FL	d	Dam re-bred early.	N	N
K54	M	FP66	FP72	9/98	B-FL	d		N	N
K76	M	FP66	FP60	12/99	B-FL	D	Roadkill 2/00	N	Y
K77	F	FP66	FP60	12/99	B-FL	?		N	Y
K78	F	FP66	FP60	12/99	B-FL	?		N	Y
FP73	F	TX101	FPx	9/95	F <sub>1</sub>	D	Died 6/03.	Y(Dead)	Y
FP74	M	FP73	FP68	6/98	B-FL	D	Den not visited. May have littermates; Suspected sire based on genetic evidence. Roadkill 9/99	Y(Dead)	Y
FP77	F	FP73	FP68	6/98	B-FL	D	Den not visited. Suspected sire and dam based on genetic evidence. Died 7/03.	Y(Dead)	Y
K81	M	FP77	FPx	5/00	X	?		N	Y
K82	F	FP77	FPx	5/00	X	?		N	Y
K83	M	FP77	FPx	5/00	X	?		N	Y
K108	M	FP77	FPx	8/01	X	?		N	Y
FP84	M	FP73	FPx	2/99	B-FL	D	Den not visited. May have littermates; Died 4/00	Y(Dead)	Y
K109	M	FP73	FPx	3/02	X	a/d	Tracking indicated 2 offspring survived.	N	Y
K110	M	FP73	FPx	3/02	X	a/d		N	Y
K111	F	FP73	FPx	3/02	X	a/d		N	Y
FP79	M	TX101	FPx	9/95	F <sub>1</sub>	A	Sired 31 known offspring	Y	Y
FP102	F	FP55	FP79	2/98	X	A	Captured as dependent kitten	Y	Y
FP103	F	FP102	FPx	8/00	X	A		Y	Y
?	?	FP102	FPx	8/00	X	?	Treed at FP103's capture	N	N
K137	F	FP102	FP79	7/02	X	a		N	Y
K138	M	FP102	FP79	7/02	X	a		N	Y
K49	F	FP55	FP79	2/98	X	?		N	N
K50	M	FP55	FP79	2/98	X	?		N	N
FP87	F	FP55	FP79	4/99	B-FL	D	Died 6/03	Y(Dead)	Y
K89	F	FP87	FP79	1/01	X	?		N	Y
FP108	M	FP87	FP79	1/01	X	D	Died 11/02	Y	Y
K91	M	FP87	FP79	1/01	X	?		N	Y
K143	F	FP87	FP79	3/03	X	D	Dam killed 3 months post-denning.	N	Y
K144	M	FP87	FP79	3/03	X	D	No evidence kittens survived.	N	Y
K145	F	FP87	FP79	3/03	X	D		N	N
K61	M	FP55	FP79	4/99	B-FL	?	Not observed after independence	N	N
K105	M	FP102	FP79	6/01	X	a		N	Y
K106	M	FP102	FP79	6/01	X	a		N	Y
K127	F	FP55	FP79	5/02	B-FL	d		N	Y
TX102	F			1991±2y	TX	D	Pregnant when hit by car (9/95)	Y(Dead)	Y
TX103	F			1991±2y	TX	D	Pregnant when died (8/99)	Y(Dead)	Y
TX104	F			1991±2y	TX	D	Did not breed. Died 4/98	Y(Dead)	Y
TX105	F			1991±2y	TX	C	2 offspring; removed from wild.	Y(Captivity)	Y
K34	F	TX105	FP16	9/96	F <sub>1</sub>	?	Not observed after independence	N	N
FP94	F	TX105	FP16	8/99	F <sub>1</sub>	A	Independent	Y	Y
TX106	F			1991±2y	TX	C	6 offspring; removed from wild.	Y(Captivity)	Y
K23	F	TX106	FP51	11/95	F <sub>1</sub>	?	Not observed after independence	N	N

ID	Sex	Dam	Sire <sup>1</sup>	Birth	Gen.	Status <sup>2</sup>	Notes	Collared	Genetic Samples
K47	M	TX106	FP51	2/98	F <sub>1</sub>	d	Disappeared after male entered area	N	N
K62	F	TX106	FP60	6/99	F <sub>1</sub>	d	Sire based on genetic evidence. No sign when sibling found	N	Y
FP83	F	TX106	FP60	6/99	F <sub>1</sub>	A	Independent; undetected den 10/00?	Y	Y
K123	M	FP83	FPx	4/02	B-FL	a		N	Y
K92	F	TX106	FP60	3/01	F <sub>1</sub>	?		N	Y
K93	M	TX106	FP60	3/01	F <sub>1</sub>	?		N	Y
TX107	F			1992±2y	TX	D	5 offspring; contracepted; died 1/01	Y (Dead)	Y
FP70	F	TX107	FP79	5/97	B-TX	A	Sire based on genetic evidence	Y	Y
FP92	M	FP70	FP79	6/99	X	D	Died September 2001	Y	Y
FP88	F	FP70	FP79	6/99	X	a	Collar out.	Y <sup>3</sup>	Y
K94	M	FP88	FP79	5/01	X	d	Still with dam as of 3/02. Sign of 2 kittens, thought to be females.	N	Y
K95	F	FP88	FP79	5/01	X	a		N	Y
K96	M	FP88	FP79	5/01	X	d		N	Y
K97	F	FP88	FP79	5/01	X	a		N	Y
FP91	F	FP70	FP79	6/99	F <sub>2</sub>	A		Y	Y
FP104	M	FP70	FP79	10/00	X	A	Born when dam's collar was not functioning. Dam and sire based on genetic evidence. May have littermates.	Y	Y
FP71	F	TX107	UNK	5/97	X	?	Collar out 7/00	Y <sup>3</sup>	N
K69	M	FP71	FP79	6/99	X	d	Presumed dead based on sign	N	Y
K70	F	FP71	FP79	6/99	X	?	No sign since independence	N	Y
FP86	F	FP71	FP79	6/99	X	A	Independent	Y	Y
FP90	M	FP71	FP79	6/99	X	D	Roadkill US 27 4/26/01	Y (Dead)	Y
K56	F	TX107	FP79	2/99	B-TX	D	Monitoring hampered by failure of dam's collar 11/99; dam recaptured 4/00	N	N
K57	M	TX107	FP79	2/99	B-TX	a		N	N
FP93	F	TX107	FP79	2/99	B-TX	A		Y	Y
K113	F	FP93	FP79	4/02	X	a/d		N	Y
K114	F	FP93	FP79	4/02	X	a/d	2 ♀ offspring confirmed alive at capture of FP119.	N	Y
FP119	M	FP93	FP79	4/02	X	A		Y	Y
K116	F	FP93	FP79	4/02	X	a/d		N	Y
TX108	F			1992±2y	TX	C	3 offspring; removed from wild.	Y(Captivity)	Y
FP61	F	TX108	FP16	7/96	F <sub>1</sub>	A		Y <sup>3</sup>	Y
FP85	M	FP61	FP16	3/99	B-FL	A		Y	Y
K139	F	FP61	FPx	8/02	X	a/d	3 kittens observed w/ dam at 5 months of age. 2 kittens observed w/ dam at 6 months of age.	N	Y
K140	M	FP61	FPx	8/02	X	a/d		N	Y
K141	M	FP61	FPx	8/02	X	a/d		N	Y
K142	F	FP61	FPx	8/02	X	a/d		N	Y
FP95	F	TX108	FP16	1/98	F <sub>1</sub>	A		Y	Y
K112	F	FP95	FP85	3/02	X	a		N	Y
K?	?	FP95	FP85	3/02	X	a	Not detected at den. Visual w/ dam.	N	N
K46	M	TX108	FP16	1/98	F <sub>1</sub>	d		N	N

<sup>1</sup> FPx indicates that the sire was unknown, but temporal and/or spatial circumstances make it likely that it was a FP male, rather than an F<sub>1</sub> or other intercross.

<sup>2</sup> Status codes:

A = Radio-collared; monitored regularly

a = Presumed alive; observed recently or signs of continued presence with dam

? = Fate unknown; not collared and not recently observed

d = Presumed dead; disappeared under circumstances that suggest mortality is likely

D = Known to be dead

C = Removed from wild and placed in captivity as per Genetic Restoration Protocol.

<sup>3</sup> Radiotransmitter failed

#### **Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution**

### **The Documented Panther Population (DPP) and its Current Distribution from July 1, 2002 to June 30, 2003**

Prepared by Roy McBride, Contract Panther Hunter, FWC Contract #01055,  
Livestock Protection Company, Alpine, Texas

Prepared for Florida Fish and Wildlife Conservation Commission  
September 11, 2003

#### **Definition**

The documented panther population (DPP) represents the number of panthers confirmed by physical evidence between July 1, 2002 and June 30, 2003. It includes adult and subadult panthers, but not kittens at the den. The DPP is not an estimate, nor does it represent an extrapolation or a guess about the total population size.

#### **Methods**

The DPP is the number of panthers whose existence has been determined by:

1. treeing with hounds, photographing, and radio-collaring,
2. treeing with hounds, photographing, but not radio-collaring,
3. physical evidence (e.g. verified tracks in areas where radio-collared panthers are absent)
4. documentation by trail camera photos,
5. sightings of uncollared panthers by a biologist and/or pilot from the monitoring plane or via ground telemetry, corroborated by photographs when possible.

Sightings of panthers are not used in our methodology with the exception of those spotted from the telemetry plane or through ground telemetry. Either the pilot or a biologist observes the panthers and often circle them until they move into cover. In some instances, photographs taken from the plane or from

#### **Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution**

an observer on the ground have validated these sightings. These techniques have proven helpful in determining kitten survival rates when family groups are sometimes observed crossing a prairie. In other cases, an uncollared male has been seen accompanying a collared female.

Regardless of the method used, when evidence of a new panther is discovered, the information is recorded on a data sheet. GPS coordinates are taken, and dated photographs accompany each record when possible. Attached are sample data sheets (Figures 1 – 5) that illustrate the various methods used to tabulate the DPP. Mortalities are subtracted from each year's inventory. The study area is divided geographically into survey units (Figure 6). The home ranges of some panthers overlap several units. In such cases, each panther is assigned to a single unit to avoid counting them twice.

#### **Caveats**

Some of the panthers recorded were part of systematic surveys; others were collected opportunistically during other field activities. Small fluctuations in the yearly count may reflect the intensity of effort and survey coverage rather than a change in the population. It is important to note that a segment of the population are non-breeders. Some are past breeding age; some are too young to breed; some have reproductive deficiencies that preclude breeding; some are geographically isolated from mates. Caution must, therefore, be exercised when comparing the DPP to suggested minimum viable population (MVP) sizes. Due to the fact that data collection occurs over a period of 12 months, it is likely that some of the panthers recorded may be dead and others reported as yearlings may have dispersed into other survey units. Additionally, kittens previously documented at the den may have become mobile, dependent-aged juveniles.

#### **Results**

This year's DPP totals **87** panthers, the highest number recorded since panther research was initiated in 1981 (Table 1). This total exceeds last year's count, in spite of a record 26 mortalities and the removal of the remaining three Texas panthers. The loss of 29 panthers from the population in any year between



#### **Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution**

1981 and 1996 would have been catastrophic. This year's DPP, regardless of such an alarming mortality, may be an indicator of overall population fitness and, at the very least, shows a significant increase in panther numbers following genetic restoration.

#### **Acknowledgments**

Contributions to this year's DPP involves a large group of dedicated people, including ENP staff Mario Alvarado and Lori Oberhofer; BCNP project leader Deborah Jansen, and her staff Steve Schulze and Bob Thomas; houndsman Rocky McBride, Livestock Protection Company; FWC staff Dave Shindle, Mark Lotz, Chris Belden, Chip Bilbrey, and Steve Shattler; Debbie Blanco, Sarasota Co. Resource Management; Ian Bartoszek, The Conservancy of Southwest Florida; and Ricky Pires, Florida Gulf Coast University.

**Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution**

**UNCOLLARED FLORIDA PANTHER SIGN**  
(INCLUDING KITTENS OF COLLARED PANTHERS)

Date April 17th-2003 Panther # 3 uncollared panthers

Sign Found: Tracks, Scat, Scrape, Kill, 3 Live panther, Other \_\_\_\_\_

Sex: M F Unknown

Number / Composition of Individuals 1 Adult female- 2 yearlings

Age/Condition of Sign Live

Location 1 mile south of Concho Billie Trail and 3mi east of Turner River Rd.

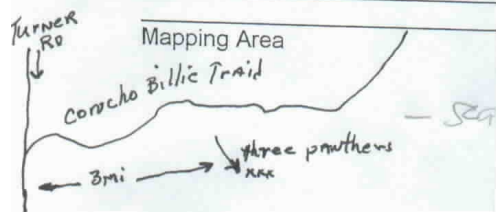



UTM'S 17-R 0480 733 <sup>UTM</sup> 2874180

Habitat Cypress swamp and small pine island

Observer(s) Roy McBride

OBSERVATION tree one adult female and 2 yearlings

Mapping Area

**Figure 1**

**Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution**

**UNCOLLORED FLORIDA PANTHER SIGN**  
(INCLUDING KITTENS OF COLLORED PANTHERS)

Date June 16-2003 Panther # UNCOLLORED MALE

Sign Found: Tracks Scat, Scrape, Kill, Live panther, Other \_\_\_\_\_  
Sex: M F Unknown  
Number / Composition of Individuals 1  
Age/Condition of Sign 2 days old

Location Wildcow Island - O'K WMA

UTM'S 17R-0460830 UTM-2934199  
Habitat Oak hammock - palmettoe - gallberry  
Observers(s) Roy McBride


OBSERVATION panther traveling east and west  
ON Wildcow Island - Tracks made after rain  
ON June 14-2003

Mapping Area

Hwy 832

Wild Cow

Mustang grass



**Figure 2**

**Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution**

**UNCOLLATED FLORIDA PANTHER SIGN**  
(INCLUDING KITTENS OF COLLARED PANTHERS)

Date Jan. 2, 2003 Panther # 61 AND 3 sub adults

Sign Found: Tracks, Scat, Scrape, Kill, Live panther, Other Photo from telemetry plane

Sex: M F Unknown - 4 panthers - Family group

Number / Composition of Individuals 1-Adult - 3-Subadults

Age/Condition of Sign Live

Location West of Homestead airport - in East Everglades

UTM'S E 537840 N 2817812

Habitat Saw grass prairie

Observers(s) Photo taken by Lori Oberhofer - from telemetry plane

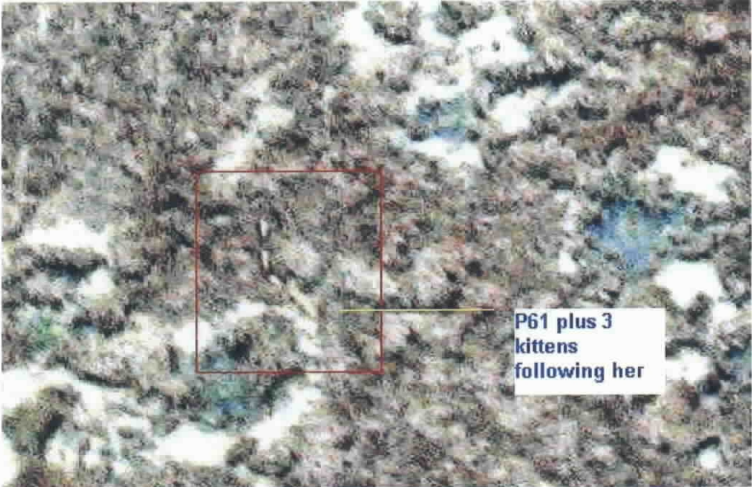
OBSERVATION #61 crossing saw grass prairie acc. by 3 of her cubs.

Mapping Area

*4 panthers*

*Homestead airport*

*N*  
*W ← → E*  
*S*



P61 plus 3 kittens following her

**Figure 3**

# Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution

**UNCOLLATED FLORIDA PANTHER SIGN**  
(INCLUDING KITTENS OF COLLARED PANTHERS)

Date 5/12 - 27 / 03 Panther # UC

Sign Found: Tracks, Scat, Scrape, Kill, Live panther. Other Photo

Sex (M) F Unknown

Number / Composition of Individuals 1

Age/Condition of Sign \_\_\_\_\_

Location Wild Cow Island

UTM'S approx: 469.9 2934.0

Habitat Trawl side - oak

Observers(s) camera by Ricky Pires

OBSERVATION Date stamp still not set. Film changed between above dates. Appears to be same uncollared male as photographed last month (April 2003). Lighting different, "spots" not prominent but white flecks on shoulders show up. May not be as young as originally thought but still young (<2 yrs?). Ears not tattooed and no visible sign of fighting.

Mapping Area

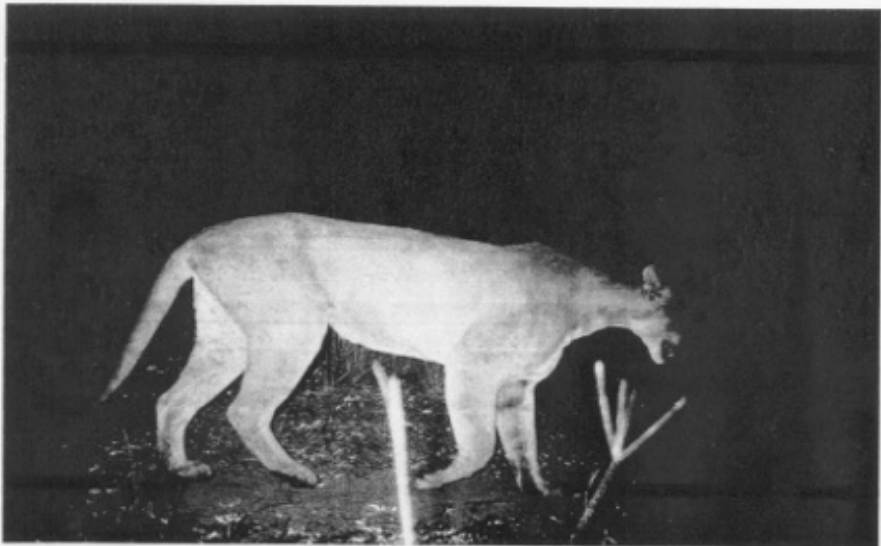


Figure 4



Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution

UNCOLLATED FLORIDA PANTHER SIGN  
(INCLUDING KITTENS OF COLLARED PANTHERS)

Date 10/9/2002 Panther # 83 K123

Sign Found: Tracks, Scat, Scrape, Kill, Live panther, Other \_\_\_\_\_

Sex (M) F Unknown

Number / Composition of Individuals FP83 w/ K123

Age/Condition of Sign VISUAL

Location 116<sup>TH</sup> AVE SE (SOUTH BLACKS) MERITT CANAL BRIDGE

UTM'S 451023 2878474

Habitat AD (Road)

Observers(s) DAVID SHINDLE

OBSERVATION Monitored FP83 w/ ground telemetry @ location from  
ca. a.m. panther flight. FP83 was ~1/4 km E. of FP83's location  
on the N. side of 116<sup>TH</sup> Ave. After locating cats on the ground I monitored  
from my truck which was parked in the center of the canal bridge  
facing east. At ~1720 FP83 stepped onto road from the south. FP83 walked  
slowly in my direction + repeatedly <sup>turned</sup> to look behind her. After ~2 min.  
K123 came onto road behind FP83. FP83 then continued moving towards  
the bridge ~~stop~~ stopping periodically to escape @ the truck. FP83 came onto  
bridge w/in ~7 yds of the truck. She paused for a long period then  
Mapping Area  
turned back towards K123 who had not made it onto the bridge yet  
FP83 "growled" + walked towards K123 who was now scared, w/in  
the road. The two then ~~littered~~ <sup>littered</sup> K123's  
Then turned back towards  
the bridge, ~~but~~ but did  
time. K123 then abruptly  
N. side of the bridge  
time FP83 "growled" @  
the bush. Encounter last  
taken.




Figure 5

## Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution

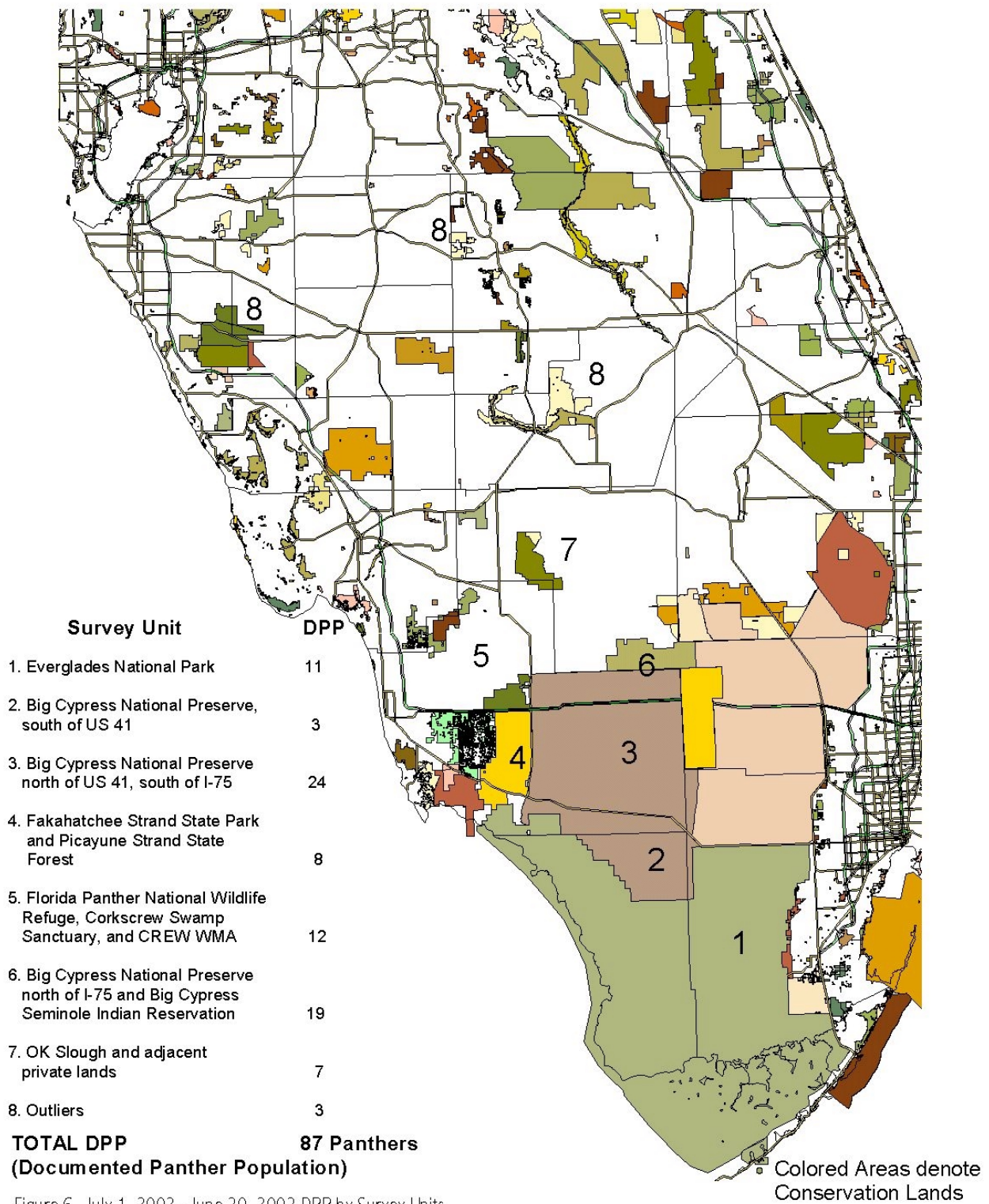


Figure 6. July 1, 2002 - June 30, 2003 DPP by Survey Units.

## Appendix IV. McBride 2003-Documented Panther Population and its Current Distribution

**Table 1. July 01, 2002 to June 30, 2003 Documented Panther Population by Survey Unit.**

### Everglades National Park

**Total = 11**

Carryover	New Panthers	Removed or Mortality
#61	3 yearlings w/ #61	Tx 105 removed
#85	2 yearlings w/ #95	Tx 108 removed
#94	uncollared female	
#95		
uncollared male		

### Big Cypress south of Hwy 41

**Total = 3**

Carryover	New Panthers	Removed or Mortality
uncollared male		
uncollared female (#88?)		
small uncollared female		

### Big Cypress north of Hwy 41 and south of I-75

**Total = 24**

Carryover	New Panthers	Removed or Mortality
#55	#119	#87
#60	#120	#108
#70 (recapture)	2 yearlings w/ #70	
#79	3 uncollared treed	
#86	2 uncollared females	
#91	1 uncollared female	
#93	2 yearlings w/ #93	
#102	2 yearlings w/ #102	
#103		
#104		

### Fakahatchee Strand and Picayune Strand State Preserves

**Total = 8**

Carryover	New Panthers	Removed or Mortality
#54	uncollared female	Tx 106 removed
#83	1 yearling w/ #83	
	uncollared male	
	uncollared female	
	uncollared male	
	uncollared female	



### Florida Panther NWR, Corkscrew Swamp Sanctuary, and Crew WMA

**Total = 12**

Carryover	New Panthers	Removed or Mortality
#59	uncollared female	#32
#66	uncollared female	#78
#107	uncollared male	#106
#113	uncollared female	#OFP#53
#114	uncollared male	#UCFP#54
	uncollared female	#99
	uncollared male	UCFP#50 (K33)
		UCFP#58

### Big Cypress north of I-75 and Big Cypress Seminole Indian Reservation

**Total = 19**

Carryover	New Panthers	Removed or Mortality
#75	2 yearlings w/ #75	#67
#81	2 yearlings w/#73	#73
#100	1 female w/ 1 yearling	#77
#101	1 female w/1 yearling	#112
#117	1 treed but not collared	#118
	uncollared male	3 uncollared
	uncollared female	
	uncollared female	
	uncollared female	
	uncollared male	

### Okaloacoochee WMA and adjacent private lands

**Total = 7**

Carryover	New Panthers	Removed or Mortality
#65	uncollared male	#82
#110	uncollared female	#109
#116	uncollared male	#111
	uncollared female	#115
		UCFP#48
		K18
		UCFP#49
		UCFP#52

### Outliers

**Total = 3**

Carryover	New Panthers	Removed or Mortality
uncollared male (Sarasota)	uncollared male (Highlands Co.)	
uncollared male (Fish-eating Creek)		

**Total Carryover = 35**

**Total New Panthers = 52**

**Total Removed or Mortality = 29**

**DPP TOTAL = 87 PANTHERS**

**Appendix V. List of panther kittens, including Texas intercrosses, handled at dens from 1992-June 2003.**

Female #	Kitten #	Sex	Transponder #	Date Marked	Age in Days	Sire	Date Collared	Eventual Panther #	Alive or Dead	Kinked tail at birth	Kinked tail at > 6 mo
FP40 <sup>a</sup>	K01	M	not marked	4/7/1992	14-21	FP28	2/10/1993	FP54	a <sup>b</sup>	U	Y
FP40	K02	M	not marked	4/7/1992	14-21	FP28	2/10/1993		u	U	
FP40	K03	M	not marked	6/18/1993	21	FP26			u	N	
FP40	K04	F	not marked	6/18/1993	21	FP26			u	N	
FP40	K05	F	not marked	6/18/1993	21	FP26			u	N	
FP48	K06	M	not marked	10/30/1993	8	FP12			u	U	
FP48	K07	F	not marked	10/30/1993	8	FP12			u	U	
FP48	K08	F	not marked	10/30/1993	8	FP12			u	U	
FP56	K09	M	not marked	4/21/1994	14	unknown			u	Y	
FP56	K10	F	not marked	4/21/1994	14	unknown			u	Y	
FP56	K11	M	not marked	4/21/1994	14	unknown			u	N	
FP19	K12	F	not marked	5/17/1994	14-17	FP51			u	N	
FP19	K13	F	not marked	5/17/1994	14-17	FP51			u	N	
FP55	K14	F	not marked	4/8/1995	12	FP42			u	N	
FP55	K15	F	not marked	4/8/1995	12	FP42			u	N	
FP48	K16	M	12A4640	6/20/1995	12	unknown	1/7/1996	FP59	A	Y	N
FP48	K17	F	129FE45	6/20/1995	12	unknown			u	Y	
TX101	K18	F	F82665	10/10/1995	21	unknown	11/12/1998	FP73 <sub>F1</sub>	A	N	N
TX101	K19	M	F79CB9	10/10/1995	21	unknown	3/3/1999	FP79 <sub>F1</sub>	A	N	N
FP56	K20	M	762141	10/31/1995	14	FP45			d	Y	
FP56	K21	M	632448	10/31/1995	14	FP45			d	Y	
FP56	K22	M	F6642F	10/31/1995	14	FP45			d	Y	
TX106	K23 <sub>F1</sub>	F	11DFD74	12/1/1995	21	FP51			u	N	
FP36	K24	F	12AB55F	2/6/1996	14	FP45			u	Y	
FP36	K25	M	1147C9B	2/6/1996	14	FP45			u	Y	
FP36	K26	M	11DF0DA	2/6/1996	14	FP45			u	Y	
			114DAFE								
FP19	K27	F	(11363DC)	4/17/1996	24	FP54/FP51			u	Y	
FP19	K28	F	11EOD50	4/17/1996	24	FP54/FP51			u	Y	

Female #	Kitten #	Sex	Transponder #	Date Marked	Age in Days	Sire	Date Collared	Eventual Panther #	Alive or Dead	Kinked tail at birth	Kinked tail at > 6 mo
FP56	K29	F?	11EAB72T	8/14/1996	14	FP45			d	Y	
FP56	K30	F?	1142876	8/14/1996	14	FP45			d	Y	
FP48	K31	M	7037C2	9/18/1996	14-17	unknown	3/18/1997	FP62	a	N	Y
FP48	K32	M	11EA2EC	9/18/1996	14-17	unknown	5/24/1997	FP64	D	Y	Y
FP48	K33	M	6FFD52	9/18/1996	14-17	unknown		UCFP50	u	Y	Unknown
TX105	K34 <sub>F1</sub>	F	11EAO30T	10/4/1996	30-35	FP16			u	N	
TX101	K35 <sub>F1</sub>	M	12AFFBF	12/21/1996	4	FP45	11/19/1997	FP65 <sub>F1</sub>	A	N	N
TX101	K36 <sub>F1</sub>	F	142581A	12/21/1996	4	FP45	12/9/1997	FP66 <sub>F1</sub>	a	N	N
FP40	K37	M	1146911	5/14/1997	21	FP45			u	N	
TX107	K38 <sub>F1</sub>	F	1311B3B	6/4/1997	30+	unknown	3/5/1998	FP71 <sub>F1</sub>	a	N	N
TX107	K39 <sub>F1</sub>	F	771B4D	6/4/1997	30+	unknown	2/25/1998	FP70 <sub>F1</sub>	a	N	N
FP56	K40	M	1412E16	6/17/1997	25-28	FP45			u	Y	
FP56	K41	F	14259BF	6/17/1997	25-28	FP45			d	Y	
FP56	K42	F	1425A07	6/17/1997	25-28	FP45	1/19/1998	FP67	A	N	N
FP56	K43	M	12C2B93	6/17/1997	25-28	FP45			u	Y	
FP55	K44	M	12A9E4AT	10/2/1997	25-30	unknown			u	N	
TX108	K45 <sub>F1</sub>	F	1D1DFDOT	2/11/1998	21	FP16		FP95 <sub>F1</sub>	A	N	N
TX108	K46 <sub>F1</sub>	M	143E96ET	2/11/1998	21	FP16	11/7/2000		u	N	
TX106	K47 <sub>F1</sub>	M	1D3E32OT	2/17/1998	7-10	FP54			d	N	
FP55	K48	F	121134F	2/25/1998	14	unknown	2/20/2001	FP102	A	N	N
FP55	K49	F	1D2B3AET	2/25/1998	14	unknown			u	N	
FP55	K50	M	12A94A6T	2/25/1998	14	unknown			u	N	
FP48	K51	M	1D2A504T	6/27/1998	28	unknown			u	Y	
FP66 <sub>F1</sub>	K52 <sub>B-FL</sub>	M	1D21638T	10/2/1998	12	FP72			d	N	
FP66 <sub>F1</sub>	K53 <sub>B-FL</sub>	F	1C49E48T	10/2/1998	12	FP72			d	N	
FP66 <sub>F1</sub>	K54 <sub>B-FL</sub>	M	1D2CBC3T	10/2/1998	12	FP72			d	N	
FP49	K55	M	1211046	2/23/1999	25	unknown			d	N	
TX107	K56 <sub>B-TX?</sub>	F	1327679T	3/11/1999	21+	FP79 <sub>F1?</sub>			u	N	
TX107	K57 <sub>B-TX?</sub>	M	14245FOT	3/11/1999	21+	FP79 <sub>F1?</sub>			u	N	

Female #	Kitten #	Sex	Transponder #	Date Marked	Age in Days	Sire	Date Collared	Eventual Panther #	Alive or Dead	Kinked tail at birth	Kinked tail at > 6 mo
TX107	K58 <sub>B-TX?</sub>	F	12A9FE5T	3/11/1999	21+	FP79 <sub>F1?</sub>	4/10/2000	FP93 <sub>B-TX?</sub>	A	N	N
FP61 <sub>F1</sub>	K59	M	1EFF6EFT	4/6/1999	14	FP16	1/17/2000	FP85 <sub>B-FL</sub>	A	N	N
FP55	K60	F	1EFFA75T	5/10/1999	24-26	FP79 <sub>F1?</sub>	2/28/2000	FP87 <sub>B-FL?</sub>	A	N	N
FP55	K61 <sub>B-FL?</sub>	M	1EFF978T	5/10/1999	24-26	FP79 <sub>F1?</sub>			u	Y	
TX106	K62 <sub>F1</sub>	F	114C9D7T	6/18/1999	14	FP54/FP60			D	N	
TX106	K63 <sub>F1</sub>	F	12AFC11T	6/18/1999	14	FP54/FP60	2/8/2000	FP83 <sub>F1</sub>	A	N	N
FP70 <sub>F1</sub>	K64	F	1E2EB33T	6/23/1999	10-12	FP79 <sub>F1</sub>	3/2/2000	FP88 <sub>F2</sub>	A	N	N
FP70 <sub>F1</sub>	K65	M	703A4AT	6/23/1999	10-12	FP79 <sub>F1</sub>	4/6/2000	FP92 <sub>F2</sub>	A	N	N
FP70 <sub>F1</sub>	K66	F	1EFFF55T	6/23/1999	10-12	FP79 <sub>F1</sub>	3/17/2000	FP91 <sub>F2</sub>	A	N	N
FP71 <sub>F1</sub>	K67	M	1E2EBFET	7/4/1999	17	FP79 <sub>F1</sub>	3/8/2000	FP90 <sub>F2</sub>	D	N	N
FP71 <sub>F1</sub>	K68	F	20509A9T	7/4/1999	17	FP79 <sub>F1</sub>	2/21/2000	FP86 <sub>F2</sub>	A	N	N
FP71 <sub>F1</sub>	K69 <sub>F2</sub>	M	1E2F6B7T	7/4/1999	17	FP79 <sub>F1</sub>			d	N	
FP71 <sub>F1</sub>	K70 <sub>F2</sub>	F	1E2DF2BT	7/4/1999	17	FP79 <sub>F1</sub>			a	N	
FP69	K71	M	1E2F276T	8/1/1999	7	unknown			u	Y	
FP69	K72	F	1F07255T	8/1/1999	7	unknown			u	N	
FP69	K73	F	1FO14C2T	8/1/1999	7	unknown			u	N	
FP48	K74	F	1EFFF38T	10/25/1999	14-17	FP63,FP68			d	N	
FP48	K75	F	1FO1BEDT	10/25/1999	14-17	FP63,FP68			d	U	
FP66 <sub>F1</sub>	K76 <sub>B-FL</sub>	M	1D2C5F6T	12/24/1999	14	FP60			D	N	
FP66 <sub>F1</sub>	K77 <sub>B-FL</sub>	F	1F00067T	12/24/1999	14	FP60			u	N	
FP66 <sub>F1</sub>	K78 <sub>B-FL</sub>	F	1E2F2D6T	12/24/1999	14	FP60			u	N	
FP78	K79	F	1D1CDD8T	4/26/2000	10-14	FP59	11/1/2001	FP107	A	Y	Y
FP78	K80	M	1F07DD7T	4/26/2000	10-14	FP59	1/7/2001	FP96	A	Y	Y
FP77	K81	M	1D3B75CT	6/27/2000	28	?			u	N	
FP77	K82	F	1433F77T	6/27/2000	28	?			u	N	
FP77	K83	M	1D3A078T	6/27/2000	28	?			u	N	
FP67	K84	M	143F34DT	8/19/2000	12	?			d	Y	
FP67	K85	F	1E2E834T	8/19/2000	12	?			d	N	
FP82	K86 <sub>B-FL</sub>	F	1E2F17ET	1/3/2001	14	FP65 <sub>F1</sub>	2/13/2002	FP110	A	N	N

Female #	Kitten #	Sex	Transponder #	Date Marked	Age in Days	Sire	Date Collared	Eventual Panther #	Alive or Dead	Kinked tail at birth	Kinked tail at > 6 mo
FP82	K87 <sub>B-FL</sub>	F	1E2EFB7T	1/3/2001	14	FP65 <sub>F1</sub>			u	Y	
FP82	K88 <sub>B-FL</sub>	M	1F00D57T	1/3/2001	14	FP65 <sub>F1</sub>			u	N	
FP87 <sub>B-FL</sub>	K89	F	20501C5T	2/7/2001	14-21	FP79 <sub>F1</sub>			u	N	
FP87 <sub>B-FL</sub>	K90	M	1E2F06B	2/7/2001	14-21	FP79 <sub>F1</sub>	11/3/2001	FP108	A	N	N
FP87 <sub>B-FL</sub>	K91	M	1F071F4T	2/7/2001	14-21	FP79 <sub>F1</sub>			u	N	
TX106	K92 <sub>F1</sub>	F	600DBE9	3/17/2001	14-16	FP60			u	N	
TX106	K93 <sub>F1</sub>	M	600CCC4	3/17/2001	14-16	FP60			u	N	
FP88 <sub>F2</sub>	K94	M	1E2EB3DT	5/25/2001	21	?			u	N	
FP88 <sub>F2</sub>	K95	F	1EFF463T	5/25/2001	21	?			u	N	
FP88 <sub>F2</sub>	K96	M	1F00576T	5/25/2001	21	?			u	N	
FP88 <sub>F2</sub>	K97	F	204F878T	5/25/2001	21	?			u	N	
FP67	K98	F	11D5AFD	5/26/2001	21	?		UCFP49	D	N	N
FP67	K99	M	1248B13T	5/26/2001	21	?			u	N	
FP67	K100	M	600EFAF	5/26/2001	21	?			u	N	
FP67	K101	M	600E363	5/26/2001	21	?			u	N	
FP75	K102	M	600E58A	6/15/2001	10-12	FP59			u	Y	
FP75	K103	M	6000FA1	6/15/2001	10-12	FP59			u	N	
FP55	K104	M	1EFFFC5T	6/28/2001	17	?			d	N	
FP102	K105	M	1E2DFA4T	7/12/2001	21	FP79 <sub>F1</sub>			u	N	
FP102	K106	M	600E036	7/12/2001	21	FP79 <sub>F1</sub>			u	N	
FP49	K107	M	000600F828	8/27/2001	21	?			u	N	
FP77	K108	M	000600F0EA	8/30/2001	30	?			u	N	
FP73 <sub>F1</sub>	K109	M	000600FD77	3/3/2002	7	?			u	N	
FP73 <sub>F1</sub>	K110	M	0001E2D9E2T	3/3/2002	7	?			u	N	
FP73 <sub>F1</sub>	K111	F	000600A2C9	3/3/2002	7	?			u	N	
FP95 <sub>F1</sub>	K112	F	0001E2E9D3T	4/21/2002	25	FP85 <sub>B-FL</sub>			A	N	
FP93 <sub>B-TX</sub>	K113	F	0001EFF813T	4/23/2002	18	FP79 <sub>F1</sub>			u	N	
FP93 <sub>B-TX</sub>	K114	F	000600CC53	4/23/2002	18	FP79 <sub>F1</sub>			u	N	

Female #	Kitten #	Sex	Transponder #	Date Marked	Age in Days	Sire	Date Collared	Eventual Panther #	Alive or Dead	Kinked tail at birth	Kinked tail at > 6 mo
FP93 <sub>B-TX</sub>	K115	M	0001F071E4T	4/23/2002	18	FP79 <sub>F1</sub>	4/2/2003	FP119	A	N	N
FP93 <sub>B-TX</sub>	K116	F	0001F01C76T	4/23/2002	18	FP79 <sub>F1</sub>			u	N	
FP78	K117	F	000600CDB3	4/30/2002	21	FP59			d	Y	
FP78	K118	F	000600DB01	4/30/2002	21	FP59			d	Y	
FP78	K119	F	000600E3E3	4/30/2002	21	FP59	10/23/2002	FP113	A	Y	Y
FP78	K120	M	0001F01D1CT	4/30/2002	21	FP59	10/23/2002	FP114	A	Y	Y
FP101	K121	M	000204F9EAT	5/9/2002	10	?			u	N	
FP101	K122	F	0001E2D6FDT	5/9/2002	10	?			u	N	
FP83	K123	M	000631AED6	5/12/2002	28	?			A	N	
FP106	K124	F	0001F003A0T	5/27/2002	10	?			u	Y	
FP106	K125	M	0001D2CBC4T	5/27/2002	10	?			u	Y	
FP106	K126	M	0001E2E8F6T	5/27/2002	10	?			u	Y	
FP55	K127	F	000600EAD2	5/30/2002	10	FP79 <sub>F1</sub>			d	N	
FP75	K128	M	000600E84B	6/6/2002	10	FP100/FP98			A	Y	
FP75	K129	M	00060101BC	6/6/2002	10	FP100/FP98			A	Y	
FP112	K130	M	0001EFF497T	6/15/2002	7	FP100/FP98			d	Y	
FP112	K131	M	000600E4CE	6/15/2002	7	FP100/FP98			u	Y	
FP67	K132	F	000600D0F1	6/18/2002	10	?	1/20/2003	FP116	A	Y	Y
FP67	K133	M	000600EBA8	6/18/2002	10	?			d	Y	
FP67	K134	M	000600E776	6/18/2002	10	?			d	Y	
FP107	K135	M	0006010509	7/7/2002	9-10	?			d	Y	
FP107	K136	F	000600F465	7/7/2002	9-10	?			d	Y	
FP102	K137	F	0006318229	7/19/2002	15	FP79			a	N	
FP102	K138	M	000630E287	7/19/2002	15	FP79			a	N	
FP61	K139	F	000204FBC3T	9/27/2002	10	?			u	N	
FP61	K140	M	000600D0D4	9/27/2002	10	?			u	N	
FP61	K141	M	000600F2F8	9/27/2002	10	?			u	N	
FP61	K142	F	0001D29A56T	9/27/2002	10	?			u	N	
FP87 <sup>c</sup>	K143	F	000600DD57	3/25/2003	15	FP79			u	N	
FP87 <sup>c</sup>	K144	M	chipped # unk	3/25/2003	15	FP79			u	N	

Female #	Kitten #	Sex	Transponder #	Date Marked	Age in Days	Sire	Date Collared	Eventual Panther #	Alive or Dead	Kinked tail at birth	Kinked tail at > 6 mo
FP87 <sup>c</sup>	K145	F	chipped # unk	3/25/2003	15	FP79			u	?	
FP101	K146	F	00062EDF9D	4/19/2003	10	FP65/FP100			a	N	
FP101	K147	M	0006328F81	4/19/2003	10	FP65/FP100			a	N	
FP101	K148	F	00062E2A15	4/19/2003	10	FP65/FP100			a	N	
FP110	K149	F	000600F8DE	6/3/2003	8-10	?			a	N	
FP110	K150	M	000600CCD1	6/3/2003	8-10	?			a	N	
FP110	K151	F	000600C049	6/3/2003	8-10	?			a	N	

<sup>a</sup> FP denotes panthers captured for radiocollaring; K denotes kittens handled at panther or Texas cougar dens; TX denotes Texas cougars used for Panther Genetic Restoration; F1 subscript denotes Florida panther x Texas cougar offspring; F2 subscript denotes offspring of F1 x F1 mating; B-FL subscript denotes offspring of F1 x Florida panther mating; B-TX subscript denotes offspring of F1 x Texas cougar mating.

<sup>b</sup> a = no evidence of mortality, presumed alive; A = known to be alive; d = some evidence of mortality, presumed dead; D = known to be dead; u = last seen at den, status unknown.

<sup>c</sup>Handled by BCNP personnel.

**Appendix VI. List of all known dens of radio-instrumented female Florida panthers and Texas cougars in southern Florida from June 1985 to June 2003. Kitten numbers preceded with K indicate natal den was visited.**

Cat ID	Den Date	Location	UTM-E	UTM-N	Habitat	No. of Kittens	Kittens Handled	Sire
FP09	Jun-85	S Golden Gate Estates	unknown	unknown	?	1?	FP10♂ den not visited	Unknown
FP09	Jun-87	FSSP	454400	2891300	hardwood hammock	1?	den not visited	FP12
FP09	May-89	FSSP	461100	2878600	mixed swamp	?	den not visited	Unknown
FP09	Jul-90	FSSP	462300	2882200	mixed swamp	2?	FP202♂, FP203♂ den not visited	FP37
FP09	Jun-93	FSSP	456000	2873800	hardwood hammock	Unsuccessful?	den not visited	FP51
FP11	May-86	BCNP - Bear Island	468100	2896400	pine/palmetto	3?	FP19♀ den not visited	FP12
FP11	May-88	BCNP - Bear Island	468100	2896400	pine/palmetto	1?	FP29♂ den not visited	FP20
FP11	Apr-90	BCNP - Bear Island	469900	2898700	pine/palmetto	1?	♀(roadkill) den not visited	FP12
FP11	Jul-91	Price's	469800	2907100	hardwood hammock	1?	FP47♂ den not visited	FP12
FP11	Mar-93	BCNP - Bear Island	468900	2896200	hardwood hammock	?	den not visited	FP12?
FP14	Apr-89	Long Pine Key	537200	2799200	hardwood hammock	2?	FP42♂, den not visited	FP16
FP14	Mar-91	Long Pine Key	536900	2808000	hardwood hammock	Unsuccessful	den not visited	FP16
FP15	May-88	Long Pine Key	525100	2807200	hardwood hammock	Unsuccessful	den not visited	FP16
FP19	Mar-88	Price's	468100	2906000	Hardwood hammock	4?	FP30♂ den not visited	FP13
FP19	Jul-89	FPNWR	460600	2893700	Hardwood hammock	1?	FP43♂ den not visited	FP12
FP19	Nov-90	Rock Spring Island	460600	2902700	Pine/palmetto	2?	FP205♀, FP45♂ den not visited	FP12
FP19	Mar-92	NE Hog Pond	459800	2900700	Pine/palmetto	2?	UCFP21♀, FP53♂ den not visited	FP12
FP19	May-94	FPNWR	464600	2902900	Pine/palmetto	2	K12♀, K13♀	FP51?
FP19	Apr-96	Barfield's	463100	2904500	Palmetto/oaks	2	K27♀, K28♀d	FP54, FP51?
FP23	Aug-92	Raccoon Point	502300	2877300	Unknown	2	FP209♀, FP210♂	FP42
FP23	Dec-92	Raccoon Point	502800	2872100	Unknown	1?	FP55♀ den not visited	FP42
FP31	Mar-89	Catherine Island	454000	2907000	Pine/palmetto	3?	FP34♂, FP35♂ den not visited	FP12
FP31	Jul-90	Regency Farms	459900	2903900	Pine/palmetto	2?	FP201♂, FP204♀ den not visited	FP12
FP31	Sep-91	Barfield's	464700	2906000	Hardwood hammock	2?	FP48♀, FP52♀ den not visited	FP12
FP32	Mar-89	Catherine Island	457100	2898600	pine/palmetto	unsuccessful?	den not visited	Unknown
FP32	May-92	FPNWR	457400	2897400	pine/palmetto	1?	FP208♀	FP12



Cat ID	Den Date	Location	UTM-E	UTM-N	Habitat	No. of Kittens	Kittens Handled	Sire
FP32	Mar-96	FPNWR	464600	2896200	pine/palmetto	1	UCFP24 (Dead ♀)	
FP36	Mar-90	BCSIR	492500	2906200	Hardwood hammock	?	den not visited	Unknown
FP36	May-91	BCNP - Add Lands	491100	2899000	Pine/palmetto	2?	FP207♂, FP50♂ den not visited	FP26
FP36	Oct-93	N of BCSIR	489100	2909400	Pine/palmetto	1?	den not visited	FP26, FP34
FP36	Jun-95	Canoe Lake Strand	502800	2901300	Pine/palmetto	?	den not visited	FP45?
FP36	Feb-96	Wilson Cypress	499800	2895400	Pine/palmetto	3 (remains of 4th)	K24♀, K25♂, K26♂, UCFP44	FP45
FP40	Nov-90	Baker's Grade	487100	2896300	pine/palmetto	2	FP206♀, FP44♂ den not visited	FP26
FP40	Mar-92	Baker's Grade	485000	2897700	pine/palmetto	2	FP54♂, K02♂	FP28?
FP40	Jun-93	Baker's Grade	486900	2896900	pine/palmetto	3	K03♂, K04♀, K05♀	FP26
FP40	?	?	unknown	unknown	?	2?	FP60♂, ♀ tracks, den not visited	Unknown
FP40	May-97	BCNP - Add Lands	488100	2899200	pine/palmetto	2	FP69♀, K37♂	FP45
FP48	Oct-93	BCNP - Bear Island	475900	2901600	pine/palmetto	3	K06♂, K07♀, K08♀	FP12
FP48	Jun-95	Dozier Hammock	482100	2903600	pine/palmetto	2	FP59♂, K17♀	Unknown
FP48	Sep-96	NE Doctor's Ham.	480200	2904000	vines/ferns	3	FP62♂, FP64♂, UCFP50♂	Unknown
FP48	Jun-98	BCNP - Bear Island	476300	2899200	pine/palmetto	2	K51♂, FP75♀	FP68 or FP45
FP48	Oct-99	BCNP - Bear Island	476100	2896100	Palmetto, myrtle	2	K74♀, K75♀ (abandoned)	FP63 or FP68
FP49	Jan-99	BCNP - Add Lands	497300	2897600	pine/palmetto	1	K55♂	Unknown
FP49	Aug-01	BCNP - Add Lands	495400	2900800	pine/palmetto	1	K107♂	Unknown
FP52	Jul-93	Sadie Cypress	467800	2918600	mixed swamp	2?	1♂ (roadkill) den not visited	FP46
FP52	Jul-94	Sadie Cypress	469600	2919000	Cypress swamp	?	den not visited	Unknown
FP55	Apr-95	BCNP	483700	2871800	pine/palmetto	2	K14♀, K15♀	FP42
FP55	Sep-97	BCNP - N Burns Lake	483300	2864800	pine/palmetto	1	K44♂	Unknown
FP55	Feb-98	BCNP - N Monument Lake	490500	2869800	pine/palmetto	3	FP102♀, K49♀, K50♂	Unknown
FP55	Apr-99	BCNP	479500	2876800	Palmetto/myrtle	2	FP87♀, K61♂	Unknown
FP55	Jun-01	BCNP - NE Airplane Prairie	481000	2882000	Palmetto	1	K104♂	FP79
FP55	May-02	BCNP	479900	2874300	pine/palmetto	1	K127♀	FP79
FP56	Apr-94	Baker's Grade	485800	2897300	pine/palmetto	3	K09♂, K10♀, K11♂	Unknown
FP56	Oct-95	North BCSIR	490700	2901600	pine/palmetto	3	K20♂, K21♂, K22♂	FP45
FP56	Aug-96	North BCSIR	490700	2907400	Palmetto	2	K29♀?, K30♀?	FP45
FP56	Jun-97	Bakers Grade	485900	2897600	pine/palmetto	4	K40♂, K41♀, K43♂, FP67♀	FP45

Cat ID	Den Date	Location	UTM-E	UTM-N	Habitat	No. of Kittens	Kittens Handled	Sire
FP57	Jun-98	FSSP	461200	2880600	mixed swamp	?	den not visited	FP54
FP61	Mar-99	Long Pine Key	537300	2810700	Hardwood hammock	1	FP85♂	FP16
FP61	Sep-02	ENP - East	544624	2829732	hardwood/Schinus	4	K139♀, K140♂, K141♂, K142♀	Unknown
FP66	Sep-98	Belle Meade	438700	2893600	pine/palmetto	3	K52♂, K53♀, K54♂	FP72
FP66	Dec-99	Private lands	464100	2909100	Cypress, cabbage	3	K76♂, K77♀, K78♀	FP60
FP67	Aug-00	Private lands	486100	2910700	palmetto	2	K84♂, K85♀	Unknown
FP67	May-01	Private lands	486200	2909800	pine/palmetto	4	K98♀, K99♂, K100♂, K101♂	Unknown
FP67	Jun-02	Private lands	481600	2909300	palmetto	3	K132♀, K133♂, K134♂	Unknown
FP69	Jul-99	BCNP - NE of Baker's Camp	485500	2902000	Palmetto	3	K71♂, K72♀, K73♀	Unknown
FP70	Jun-99	BCNP - NE of Monument Lake	491200	2865700	pine/palmetto	3	FP88♀, FP92♂, FP91♀	FP79
FP71	Jun-99	BCNP	497700	2893800	pine/palmetto	4	FP90♂, FP86♀, K69♂, K70♀	FP79
FP73	?	?	unknown	unknown	?	1?	FP74♂ den not visited	-
FP73	Feb-99	BCSIR	unknown	unknown	?	1?	FP84♂ den not visited	-
FP73	Feb-02	BCNP - Addition Lands	507900	2900000	palmetto	3	K109♂, K110♂, K111♀	Unknown
FP75	Apr-00	Private lands	466400	2904800	hardwood hammock	Unsuccessful	den not visited	
FP75	Jun-01	BCNP - Bear Island	466800	2899400	pine/palmetto	2	K102♂, K103♂	FP59
FP75	May-02	BCNP - Bear Island	466000	2894800	palmetto	2	K128♂, K129♂	FP98, FP100
FP77	May-00	BCNP - Addition Lands	501300	2900100	Palmetto	3	K81♂, K82♀, K83♂	Unknown
FP77	Aug-01	BCNP - Addition Lands	502600	2903900	pine/palmetto	1	K108♂	Unknown
FP78	Apr-00	FPNWR	464500	2896900	Pine/cabbage	2	FP107♀d, FP96♂	FP59
FP78	Apr-02	FPNWR	457500	2897700	pine/palmetto	4	K117♀, K118♀, K119♀, K120♂	FP59
FP82	Dec-00	OK Slough	472600	2933600	sawgrass marsh	3	K86♀, K87♀, K88♂	FP65
FP83	Apr-02	FSSP	460800	2871500	fern bed	1	K123♂	Unknown
FP87	Jan-01	BCNP	496600	2868600	palmetto	3	K89♀, FP108♂, K91♂	FP79
FP87 <sup>c</sup>	Mar-03	BCNP - N of Oasis	499508	2866287	pine/palm	3	K143♀, K144♂, K145♀	FP79
FP88	May-01	BCNP - Loop Unit	500200	2855800	sawgrass marsh	4	K94♂, K95♀, K96♂, K97♀	Unknown
FP93	Apr-02	BCNP - Turner River Unit	484500	2874500	palmetto	4	K113♀, K114♀, K115♂, K116♀	FP79
FP95	Mar-02	ENP - Long Pine Key	533700	2807600	Brazilian pepper	1	K112♀	FP85
FP101	Apr-02	BCSIR	494300	2905200	pine/palmetto	2	K121♂, K122♀	Unknown

Cat ID	Den Date	Location	UTM-E	UTM-N	Habitat	No. of Kittens	Kittens Handled	Sire
FP101	Apr-03	Private lands	486563	2909969	palmetto/vines	3	K146♀, K147♂, K148♀	FP65/FP100
FP102	Jun-01	BCNP - Monument Lake	491400	2865600	mixed swamp	2	K105♂, K106♂	FP79
FP102	Jul-02	BCNP - Monument Lake	493060	2867279	palmetto	2	K137♀, K138♂	FP79
FP106	May-02	FPNWR	464500	2903200	hardwood hammock	3	K124♀, K125♂, K126♂	Unknown
FP107	Jun-02	FPNWR	452200	2894400	pine palmetto	2	K135♂, K136♀	Unknown
FP110	May-03	OK Slough	467115	2938383	palmetto	3	K149♀, K150♂, K151♀	Unknown
FP112	Jun-02	BCNP - Bear Island	473300	2901600	palmetto	2	K130♂, K131♂	FP98, FP100
TX101	Sep-95	BCSIR	500000	2906900	pine/palmetto	2	FP73♀, FP79♂	Unknown
TX101	Dec-96	BCSIR	499400	2907600	Palmetto/oak	2	FP65♂, FP66♀	FP45
TX105	Sep-96	ENP - Long Pine Key	523200	2808000	tropical hardwood	1	K34♀	FP16
TX105	Jul-99	ENP - Long Pine Key	530700	2808300	Brazilian pepper	1?	FP94F1♀ den not visited	FP16
TX106	Nov-95	S Golden Gate Estates	447100	2885200	Cypress/mixed	1	K23♀	FP51
TX106	Feb-98	N Golden Gate Estates	447800	2895700	vines/cabbage	1	K47♂	FP54, FP59?
TX106	Jun-99	PSSF	453600	2891600	Cabbage	2	K62♀, FP83♀	FP54
TX106	Mar-01	FPNWR	453400	2896200	pine/palmetto	2	K92♀, K93♂	FP60
TX107	May-97	BCNP - N of Oasis	496500	2869100	pine/palmetto	2	FP70♀, FP71♀	Unknown
TX107	Feb-99	BCNP - N of Buckskin Prairie	493800	2875700	pine/palmetto	3	K56♀, K57♂, FP93♀	FP79
TX108	Jun-96	ENP - Long Pine Key	532300	2809300	tropical hardwood	1?	FP61♀ den not visited	FP16
TX108	Feb-98	ENP - Long Pine Key	530100	2809500	tropical hardwood	2	FP95♀, K46♂	FP16

<sup>a</sup>FP denotes panthers captured for radiocollaring; K denotes kittens handled at panther or Texas cougar dens; TX denotes Texas cougars used for Panther Genetic Restoration; F1 subscript denotes Florida panther x Texas cougar offspring; F2 subscript denotes offspring of F1 x F1 mating; B-FL subscript denotes offspring of F1 x Florida panther mating; B-TX subscript denotes offspring of F1 x Texas cougar mating.

<sup>b</sup>ENP = Everglades National Park; BCSIR = Big Cypress Seminole Indian Reservation; PSSF = Picayune Strand State Forest; FPNWR = Florida Panther National Wildlife Refuge; OSSF = Okaloacoochee Slough State Forest; NBCNP = Big Cypress National Preserve north of Interstate 75; FSSP = Fakahatchee Strand State Preserve; SBCNP = Big Cypress National Preserve south of Interstate 75.

<sup>c</sup>Kittens removed from wild into captive breeding program.

<sup>d</sup>Kittens marked with transponders.

<sup>e</sup>Handled by BCNP personnel.

## Appendix VII. Linda 2001 – Analysis of panther survival data.

### MEMORANDUM

FROM: Mr. Stephen B. Linda, Biological Scientist IV, Wildlife Technology Services Section

TO: Mr. Darrell Land, Panther Section Leader, Bureau of Wildlife Diversity Conservation

DATE: June 27, 2001

SUBJECT: Analysis of Panther Survival Data

### Summary of results

#### Six-month survival:

- Texas ancestry did not appear to affect the probability of surviving to six months ( $P = 0.2776$ ).
- There appeared to be weak but non-negligible evidence of mother-specific (i.e., individual) effects for the probability of surviving to six months ( $P = 0.1446$ ).

#### Survival of radio-collared panthers:

The data contained only one non-censored observation for panthers with Texas ancestry (Table 2, Figure 1). Nevertheless, Texas ancestry effects on lifelength were suggested ( $P = 0.1308$ ), with panthers descended from Texas cougars expected to have a longer lifelength than other Florida panthers.

### Methods

All computations were performed using the SAS System (SAS Inst. Inc., 1999).

#### Six-month survival

The data used in the analysis are given in Table 1. The number of kittens surviving to six months for a given litter was assumed to follow a binomial distribution, and generalized linear mixed model (GLMM) methodology, as can be implemented in PROC NLMIXED in the SAS System, was performed. A logit link and binomial error distribution were specified; a fixed Texas-ancestry effect and a random mother-specific effect (assumed normally distributed with zero expectation and variance  $\sigma^2$ ) were included in the linear predictor.

#### Survival of radio-collared panthers

The data used in the analysis are given in Table 2. The log of (possibly right censored) survival time was modeled using the Weibull, exponential, gamma, logistic, and normal distributions, with the location parameter dependent on Texas ancestry. The fits of the models were compared using AIC.

In addition, Cox's proportional hazards model was fitted to the data.

## Appendix VII. Linda 2001 – Analysis of panther survival data.

### Results

#### Six-month survival

The estimate of the square root of the panther variance component was:

$\hat{\sigma}$	SE	$P$ -value for $H_0: \sigma = 0$	95% CI limits for $\sigma$	
			Lower	Upper
0.795737	0.5170143	0.1446	0.000000	1.897727

The ratio of the odds of surviving to six months for Texas descendants to the odds for non-Texas descendants was:

Log(odds ratio) scale					Back-transformed (i.e., odds ratio) scale			
		95% CI limits		$P$ -value for			95% CI limits	
Estimate	SE	Lower	Upper	$H_0: \log(\text{odds ratio}) = 0$	Estimate	SE <sup>†</sup>	Lower	Upper
0.873046	0.7749453	-0.778711	2.524803	0.2776	2.3942	1.85537	0.4590	12.4884

<sup>†</sup>Obtained by application of the delta method.

The expected probability of surviving to six months for each group was as follows:

Texas ancestry	Log(odds) scale				Back-transformed (i.e., probability) scale			
	Estimate	SE	95% CI limits		Estimate	SE <sup>†</sup>	95% CI limits	
Yes	0.955591	0.5929970	-0.308352	2.219534	0.7222	0.11896	0.4235	0.9020
No	0.082546	0.4967333	-0.976216	1.141308	0.5206	0.12397	0.2736	0.7579

<sup>†</sup>Obtained by application of the delta method.

Thus, there was no evidence that the probability of surviving to six months depended on Texas ancestry ( $P = 0.2776$ ). However, as indicated by relatively wide confidence intervals for the odds ratio and for the six-month survival probabilities, the experiment appeared to have low power.

#### Survival of radio-collared panthers

AIC values for the fitted models were as follows (gray shaded box indicates best model according to AIC):

Distribution	AIC
Weibull	35.0792
Exponential	35.6831
Gamma	35.0597
Logistic	34.7222
Normal	34.0987

Thus, according to AIC, the log-normal distribution provided the best fit to the survival data.

Based on the log-normal distribution, the ratio of the expected lifelength of non-Texas descendants to the expected lifelength for Texas descendants was:

## Appendix VII. Linda 2001 – Analysis of panther survival data.

Log(ratio) scale					Back-transformed (i.e., ratio) scale			
Estimate	SE	95% CI limits		$P$ -value for $H_0: \log(\text{ratio}) = 0$	Estimate	SE <sup>†</sup>	95% CI limits	
		Lower	Upper				Lower	Upper
-0.76216	0.504401	-1.75077	0.22644	0.1308	0.4667	0.23538	0.1736	1.2541

<sup>†</sup>Obtained by application of the delta method.

Expected lifelength was as follows:

Texas Ancestry	Log-scale				Back-transformed scale			
	Mean	SE	95% CI limits		Mean	SE <sup>†</sup>	95% CI limits	
			Lower	Upper			Lower	Upper
No	1.58646	0.701950	0.21067	2.96226	4.88644	3.430042	1.23450	19.34168
Yes	2.34863	0.488174	1.39183	3.30543	10.47121	5.111767	4.02219	27.26031

<sup>†</sup>Obtained by application of the delta method

Thus, based on the log-normal distribution, Texas ancestry effects on lifelength were suggested ( $P = 0.1308$ ), with panthers descended from Texas cougars expected to have a longer lifelength than other Florida panthers (Figure 1).

Inferences from the fit of Cox's proportional hazards model were consistent with those from the fit of the log-normal distribution ( $P = 0.1429$  for  $H_0$ : log hazard ratio depended on Texas ancestry).

## Caveats

The analysis of survival of radio-collared panthers was based on rather scant data (the data contained only one non-censored observation for panthers with Texas ancestry). Therefore, assessment of the plausibility of the assumptions necessary for application of Cox's proportional hazards model was problematic. Also, as indicated by relatively wide confidence intervals for expected lifelengths and the ratio of expected lifelengths, the power of the experiment did not appear to be very high. As more lifelength data are obtained over time, we might expect to obtain more confidence in the choice of appropriate statistical methodology, and in resulting inferences concerning Texas ancestry effects on survival.

## Reference

SAS Inst. Inc. 1999. *SAS OnlineDoc<sup>TM</sup>, Version 8*. SAS Institute Inc., Cary, NC.

## Appendix VII. Linda 2001 – Analysis of panther survival data.

Table 1: Data used in the analysis of six-month survival.

Texas ancestry	Mother ID	Den year	Litter size	Number alive at six months
No	32	1996	1	0
	40	1992	2	2
	40	1993	3	2
	48	1995	2	2
	48	1996	3	2
	48	1998	2	2
	48	1999	2	0
	49	1999	1	0
	56	1995	3	0
	56	1996	2	0
	56	1997	4	2
	69	1999	3	2
	77	2000	3	1
	78	2000	2	2
Yes	61	1999	1	1
	66	1998	3	0
	66	1999	3	2
	70	1999	3	3
	71	1999	4	3
	TX101	1995	2	2
	TX101	1996	2	2
	TX106	1998	1	0
	TX106	1999	2	1
	TX107	1997	2	2
	TX108	1998	2	1

## Appendix VII. Linda 2001 – Analysis of panther survival data.

Table 2: Data used in the analysis of survival of radio-collared panthers.

Texas ancestry	Kitten ID	Birth date	Date of death <sup>†</sup>	Censored	Life length (yrs)
No	10	08/15/85	01/27/87	0	1.4511
	16	12/15/85	01/03/00	0	14.0507
	19	05/15/86	12/02/97	0	11.5510
	22	10/15/86	07/20/91	0	4.7611
	29	05/15/88	05/27/92	0	4.0329
	30	03/15/88	01/29/90	0	1.8754
	34	03/15/88	11/15/93	0	5.6701
	42	05/15/89	06/22/95	0	6.1027
	43	07/15/89	10/31/91	0	2.2943
	44	11/15/90	07/06/93	0	2.6393
	45	11/15/90	08/02/98	0	7.7125
	47	07/15/91	02/19/93	0	1.6016
	48	10/15/91	05/23/01	1	9.6044
	50	05/15/91	12/06/93	0	2.5626
	52	10/15/91	01/14/95	0	3.2498
	53	04/15/92	02/26/93	0	0.8679
	54	04/15/92	05/23/01	1	9.1034
	58	04/15/94	03/30/97	0	2.9569
	59	06/15/95	05/23/01	1	5.9384
	60	10/15/95	05/23/01	1	5.6044
	62	09/15/96	05/23/01	1	4.6845
	64	09/15/96	03/26/99	0	2.5243
	67	06/15/97	05/23/01	1	3.9370
	69	05/15/97	05/23/01	1	4.0219
	75	06/15/98	05/23/01	1	2.9377
Yes	61	07/15/96	05/23/01	1	4.8542
	65	12/15/96	05/23/01	1	4.4353
	66	12/15/96	05/23/01	1	4.4353
	70	05/15/97	05/23/01	1	4.0219
	71	05/15/97	05/23/01	1	4.0219
	83	06/15/99	05/23/01	1	1.9384
	85	03/15/99	05/23/01	1	2.1903
	86	06/15/99	05/23/01	1	1.9384
	87	04/15/99	05/23/01	1	2.1054
	88	06/15/99	05/23/01	1	1.9384
	90	06/15/99	04/26/01	0	1.8645
	91	06/15/99	05/23/01	1	1.9384
	92	06/15/99	05/23/01	1	1.9384
	93	02/15/99	05/23/01	1	2.2669
	94	07/15/99	05/23/01	1	1.8563

<sup>†</sup>Date of death for censored observations was the date the data were compiled.



## Appendix VII. Linda 2001 – Analysis of panther survival data.

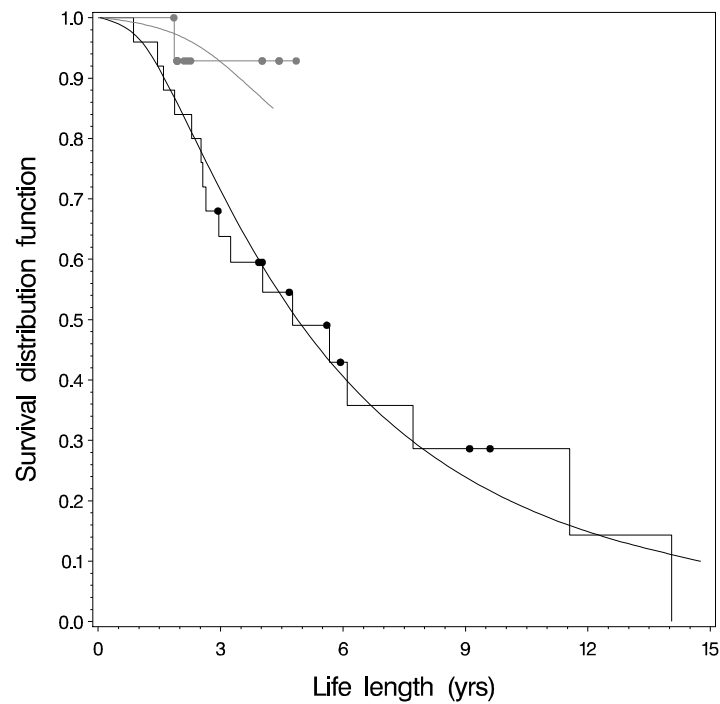


Figure 1: Survival of radiocollared panthers. Step-function indicates the product-limit estimate of the survival distribution function (steps occur at non-censored life-lengths), dots indicate censored observations, and curve indicates the survival function based on the fit of the log-normal distribution; black indicates panthers with no Texas ancestry, gray indicates panthers having Texas ancestry.

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**Appendix VIII. Summary of Florida panther and Texas cougar mortalities in southern Florida from 1 July 2002 to 30 June 2003.**

*Florida Panther 32.*— The carcass of this 15-year-old collared female was recovered on 14 September 2002 from the Florida Panther National Wildlife Refuge (FPNWR) approximately 0.2 mi. north of I-75. Necropsy was performed at the Wildlife Research Lab (WRL), and death was likely due to malnutrition. FP32 was severely emaciated with muscle wasting and loss of fat stores. Fractures of all canines may have impaired the panther's ability to capture prey. A chronic fracture of the left 5<sup>th</sup> rib and subsequent adhesion of the left upper lung lobe may have further impaired the panther's health. A double-kinked tail was the only congenital defect observed.

*Florida Panther 67.*—The carcass of this 5.5-year-old collared female was recovered from private land off of Windgate Mill east of the prison in Hendry County following detection of a mortality signal 15 January 2003. A partial necropsy was performed at the collection site and the abdominal viscera removed. The remaining carcass was left to hold any orphaned kittens in the area. Remote photos indicated only one surviving kitten (FP116), and she was captured and removed temporarily to captivity. Further necropsy was performed at WRL, and intraspecific aggression (ISA) was confirmed as the cause of death. At necropsy, a 3.5 mm diameter atrial septal defect (ASD) was observed along with slight enlargement of the right side of the heart. Numerous small vaginal papillomas were also observed. Other congenital defects included a cowlick and cleft in the spleen.

*Florida Panther 73.*—The carcass of this approximately 8-year-old collared female was found 2 July 2003 just outside the east fence near the bone yard at the Big Cypress Seminole Indian Reservation(BC-SIR) – Hunting Adventures Game Pen following a field investigation into her apparent restricted movements. The carcass had been reduced to bones and hide by scavengers. Necropsy was performed at WRL, and cause of death was not determined due to carcass condition. No congenital defects were observed although severe autolysis and scavenging precluded complete examination (a cowlick was reported at previous captures). The death of FP73 may be related to those of UCFP55, 56, 57, and FP77, and FP118.

*Florida Panther 78.*—This 6-year-old collared female was found dead in the FPNWR following detection of a mortality signal 18 October 2002. Necropsy was performed at WRL, and ISA was confirmed as the cause of death. Congenital defects observed included a kink in the last coccygeal vertebrae and a cleft in the spleen. Two dependent kittens (FP113, 114), orphaned as a result of her death, were captured and removed to White Oak Plantation until they reached sufficient age for release.

*Florida Panther 82.*—The carcass of this 6-year-old collared female was collected 13 May 2003 from the Okaloacoochee Slough WMA (OKS-WMA) after detection of a mortality signal. The carcass was severely scavenged and decomposed. Necropsy was performed at WRL, and cause of death could not be determined. Male panther sign in the area and a laceration on a forearm suggested ISA may have been the cause of death. Polymerase chain reaction testing for FeLV indicated she was not infected. Carcass condition precluded examination of the heart and spleen – congenital defects observed were limited to a kink in the last vertebrae of the tail.

*Florida Panther 87.*—FP87 was a radio-collared female was found dead 27 June 2003 in Big Cypress National Preserve. The carcass was severely decomposed and only skeletal remains were recovered. However, canine punctures were evident in the cranium suggesting ISA was the likely cause of death. The carcass is currently being held at the Big Cypress Field Office in Naples awaiting necropsy. FP87 gave birth to 3 kittens in early March 2003, however, no kitten sign was found in the immediate area surrounding FP87's carcass.

*Florida Panther 98.*—FP98 was a 4 to 5-year old radio-collared male found dead on SR29 approximately 1 km north of Pistol Pond following detection of a mortality signal 1 July 2002. Necropsy was performed at WRL, and vehicular collision was confirmed as the cause of death. Enlargement of the peripheral lymph nodes was observed. Congenital defects included a kinked tail, cowlick, unilateral cryptorchidism, and cleft in the spleen.

*Florida Panther 99.*—FP99 was a 3-year-old radio-collared male found dead 28 November 2002 on CR846 approximately 0.25 mi north of Collier County Fairgrounds. Necropsy was performed at

WRL, and vehicular collision was confirmed as the cause of death. Congenital defects included a kinked tail, cowlick, and cleft in the spleen.

*Florida Panther 106.*—FP106 was a radio-collared 3-year-old female found dead 20 February 2003 on SR29 just south of the entrance to Sunniland Mine. Necropsy was performed at WRL, and death was due to vehicular collision. Congenital defects included a kinked tail and cowlick. FP106 had three kittens in mid-May 2002 that would have been 9 months-of-age at the time of 106's death.

*Florida Panther 108.*—FP108 was a radio-collared adult male found dead 17 November 2002 in the Monument Lake Unit of Big Cypress National Preserve (BCNP). Necropsy was performed at Disney's Animal Kingdom, and cause of death was not determined although hemorrhage around the neck suggested trauma. Radiographs of the neck were normal and no other signs of trauma were observed. Rabies FA, and viral isolation and polymerase chain reaction (PCR) for pseudorabies (PRV), canine distemper virus (CDV), West Nile Virus (WNV), and Eastern Equine Encephalitis virus (EEE) were negative. Congenital defects included a cowlick and cleft in the spleen.

*Florida Panther 109.*—FP109 was a radio-collared 11-year-old male found dead 26 February 2003 on OKS-WMA north of CR832. The carcass was observed from the air (a mortality signal was not detected) and was severely autolyzed and scavenged. Necropsy was performed at WRL, and death is believed to be due to ISA. However, FP109 was positive for FeLV; associated anemia, present at capture 1 mo previous, may have increased his vulnerability to ISA. Assessment for congenital defects was limited by carcass condition.

*Florida Panther 111.*—This approximately 9-year-old panther was found dead 6 September 2002 in OKS-WMA approximately 1.2 km north of CR832 following detection of a mortality signal. Necropsy was performed at WRL, and death was due ISA. Congenital defects included a kinked tail and cleft in the spleen. Carcass condition precluded complete necropsy; unilateral cryptorchidism observed at capture in FY01-02.

*Florida Panther 112.*—FP112 was a 4-year-old radio-collared female found dead 13 September 2002 in the Bear Island Unit of BCNP. Male panther tracks were found approximately 2 m from the

carcass and two areas were found where a panther bedded down. No sign of her two kittens was found (handled 15 June 2002 at 1 wk of age). Necropsy was performed at WRL, and suspected cause of death (ISA) was confirmed. Congenital defects included a cowlick and cleft in the spleen (a kinked tail was observed at capture 25 February 2002).

*Florida Panther 115.*—FP115 was an approximately 4.5-year-old female that died 17 May 2003 at 1730 hr in OKS-WMA. Researchers were in the field at time of death, and some thrashing and vocalizations were heard. Necropsy was performed at Disney's Animal Kingdom. An *E. coli* septicemia was diagnosed which may have been opportunistic – resulting from concurrent FeLV and Feline Immunodeficiency Virus infections. No fetuses were found although the panther had been with a male 3 mo previous. Congenital defects included a kink in the last coccygeal vertebrae and a cleft in the spleen.

*Florida Panther 118.*—FP118 was a radio-collared 1-year-old female found dead 4 April 2003 in the BC-SIR Hunting Adventures Game Pen. Necropsy was performed at the University of Florida, College of Veterinary Medicine. No significant gross or microscopic changes were observed and cause of death was not determined. Gas chromatography (broad organic toxin screen covering several thousand toxins [liver]), anticoagulant screen (liver), heavy metals (kidney), and chlorinated pesticide screen (fat) were negative. A convulsant screen (strychnine, penitrem A, roquefotine, and bromethalin), cyanide, and Zn phosphide (intestinal contents) were also negative. Rabies and Feline Panleukopenia virus (FPL) fluorescent antibody (FA), and viral isolation and PCR for PRV, CDV, WNV, and EEE were negative. Botulinum toxin type C was identified in thoracic blood by mouse assay and ELISA at the National Wildlife Health Center (Madison, Wisconsin). Confirmatory testing at the Center for Disease Control and Prevention (Atlanta, Georgia) is pending. Analysis of brain, kidney, liver, and thoracic blood for algal toxins is also pending (Jacksonville Central Lab, Florida Department of Health, Jacksonville, Florida). Congenital defects included a cowlick and splenic cleft. The death of FP118 may have been related to those of FP73, FP77, UCFP55, UCFP56, and UCFP57.

*Uncollared Florida Panther 48.*—This approximately 1-year-old uncollared female was found dead 11 November 2002 on CR846 approximately 5 to 6 km east of Immokalee. Necropsy was

performed at WRL, and death was due to vehicular collision. Observed congenital defects were limited to a cleft in the spleen.

*Uncollared Florida Panther 49.*—UCFP49 was an uncollared sub-adult female found dead 26 November 2002 on CR846 approximately 75 m west of the Immokalee Ranch entrance. Necropsy was performed at WRL, and death was due to vehicular collision. Congenital defects included a cowlick and a cleft in the spleen. Three 2 to 3-week-old fetuses were found and saved for possible genetic analysis. A transponder chip identified UCFP49 as K98, a kitten of FP67 first handled in May 2001.

*Uncollared Florida Panther 50.*—This uncollared male Florida panther was found dead 26 January 2003 on Immokalee Rd approximately 3.4 mi east of Everglades Blvd. A transponder chip was not detected initially but was later found on radiographs. The transponder chip number identified UCFP50 as K33, one of 3 kittens from FP48 handled in their natal den 18 September 1996. Necropsy was performed at WRL, and vehicular collision was confirmed as the cause of death. A patchy dermatitis may have been due to a resolving dermatophytosis although culture was negative. A peripheral lymphadenopathy was also present, and lymphoid tissue tested negative for FeLV by PCR. Congenital defects observed included a cowlick, unilateral cryptorchidism, and a cleft in the spleen.

*Uncollared Florida Panther 51.*—This uncollared 2-year-old male was found dead 10 March 2003 on Interstate 4 approximately 0.25 mi east of Interstate 75. Necropsy was performed at Disney's Animal Kingdom, and vehicular collision was confirmed as the cause of death. Congenital defects observed included a cowlick and a double cleft in the spleen.

*Uncollared Florida Panther 52.*—UCFP52 was a 1.5-year-old uncollared male that was found dead 22 March 2003 on CR833 approximately 2 mi south of CR832 (Devil's Garden). Necropsy was performed at WRL, and vehicular collision was confirmed as the cause of death. No congenital defects were observed although severe autolysis and scavenging precluded complete examination.

*Uncollared Florida Panther 53.*—UCFP53 was a 3 to 4-year-old uncollared female that was found dead 26 May 2003 on SR29 approximately 1.4 mi north of CR858. Necropsy was performed at WRL, and death was due to vehicular collision. The only congenital defect observed was a kink in the

last vertebrae of the tail although severe autolysis and scavenging precluded complete examination.

UCFP53 was likely the mother of UCFP54.

*Uncollared Florida Panther 54.*—UCFP54 was an 8 to 10-month-old uncollared male that was found dead 1.5 mi north of CR858 on SR29 on 3 June 2003. Necropsy was performed at WRL, and death was due to vehicular collision. Congenital defects observed included an ASD, unilateral cryptorchidism, a kink in the last vertebrae of the tail, cowlick, and a cleft in the spleen. UCFP54 may have been the offspring UCFP53.

*Uncollared Florida Panther 55.*—UCFP55 was a 1.5-year-old uncollared male that was found dead 13 June 2003 in the BC-SIR Safari Game Pen. Necropsy was performed at WRL, and cause of death was not determined. There was no kink in the last vertebrae of the tail, and presence of other congenital defects could not be determined due to carcass condition. UCFP55 is suspected to be the offspring of UCFP57 and sibling of UCFP56. The deaths of these three and those of FP73, 77, and 118 may be related.

*Uncollared Florida Panther 56.*—UCFP56 was a 1.5-year-old uncollared male that was found dead 14 June 2003 in the BC-SIR Safari Game Pen. Necropsy was performed at WRL, and cause of death was not determined. There was a kink in the last vertebrae of the tail, and presence of other congenital defects could not be determined due to carcass condition. UCFP56 is suspected to be the offspring of UCFP57 and sibling of UCFP55. The deaths of these three and those of FP73, 77, and 118 may be related.

*Uncollared Florida Panther 57.*—UCFP57 was a 5-year-old uncollared female found dead 16 June 2003 in the BC-SIR Safari Game Pen. Necropsy was performed at Disney's Animal Kingdom. Severe autolysis and scavenging precluded complete necropsy and cause of death was not determined. Gas chromatography (liver), anticoagulant screen (liver), heavy metals (kidney), and chlorinated pesticide screen (fat) were negative. Fluorescent antibody for PLV was negative and unsatisfactory for rabies (due to tissue condition). Viral isolation and PCR for PRV, WNV, CDV, and EEE were also negative. UCFP57 is the suspected mother of UCFP55 and UCFP56. The narrow timing of their deaths, their close

proximity, and the apparent relatedness of these individuals suggest a point source for cause of death for UCFP55, 56, 57. These deaths may also be related to those of FP73, 77, and 118.

*Uncollared Florida Panther 58.*—UCFP58 was a 10-month-old female that died 30 June 2003 approximately 3-4 mi east of Everglades Blvd on CR846. Necropsy was performed at WRL, and death was due to vehicular collision. Congenital defects observed were limited to a cleft in the spleen.



**Appendix IX. Summary of Florida panther and Texas cougar mortalities and injuries in southern Florida from 2 February 1972 to 30 June 2003.**

Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
<b>Vehicular Mortalities</b>				
UFP28	13 Feb 1972	M	2-3	SR 25 S of Moore Haven
UFP04	23 Dec 1979	F	1.5-2.5	SR 29 just No. of Alligator Alley
UFP05	07 Feb 1980	M	1.5-2.5	SR 29 near Sunniland
UFP06	19 Apr 1981	F	2-3	SR 29 near Copeland
UFP09	18 Mar 1983	M	2-3	US 27 - Palmdale
FP01	14 Dec 1983	M	12-14	Alligator Alley mm 18
UFP12	12 Nov 1984	F	8-10	Alligator Alley mm 16
UFP13	08 Jan 1985	F	18-24 mos.	Alligator Alley mm 16
FP04	18 Apr 1985	M	12+	Alligator Alley mm 17
FP07	26 Oct 1985	M	10	SR 29, 4 mi. So. of Alligator Alley
UFP15	15 Nov 1986	F	4-5	Alligator Alley mm 16.5
FP13	14 Dec 1987	M	6-8	SR 29 - Sunniland
UFP18	25 Jan 1989	M	3	CR 850 near Immokalee
UFP19	18 Jun 1990	M	10 mos.	CR 846, 1 mi. E. of 833 - Hendry Co.
FP37	26 Nov 1990	M	4-5	SR 29, 1/2 mi. No. of I-75 - Collier Co.
UFP20	04 Feb 1991	F	9 mos.	SR 29, 6 mi. No. of I-75 - Collier Co.
UFP21	09 Nov 1992	F	7 mos.	SR 29 - Sunniland
UFP22	09 Aug 1993	M	2-3	Daniels Rd. 1 mi. E. of I-75
FP50	06 Dec 1993	M	2.5	CR 846 - 5 mi. E. of Immokalee
UFP23	28 Feb 1994	M	8 mos.	3 mi. No. along County Line Rd
FP31	03 Mar 1994	F	12-14	SR 29 - Sunniland

Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
<b>Vehicular Mortalities (continued)</b>				
FP52	14 Jan 1995	F	3.3	CR 846 4 m E Immokalee, (Dupree Road)
TX102	21 Sep 1995	F	4	CR 833 just N CR 835(846) Hendry Co.
UFP29	24 Apr 1996	M	3-5	CR 832 5.5 mi. E of SR 29 - Keri
UFP30	02 May 1996	F	1	US 41 @ Turner River
UFP31	13-16 Jul 1997	?	?	CR 846 1.5 m W CR 858
UFP25	13 Jun 1998	F	2	CR 846 3 miles E CR 858
FP51	17 Jul 1998	M	9	SR 29 at Bear Island Grade
UFP26	17 Sep 1998	M	3-5	US 41, 2 mi E of Oasis Ranger Station
UFP27	08 Jul 1999	F	2	Unimproved farm road, Hendry County
FP74 <sub>B-FL</sub>	08 Sep 1999	M	2-2.5	US 27 8 mi N of Palmdale
UFP33	29 Oct 1999	M	10 mos.	CR 833 2 mi N BCSIR
FP63	15 Jan 2000	M	4.5	SR 29 0.6 mi N. of Pistol Pond
FP80	10 Feb 2000	F	4	BCSIR road 200 ft W of Swamp Safari entrance
K76	28 Feb 2000	M	3 mos.	CR 858 on curve W of SR 29
UFP34	23 Mar 2000	M	1.5-2	CR 846 10 mi E of Immokalee
UFP35	23 Jun 2000	M	2	CR 846 2 mi E of Immokalee
UCFP36	13 July 2000	F	2	CR 846 10 mi. E of Immokalee
UCFP37	29 Dec 2000	F	5	CR 846 4.5 mi. E of Immokalee
UCFP38	14 April 2001	F	2	CR 833 1 mi. N of BCSIR
FP90 <sub>F2</sub>	26 April 2001	M	1 yr, 10 mo	US 27 Palm Beach Co.
UCFP39	7 May 2001	F	10 mo	SR 29 ½ mi. N of Jerome
UCFP40	7 May 2001	M	10 mo	SR 29 ½ mi. N of Jerome
UCFP41	22 May 2001	M	2	SR 29 Sunniland

Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
<b>Vehicular Mortalities (continued)</b>				
UCFP42	14 June 2001	F	3-4	CR 846, 4 mi E of County Line Rd.
UCFP43	17 Aug 2001	M	2-3	CR 846, 4 mi E of County Line Rd.
UCFP45	5 Apr 2002	M	3	US27 3.5 mi N of Palmdale
UCFP46	10 Apr 2002	M	6 mos.	SR 29 0.5 mi N of Deep Lake
UCFP48	10 Nov 2002	F	8 mos.	CR846 5 mi E of Immokalee
UCFP49 (K98)	25 Nov 2002	F	19 mos.	CR846 entrance to Immokalee Ranch
FP99	28 Nov 2002	M	2.5	CR846 Collier Fairgrounds
UCFP50 (K33)	26 Jan 2003	M	6.5	CR846, 3.4 mi E Everglades Blvd.
FP106	20 Feb 2003	F	3	SR29 at Sunniland mine entrance
UCFP51	10 Mar 2003	M	2	I-4, 1/4 mi E I-75, Tampa
UCFP52	20 Mar 2003	M	1.5	CR833 2 mi S CR832, Devil's Garden
UCFP53	25 May 2003	F?	2-3	SR29 1.4 mi. N CR858
UCFP54	3 June 2003	M	8-10 mos.	SR29 1.7 mi N CR858
UCFP58	30 June 2003	F	1	CR846, 3-4 mi E of Everglades Blvd.
<b>Vehicular Injuries</b>				
CP200	02 Nov 1984	M	2-3 (at time of injury)	US 41, 1/4 mi. E. of Turner River Rd.
-	12 May 1985	F	-	CR 951, 2 mi. No. of US 41
FP20	17 Jun 1987	M	-	CR 858, .8 mi. E. of SR 29
FP21	23 Jul 1988	F	2.5 (at time of injury)	1 mi E of US 1 on Palm Drive, Dade Co.
FP28	29 Nov 1988	M	-	Near Daniels Rd. at Ft. Myers Airport
-	07 Apr 1992	M	-	Alico Rd. - 1/3 mi. E. of I-75
FP64	14 Feb 1998	M	1.5 (at time of injury)	SR 29 @ FPNWR clearcut
<b>Shootings</b>				
UFP02	8 Mar 1978	M	2-3	L-28, Dade County

Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
UFP10	22 May 1983	F	adult	L-8 canal near Canal Point, Palm Bch Co.
UFP08	01 Dec 1983	M	3-6	Seminole Indian Reservation, Hendry Co. (James Billie)
UFP11	30 Oct 1984	F	2-3	Corbett WMA, Palm Bch. Co. (Elmer Brooker)
UFP14	23 Mar 1985	F	2-3	CSSP, Collier Co. (skeleton)
TX104	18 Apr 1998	F	6-7	S of Sabal Palm Road in citrus grove
<b>Shooting Injuries</b>				
FP09	??-??-86	F	not fatal	Golden Gate Estates, So. of SR 84, Collier Co.
<b>Intraspecific Aggressions</b>				
FP02	27 Oct 1984	M	14+	FSSP
FP10	27 Jan 1987	M	16-20 mos.	Mud Lake Strand - by adult male panther
FP25	26 Aug 1988	M	4-5	FPNWR - bacterial infection from panther fight
FP30	29 Jan 1990	M	22 mos.	FSSP, Killed by adult male FP37
FP41	26 Sep 1990	F	2	Hendry Co. W. of BCSIR - killed by male FP28
FP18	03 Oct 1990	F	9	Hendry Co. So. of CR 846 near Rock Lake - killed by male FP28
FP43	01 Nov 1991	M	2	BCSIR, Hendry Co. - killed by adult male FP26
FP28	25 Sep 1992	M	5.5	BCSIR, Hendry Co. - possibly killed by male FP26
FP47	19 Feb 1993	M	18 mos.	Killed by male FP51 in FSSP
FP53	26 Feb 1993	M	11 mos.	Private lands N of FPNWR-killed, eaten by uncollared male
FP44	06 July 1993	M	2.5	Raccoon Pt. BCNP-killed by FP42
FP26	08 Jul 1994	M	11-12	4 mi. E. Hendry Prison - killed by male FP46 – punctured skull
FP12	08 Nov 1994	M	13-14	Private lands, Hendry County - died of infected injury from fight w/FP46
FP58	30 Mar 1997	M	3	Sadie Cypress – septicemia from bite wounds from intraspecific aggression
FP40	02 Feb 1998	F	10	Bear Island - E Harrell Strand, died of infection from bite wounds to foreleg
FP45	02 Aug 1998	M	7.5	BCSIR, Hendry Co.

Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
FP72	23 Dec 1998	M	3-4	BCSIR, Hendry Co.- killed by uncollared male
FP46	03 Feb 1999	M	9-9.5	Private land S. CR 846, Hendry Co. - killed by uncollared male
FP64	26 Mar 1999	M	2.5	Audubon's Corkscrew Sanctuary – killed by uncollared male
FP76	13 Nov 1999	M	2.5-3	FSSP, 1.9 mi W of SR 29 off of Lancaster Grade – killed by FP54
FP89	10 Nov 2000	M	3.5	BCNP, 2 mi NW of Mud Lake – killed by FP79 <sub>F1</sub>
FP11	27 Feb 2001	F	19-20	200 yds. S of CR 846, 1 mi E of Dupree Rd.
FP97	2 Dec 2001	M	2	E of Gopher Ridge Grove N of Immokalee
FP49	03 Jan 2003	F	12	BCNP Addition Lands – Killed by uncollared male
FP96	15 Jan 2002	M	1.75	N end Big Corkscrew Island
FP111	5 Sep 2002	M	9-10	OK Slough N of CR832
FP112	11 Sep 2002	F	4	BCNP – Bear Island
FP78	16 Oct 2002	F	6	FPNWR – Fire Tower
FP67	15 Jan 2003	F	5.5	Hendry Co. – Gum Slough, killed by FP65
FP109	21-24 Feb 2003	M	10+	OK Slough N of CR832
FP82	09-10 May 2003	F	6	OK Slough
FP87	19 Jun 2003	F	4	BCNP – 7 mi NNE of Oasis
<b>Other or Unknown Causes</b>				
UFP03	01 Feb 1979	M?	unknown	Gannet Strand (Fl. Museum of Natural History)
FP06	16 Apr 1982	M	6-7	NE BCNP - unknown cause
FP03	17 Jan 1983	F	9+	FSSP - capture mortality
FP05	18 Nov 1983	F	8-9	Fakahatchee Conserv. Club – unknown cause
FP15	10 Jun 1988	F	7-8	ENP – unknown cause
FP08	20 Aug 1988	F	13-15	Gainesville - liver failure (old age)
FP24	22 Aug 1988	M	3-5	Glades Co. near Palmdale - unknown

Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
FP20	24 Aug 1988	M	4-5	Bear Island – congenital heart defect
FP27	23 Jul 1989	M	3-4	ENP - unknown cause
FP33	25 Nov 1989	M	3	2 mi. NW of Hendry Prison - rabies
FP35	24 Jan 1990	M	10 mos.	Gainesville, infection from capture-related abandonment
FP39	18 Jun 1990	M	3-4	ENP - pyrothorax
FP17	23 Jul 1990	M	9	Addition lands near Tangerine Camp - unknown
FP14	20 Jun 1991	F	10-11	ENP - unknown cause
FP22	20 July 1991	F	5	ENP - infection
FP29	27 May 1992	M	4	Hendry Co., Gum Swamp - pseudorabies
FP34	15 Nov 1993	M	5	SE Hendry Co. L28-I canal-bacterial infection from lacerated esophagus
FP38	04 Aug 1994	F	9	Conservation Area 3A; pleuritis from chest puncture
FP42	22 Jun 1995	M	6	Turner River Unit – unknown
UFP24	18 Mar 1996	F	1.5-2 weeks	FPNWR, unknown (dehydrated)
FP19	02 Dec 1997	F	11.5	FPNWR (Merry Xmas) - ruptured aorta
FP21	26 Dec 1997	F	11-12	White Oak – euthanasia
FP36	10 Oct 1998	F	14+	NBCNP E. of L28 interceptor canal – unknown, likely natural causes
TX103	19 Aug 1999	F	-	SBCNP, southern Lostman's Pines 1 mi N of ENP boundary—Metabolic complications associated with pregnancy
FP16	3 Jan 2000	M	14	NE boundary of ENP—unknown
FP68	01 Mar 2000	M	5-7	NBCNP W of Tangerine tram-- unknown
TX101	29 Mar 2000	F	-	BCSIR ¼ mi W of game pen, ¾ mi S of canal-unknown
FP84 <sub>B-FL</sub>	20 Apr 2000	M	14 mos.	Fisheating Creek WMA, N side of creek, 5 mi W of US 27-unknown
FP23	1 Dec 2000	F	14	BCNP 2 mi E of Turkey Foot – unknown
TX107	18 Jan 2001	F	8-9	BCNP 11 Mile Rd.-unknown

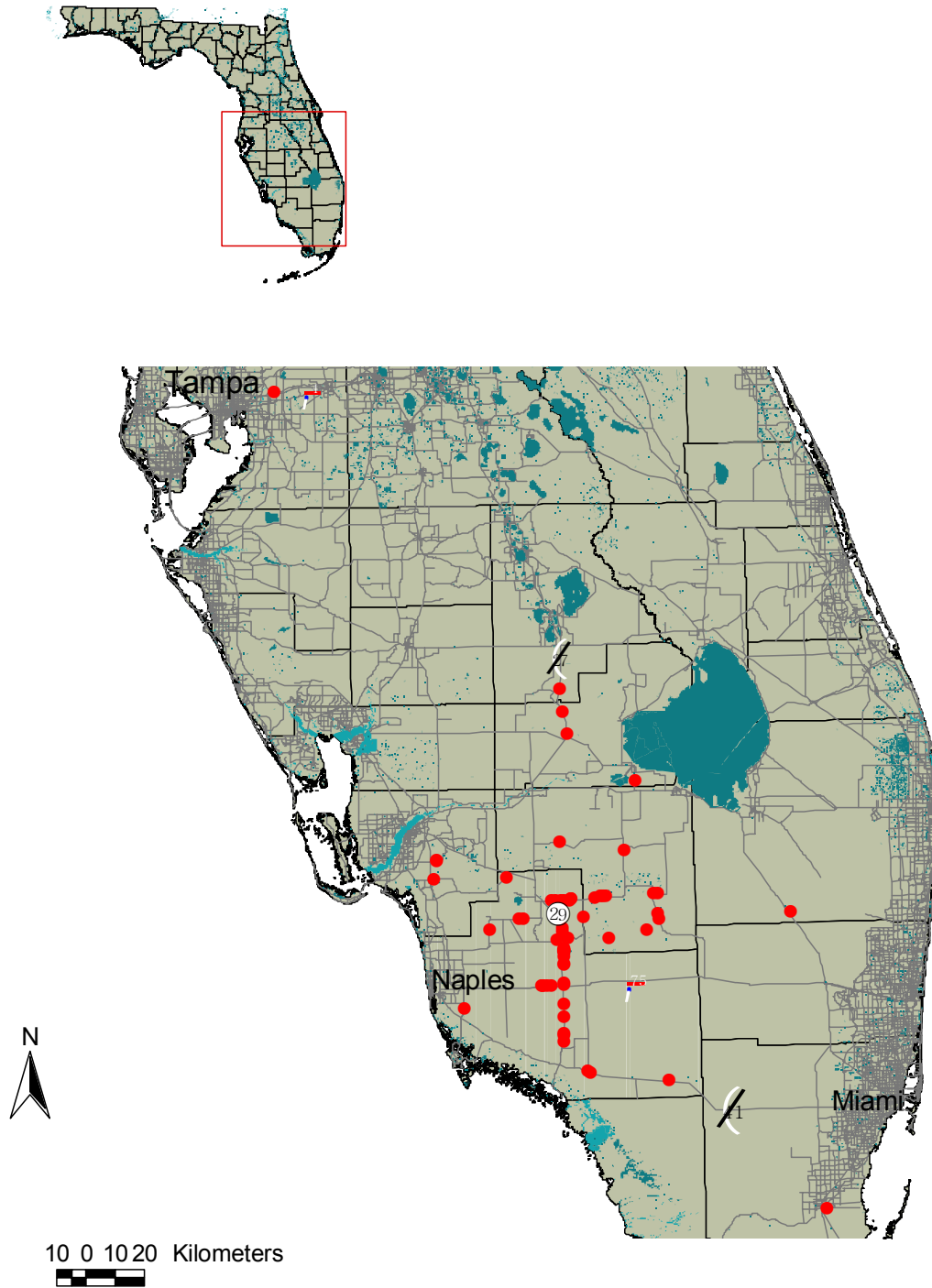
Cat ID <sup>a</sup>	Date	Sex	Age at Death	Location
FP92	Sep 2001	M	2.2	N Flint Pen Strand, CREW, unknown
FP32	11-12 Sep 2002	F	15	FPNWR – Rock Island, old age-malnutrition
FP108	16 Nov 2002	M	22 mos.	BCNP Raccoon Pt. – traumatic neck injury
FP118	4 Apr 2003	F	1	BCSIR – Game Pen, unknown
FP115	17 May 2003	F	4-5	OK Slough SF – Sick Island, feline leukemia?
UCFP55	11 May 2003	M	1-1.5	BCSIR Safari Pen – Unknown
UCFP56	11-12 May 2003	M	1-1.5	BCSIR Safari Pen – Unknown
UCFP57	14-15 May 2003	F	4-6	BCSIR Safari Pen – Unknown
FP73 <sub>F1</sub>	27-28 June 2003	F	7 yr 10 mo	BCSIR – Game Pen, Unknown

<sup>a</sup> FP denotes panthers captured for radiocollaring; K denotes kittens handled at panther or Texas cougar dens; TX denotes Texas cougars used for Panther Genetic Restoration; F1 subscript denotes Florida panther x Texas cougar offspring; F2 subscript denotes offspring of F1 x F1 mating; B-FL subscript denotes offspring of F1 x Florida panther mating; B-TX subscript denotes offspring of F1 x Texas cougar mating.

<sup>b</sup>ENP = Everglades National Park; BCSIR = Big Cypress Seminole Indian Reservation; PSSF = Picayune Strand State Forest; FPNWR = Florida Panther National Wildlife Refuge; OSSF = Okaloacoochee Slough State Forest; NBCNP = Big Cypress National Preserve north of Interstate 75; FSSP = Fakahatchee Strand State Preserve; SBCNP = Big Cypress National Preserve south of Interstate 75.

## Appendix X

### Locations of Vehicular-Related Mortalities of Florida Panthers February 1972 – June 2003





## **Appendix XI.**

**Draft: August 19, 2003**

**NOT FOR CITATION WITHOUT PERMISSION**

### **UPDATE OF GENETIC ANALYSIS OF FLORIDA PANTHER RECOVERY EFFORTS**

Warren E. Johnson, Darrell Land, Janice Martenson, Melody Roelke-Parker,  
and Stephen J. O'Brien

The goals of the research described in this draft report have been to develop an array of molecular genetic markers to characterize the status of current and past populations, to monitor the effectiveness of conservation efforts, and ultimately to help predict the future viability of the population. We have completed genotyping at 25 microsatellite loci of over 200 animals from several groups of different genetic ancestry. These included individuals from the Everglades subpopulation, the canonical Florida panther group (collared and uncollared animals), Texas females, crosses with some Texas heritage, and captive animals of generally unknown origin held in various facilities throughout Florida, and pumas from Florida of unknown origin.

For a large percentage of the populations we have either determined that the individuals were not of Everglades or Florida origin or have assigned probable dams and sires. For animals that we were not able to assign parents, it was generally possible to determine their ancestry. We are continuing to compare the conclusions that were made based on the molecular genetic analysis and the ages of animals with results with field data to identify errors in the analyses and are adding other kinds of information that will complement and expand our results and help clarify what the next steps in the analysis should be. We have also completed, to a large extent, a pedigree of the Florida populations spanning the last 30 years.

The analysis of potential parents has been completed through animals born in 2000-2001 and pedigrees have been completed to the extent possible for all animals. We are now finishing a more rigorous analysis of the current situation and of possible future trends. Physical traits are being traced in the pedigree to explore the occurrence of inheritable traits. The impact of the molecular genetic effects of the introduction of Texas females is being assessed using several criteria, including a pedigree analysis based on founders (relative contributions of genome equivalents and retention of maternal and paternal lineages), analysis of unique molecular genetic markers, and analysis of adaptive and maladaptive morphological traits.

Some of our early impressions are that males can and do breed earlier than previously expected and that established, resident adult males are not always the sire of kittens. Inbreeding loops are prevalent in many portions of the Florida panther pedigree.

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