ANNUAL REPORT

Bureau of Wildlife Diversity Conservation

Project:	Florida Panther Research (93112503002)
Study:	**Florida Panther Genetic Restoration and Management**
Period Covered:	July 2001 – June 2002
Study Duration:	July 1995 – June 2002
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Abstract: Telemetry data were collected on 42 radiocollared Florida panthers (*Puma concolor coryi*) and 3 Texas cougars (*P. c. stanleyana*) in southern Florida during the reporting period. Five radiocollared panthers and 3 uncollared panthers died this past year. Male panthers FP96 and FP97 and female panther FP49 died of intraspecific aggression; male panther FP92 and female panther FP105 died of unknown causes. The three uncollared panthers were struck and killed by vehicles. Six new panthers were added to our radiocollared population this past capture season. Our current verifiable population count is 80 adult and subadult panthers and does not include kittens at dens. We documented 14 panther dens during the study period producing a total of 30 neonate kittens (13♀, 17♂). No Texas puma produced litters during the study period. 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 112 panthers since 1981and handled 136 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%.

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^2 (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. couguar* 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.

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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. Telazol® (tiletamine HCl and zolazepam HCl) at 4.5 mg/kg, or a combination of Telazol at 3.7 mg/kg and ketamine at 3.0 mg/kg, was used for immobilization. Propofol was administered intravenously (IV) either as a bolus or continuous drip to maintain anesthesia.

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. 2000). 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 warranted. 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, MD for genetic analyses (O'Brien et al. 1990). Serology for FCV, FVR, feline immunodeficiency virus/puma lentivirus (FIV/PLV), and feline leukemia virus (FeLV) was performed at the Cornell University Feline Health Center, Ithaca, NY. Serum, whole blood, skin biopsies, and hair samples were catalogued and stored frozen at the FWC Naples office.

Neonate kittens <6 weeks-of-age were handled according to Land et al. (1998) and had transponder identification chips implanted SQ between the shoulder blades. Pyrantel pamoate (10 mg/lb) was administered orally and blood was collected from the jugular vein for CBC and serum chemistry. Feces were 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 or were necropsied by the Panther section veterinarian at the Wildlife Research Laboratory (Gainesville). 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 males, 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

2001-2002 Capture Season Summary

Our capture efforts began 01 November 2001 and continued through 22 April 2002. We captured 14 panthers during the study period. We recollared 8 panthers, added 6 new panthers, and released 2 male panthers back into their home ranges following rehabilitation from injuries suffered last capture season. A complete listing of all radiocollared panthers can be found in Appendix 1. As of 30 June 2002, we have 36 panthers and 3 Texas cougars with working radiocollars and another 10 panthers have radiocollars that are no longer functioning. Seventeen of the radiocollared panthers are confirmed first- or second-generation progeny of Texas cougars.

The primary objective of our capture work this season was recollaring panthers scheduled for collar replacement. Nine panthers were scheduled for recollaring prior to the start of the 2001-2002 capture season for routine collar replacement. We recollared 7 of these cats; however, the transmitter on FP77 failed prematurely and FP97 died of intraspecific aggression prior to any capture attempts. Additionally, 1 unscheduled recollaring ($FP93_{B\text{-}TX}$) was performed due to suspicions of a malfunctioning transmitter. Two new panthers were captured while conducting recapture activities. FP107 was darted under the assumption she was FP99, who was being pursued for a scheduled recollaring and FP108, a dependent male offspring treed during the pursuit $FP87_{B\text{-}FL}$, was opportunistically radiocollared to

maintain contact with $FP87_{B\text{-}FL}$ in the event her transmitter failed. Two uncollared panthers, a second dependent offspring of $FP87_{B\text{-}FL}$ and an adult male paired with female FP112, were incidentally treed during our pursuit of the aforementioned objectives, but not captured.

The second and final objective of the 2001-2002 capture season was the deployment of 4 collars equipped with Global Positioning System (GPS) receivers. This objective was successfully completed with the captures of FP109, FP110 and FP111 on Okaloacoochee Slough State Forest, and FP112 in the Bear Island Unit of BCNP.

Status of Radiocollared Florida Panthers

FWC and NPS monitored 42 radiocollared panthers this reporting period, however, NPS-Big Cypress National Preserve telemetry data were not made available for this report. Locations of radio-instrumented Florida panthers showed spatial use patterns similar to previous years (Appendix II, Figures 1-12). Home range sizes (minimum convex polygon method) for established, non-dispersing adult panthers averaged 136.4 km^2 for females (n = 16) and 324.6 km^2 for males (n = 8) (Appendix II , Figures 1-6**).**

Status of Female Texas Cougars

The study period began with 3 Texas cougar females and all are still alive as of 30 June 2002. Locations of the 3 translocated Texas cougar during the reporting period (Appendix II, Figure 13) showed movements that were within Florida panther habitat; however, no displacement of Florida panthers has occurred and no disruptions to the existing social organization have been observed. No Texas cougars have exhibited aberrant behaviors or unacceptable human interactions, and none were removed from the study. 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 Verified Population and Distribution

(Note: this section is excerpted from R. McBride, *Current Verified Panther Population, Distribution and Highlights of Field Work: Fall 2001 -- Winter 2002*)

The current verified population (CVP) count represents the number of adult and subadult panthers we documented during the past year but does not include kittens at dens. The CVP is not an estimate, nor does it represent an extrapolation from the known population or a guess about the total population size. The 2002 verified count is simply the number of panthers whose existence has been confirmed by:

(1) treeing with hounds and radiocollared,

(2) treeing with hounds but not radiocollared,

(3) physical evidence (e.g. tracks in areas where collared panthers are absent),

(4) documentation by camera trap photos,

(5) sighting of an uncollared panther accompanying a radiocollared panther by a biologist conducting aerial relocations.

Geographic coordinates were recorded for most of the observations and photographs taken when possible. Some of these observations were part of systematic surveys and 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 many of these cats are not breeders. Some are past breeding age; some are too young to breed; some have reproductive deficiencies that preclude breeding or diminish breeding potential; some are geographically isolated from mates. Caution must therefore be exercised when comparing the verified population size to suggested minimum viable population sizes (MVPs). Most MVP estimates make assumptions that are inconsistent with the verified population size described above and with known conditions in the south Florida population. For example, MVPs generally assume that half the population is made up of regularly-breeding females, that no habitat loss will occur, that there is equal random access to mates, no genetic effects of inbreeding, and no man-made or geographic impediments to movement (e.g. highways, Shark River Slough).

Everglades National Park
Number of panthers: 7

Six radiocollared and 1 uncollared panthers:
$FP61_{F1}$
$FP85_{B\text{-}FL}$
$FP94_{F1}$
$FP95_{F1}$
TX105
TX108
Observations from monitoring plane on 2 separate occasions of an uncollared panther with $FP61_{F1}$ (Mario Alvarado, ENP); David Shindle, FWC, provided additional confirmation for the presence of an uncollared panther in ENP with a camera trap photograph, 28 October 2001.

Big Cypress National Preserve south of US 41
Number of panthers: 3

One collared and 2 uncollared panthers:
$FP88_{F2}$
tracks of 2 uncollared dispersal-aged juvenile females with FP88 (Roy McBride, FWC contract houndsman and Deborah Jansen, BCNP, 12 January 2002 and 19 March 2002)
Note: The uncollared male treed at Gum Slough in February 2001 has not been confirmed by recent track surveys and therefore was dropped from this year's count.

Big Cypress National Preserve north of US 41, south of I-75
Number of panthers: 19

Eleven radiocollared and 8 uncollared panthers:
FP55
$FP70_{F1}$* (* denotes radiocollar failure)
$FP79_{F1}$
$FP86_{F2}$
$FP87_{B\text{-}FL}$
$FP91_{F2}$
$FP93_{B\text{-}TX}$
FP102
FP103
FP104 (recently moved north of I-75, returned once, currently north of I-75 again)
$FP108_{X}$
treed 2 uncollared dispersal-aged kittens of $FP87_{B\text{-}FL}$ on 3 November 2001; left uncollared
treed and photographed 1 uncollared female; left uncollared on 21 January 2002
tracks of 2 uncollared females in the home range of $FP70_{F1}$*; only 1 added to the count
tracks and scrapes of 1 uncollared female north of Monument Lake on 11 March 2002
tracks of uncollared male in Baxter Island on 31 August 2002
tracks of uncollared female in Baxter Island on 31 August 2002

observation of an uncollared male during the recollaring of $FP93_{B\text{-}TX}$

Big Cypress National Preserve north of I-75 and Big Cypress Seminole Indian Reservation (BCSIR)
Number of panthers: 19

Eleven radiocollared and 8 uncollared panthers:
FP48* (Bear Island)
FP56* (treed and photographed, but not recollared, 20 October 2001, in the Addition Lands)
FP67 (private lands)
FP69* (treed and photographed, but not recollared, 8 November 2001, in the Addition Lands)
$FP73_{F1}$ (BCSIR, accompanied by 2 juveniles, 26 August 2002)
FP75 (private land)
FP77* tracks and scrapes found recently in her home range (nursery to Jeep Tram)
FP81 (BCSIR)
FP100 (Doctor's Hammock, Bear Island, Addition Lands)
FP101 (Addition Lands)
FP112 (Bear Island)
uncollared male treed at site of cannibalized carcass of FP49, 4 January 2002.
uncollared male treed in company with FP112 and making urine markers showing signs characteristic of a breeding male; left uncollared, 25 February 2002.
uncollared male treed and photographed 11 January 2002, at Bear Island Because this panther was bilaterally cryptorchid, it is unlikely he was the breeder listed above.
tracks of uncollared female and 2 kittens; Baker's Grade, Addition Lands, 11 September 2002

Fakahatchee Strand State Preserve (FSSP) and Picayune Strand State Forest (PSSP)
Number of panthers: 7

Four radiocollared and 3 uncollared panthers:
FP54*
FP57*
FP60
$FP83_{F1}$
sighting of uncollared female in FSSP by Mike Owen, 7 February 2002; photos taken by Dale Morton.
photo of female tracks in PSSP (taken by PSSP biologist Sonya Durrwachter)
tracks of small uncollared female on East Main tram (Mark Lotz, FWC), 12 September 2001.
tracks of uncollared female on Pennington Post Rd. (Mark Lotz, FWC)
Note: One of the last two could be FP57 whose collar has failed, so only 1 was added to the count.

Florida Panther National Wildlife Refuge and Catherine Island
Number of panthers: 8

Seven radiocollared and 1 uncollared panthers:
FP32
FP59
$FP66_{F1}$* (north of Refuge)
FP78
FP106

TX106
FP107
tracks of juvenile with FP78

Note: Ranges of some resident males overlap Fakahatchee Strand, Panther Refuge and Bear Island. These males were assigned to a single area to avoid counting them twice.

OK Slough and adjacent private lands
Number of panthers: 10

Five radiocollared and 5 uncollared panthers:
$FP65_{F1}$
FP82
FP109*
$FP110_{B\text{-}FL}$
FP111
tracks of uncollared female northwest of CR 832 (OK Slough)
tracks of uncollared young male (OK Slough)
tracks of uncollared female south of CR 832 (OK Slough)
tracks of uncollared male and uncollared female seen at the site of the carcass of FP97 (David Shindle and Mark Lotz, FWC).

Outliers
Number of panthers: 7

One radiocollared and 6 uncollared panthers:
FP99 (CREW, Ft. Myers Airport, and FGCU)
tracks of uncollared panther (Sarasota County)
tracks of uncollared male (CREW Lands and Corkscrew area)
photo of an uncollared female (taken by trail camera by Audubon Society biologist Jason Lauritsen)
tracks of an uncollared female and juvenile on Corkscrew Island (Mark Lotz, FWC)
tracks of uncollared male tracks found by Steve Shattler (FWC) and confirmed by McBride on 4 September 2002
Note: FP62* (male whose collar has failed 2 years ago; status currently unknown; dropped from this year's count)

Total: 80 panthers
46 radiocollared and 34 uncollared panthers

Biomedical Summaries of Florida Panthers and Texas Cougars Handled in 2001-2002

Capture summary.—We captured 14 adult or juvenile panthers on 15 occasions and 30 neonatal kittens during this study period. One additional panther (UCFP43) was captured, but not radio-

instrumented, after being injured by vehicular collision (see below). Capture date, capture location, age, weight, physical condition, presence of kinked tail, cowlick, retained testicles, vaginal papillomas; and significant medical findings and procedures were recorded for each animal and are summarized in Table 1.

UCFP43.— UCFP43 was an approximately 2-year-old male Florida panther that was hit by a car on CR846 sometime prior to 0030 h 17 August 2001. The panther was immobilized by FWC biologists at 0445 h. Prior to immobilization, they observed that the panther could lift its head and forelimbs but otherwise could not move. The panther also appeared to have sensation in its tail (responded to stimulation) and was coherent—aware of the researchers and able to maintain eye contact. The panther was transported to Naples for preliminary radiographs and IV fluids administration. The panther was then taken to the Lowery Park Zoo where it was re-examined and antibiotic and steroid treatment begun (1030 h 17 August).

UCFP43 was driven to the Veterinary Medical Teaching Hospital (VMTH) in Gainesville where radiographs, a comprehensive examination, and blood work revealed several problems. Radiographs indicated a severe compression fracture of the last lumbar vertebrae (L7) which resulted in a shortening of the vertebrae to approximately 30% of its original length. L3 was also fractured though less severely and a fracture of the left shoulder blade (scapula) was also present. The latter injury was not serious and did not require surgical repair; however, it indicated a severe impact to the thorax possibly resulting in other unknown injuries. Neurological examination was difficult because, by necessity, the panther was sedated and thus unresponsive. Reflexes were present in the lower limbs however, and the history of deep pain/sensation in the tail was a good sign that at least some function remained. Finally, blood work indicated severe blood loss and dehydration.

The panther's chances for recovery and return to the wild were considered less than 50%, however, the presence of deep pain/sensation in the tail gave us reasonable hope for success and surgery was elected. Surgery was performed the evening of 17 August and an external ring fixater was placed over the dorsal aspect of the lumbar and pelvic region. The surgery was considered a success and post-

operative radiographs indicated a return to normal length for L7. Over the next 10 days UCFP43's condition improved slightly but he never regained control of urination, defecation, or use of his hindlimbs. The external fixater was tolerated and no pressure sores developed; however, at 10 days he was still not eating or drinking. Failure to urinate required daily immobilization to express the bladder and provide IV fluids.

As of 28 August UCFP43 had superficial sensation (i.e., he could feel touch, pain, etc. in the skin), deep pain (could feel pain caused by intense pressure such as clamping down on a toe with hemostats), and reflexes in the hindlimbs. Deficits included paralysis of the hindlimbs and tail, lack of anal sphincter tone, and urinary incontinence with a distended bladder. These deficits suggested that UCFP43 had persistent injuries in two locations along the length of the spine – L3 and L7. Because of the presence of two injuries, limited improvement, difficult and intensive medical care, and grave prognosis, euthanasia was performed 29 August 2001 at 1430 h. Electroejaculation prior to euthanasia yielded no viable sperm—which was probably due to the young age of the panther.

Necropsy was performed by Dr. Scott Terrell and the FWCC veterinarian. At necropsy a sponge was found obstructing the pyloric sphincter (connection from the stomach to small intestine). The sponge originated from the bandage around the external fixater and was likely ingested within 2 days of the surgery. Although this obstruction had no effect on the spinal injuries it would have necessitated surgical removal had the panther survived. The obstruction likely contributed to the panther's anorexia.

Field Treatment of Florida panthers.—During routine capture for replacement of a radio-collar, a chronic injury and infection was noticed in the left rear 2nd digit of FP60. The nail was growing into soft tissue resulting in a persistent draining tract. Severe arthritis, secondary to the original injury, was also present. The panther had also lost approximately 15 lbs since his last capture 2 years previous – the cause of which was unknown. Because the injury did not appear to be resolving on its own, the digit was surgically amputated at the metatarsal-phalangeal joint. The vessels were ligated and the incision closed with 2-0 PDS (absorbable) suture. Penicillin G procaine/benzathine was administered IM at a dose of 80,000 IU/kg.

Capture related injuries.—One of 15 (6.7%) captures of adult or juvenile panthers resulted in moderate injury (see Table 2 for injuries by year since 1990). 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°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 [≥108°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).

The only capture-related injury this season was a dog bite inflicted on FP111; this injury was treated in the field. FP111 jumped from the capture tree after being darted and was bayed on the ground by hounds. This panther suffered a laceration and hematoma to the to the left lateral thigh. The wound was flushed and a 2 cm incision was made in the skin overlying the hematomas to allow drainage. Penicillin G procaine/benzathine was administered IM at a dose of 40,000 IU/kg. Because of similar injuries and the apparent increased propensity for intergrades to jump after being darted, most dogs are chained up before the panther is darted leaving only those dogs that are not likely to bite free to pursue the panther if it jumps. This may have contributed to fewer and less severe dog-bite injuries this capture season.

Convalescence and release of FP65 and FP104.--FP65 and FP104 suffered fractures during routine capture (’00-01 capture season) and, following surgery, convalesced at White Oak Plantation until their release this capture season. FP65 underwent 3 surgeries to repair an open comminuted fracture of the right tibia and approximately 68 immobilizations for wound management and/or radiographs during the ’00-01 fiscal year. During the final surgery on 23 March 2001, an external fixater and interlocking nail were installed. The external fixater was left in place until 13 September; the interlocking nail was not removed. FP65 was housed in a hospital ward from 24 November 2000 until 7 May 2001 when he was moved to a ½-acre outdoor enclosure. On 04 December he was moved to a 7-acre wooded enclosure

where he remained until release 24 January 2002. Since release in Okaloacoochee Slough he has reoccupied his former home range making movements comparable to those before injury.

FP104 was a 6-month-old dependent male kitten who suffered a simple closed fracture of the right radius and ulna during routine capture. The fracture was surgically repaired 03 April at the VMTH. Following surgery he was hospitalized at the Lowry Park Zoo until radiographs indicated fracture repair at 2 months. Although the fracture had healed, continued captivity was necessary because of the panther's immaturity. FP104 was moved to a 7-acre outdoor wooded enclosure at White Oak Plantation on 04 June 2001 where he was fed live small (chickens, rabbits, raccoons) and large (deer) prey. Human contact with FP104 was minimized and aversive training was practiced (hazing by yelling, beating the brush in an attempt to instill fear of humans). FP104 was released 28 November 2001 in his natal home range in the BCNP. Movement patterns since release have been consistent with that of a dispersing male.

Physical examination.--All panthers captured were in good to excellent body condition with the exception of FP60 and FP103 (fair to poor condition). At capture, FP96 and FP109 had puncture wounds and lacerations consistent with intraspecific aggression.

Four of 30 (13.3%) neonatal kittens had a crusting, scabbing dermatitis on the crown. The etiology is unknown. Culture for dermatophytes (ringworm) and skin scrapings for mites have been negative. Histological examination has revealed a non-specific chronic dermatitis.

Clinical pathology.--Hematology and serum chemistry results for adult and juvenile Florida panthers and the Texas cougar were similar to Florida panther reference intervals reported by Dunbar et al. (1997) (Tables 3, 4). Kitten hematological and serum chemistry values are presented in Tables 5 and 6. Florida panther 103 had a normocytic, normochromic anemia which was likely related to her relatively poor body condition. The anemia and body condition may have been the result of an unknown chronic disease. Serum biochemical values outside reference ranges (Duncan et al., 1994; Dunbar et al., 1997) in FP99 were likely capture-related resulting from dehydration (elevated serum electrolytes, total protein, and osmolality) and muscle damage (likely due to exertion during capture – elevated creatine kinase

concentrations). Elevated blood urea nitrogen in FP60, FP93, and FP108 was likely due to recent ingestion of protein.

Infectious disease serology.--All Florida panthers sampled FY 01-02 were negative for exposure to FECV/FIP and FeLV based on ELISA tests. Results of serological testing for exposure to FPV, FCV, FVR, and FIV are summarized in Table 7. Florida panther 96 was FIV-positive by ELISA and Western blots and FP60, FP78, and FP107 were equivocal by ELISA but positive by Western Blot (a more specific test). Florida panther 108 was negative by ELISA but positive by Western Blot – the significance of which is unknown. Positive FIV tests appeared to be concentrated west of SR29 (FPNWR and northern FSSP). Three of 6 (50%) panthers not previously vaccinated had positive antibody titers to feline panleukopenia virus (FP109, FP111, FP112) and feline calicivirus (FP107, FP109, FP110).

Serum progesterone.--Serum progesterone concentrations were determined for 5 female Florida panthers this capture season (Table 3). Three panthers had values <10 ng/ml and did not have kittens within 90 days (gestation period). Two panthers (FP67 and FP93) had mean serum progesterone concentrations of 14.6 and 19.0 ng/ml respectively when captured approximately 38 and 47 days before giving birth. Serum progesterone concentrations appear to be a reliable indicator of pregnancy in Florida panthers.

Semen analysis.—Two Florida panthers were electroejaculated while in temporary captivity this fiscal year. $FP65_{F1}$ was electroejaculated after 1.25 yrs in captivity and UCFP43 was electroejaculated after 3 weeks in captivity (following vehicular collision). No sperm was recovered from UCFP43 – most likely due to his immaturity. FP97 was killed by vehicular collision and semen was collected from the reproductive tract and analyzed post-mortem; results are pending. Semen characteristics of FP65 and pure Florida panthers (Barone et al., 1994) are presented in Tables 8 and 9.

Parasitology.—Two of 10 kitten fecal samples from separate litters were negative for coccidia. Two adult heartworms (*Dirofilaria immitis*) were found in the right ventricle of UCFP45 at necropsy. Heartworms are less common in domestic cats than in dogs but cause more severe clinical signs – frequently resulting in death (Calvert et al., 2000). UCFP45 was killed by vehicular collision and there

did not appear to be any pathological changes associated with the dirofilariasis. This is the first report of heartworms in a Florida panther.

Mercury.—Hair and whole blood mercury concentrations for the 1999-2000, 2000-2001, and 2001-2002 capture seasons will be included in the Final Report.

Florida Panther and Texas Cougar Reproduction in 2001-2002

Fourteen female panther dens were documented during the study period producing 30 neonate kittens (17♂, 13♀). No Texas cougars denned the past year; these cats have been in Florida for 7 years and were 2-4 years-of-age when released. All of these kittens were handled successfully at their dens, permanently marked with subcutaneous transponder chips, and skin biopsies taken.

A description of Florida panther litters handled during the reporting period can be found in Table 10 and lists of all known panther and Texas cougar dens, and kittens handled can be found in Appendices IV and V. Female Florida panthers and Texas cougars have produced litters throughout the year; however, there is a decided peak of denning from March – July (Fig. 1). Florida panthers had larger mean litter sizes than Texas cougars and were skewed toward males versus the female-skewed Texas cougar litters (Tables 11, 12, and 13). 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. From 1990-2002, the number of births in the radiocollared population has exceeded the number of deaths by threefold (Fig. 3).

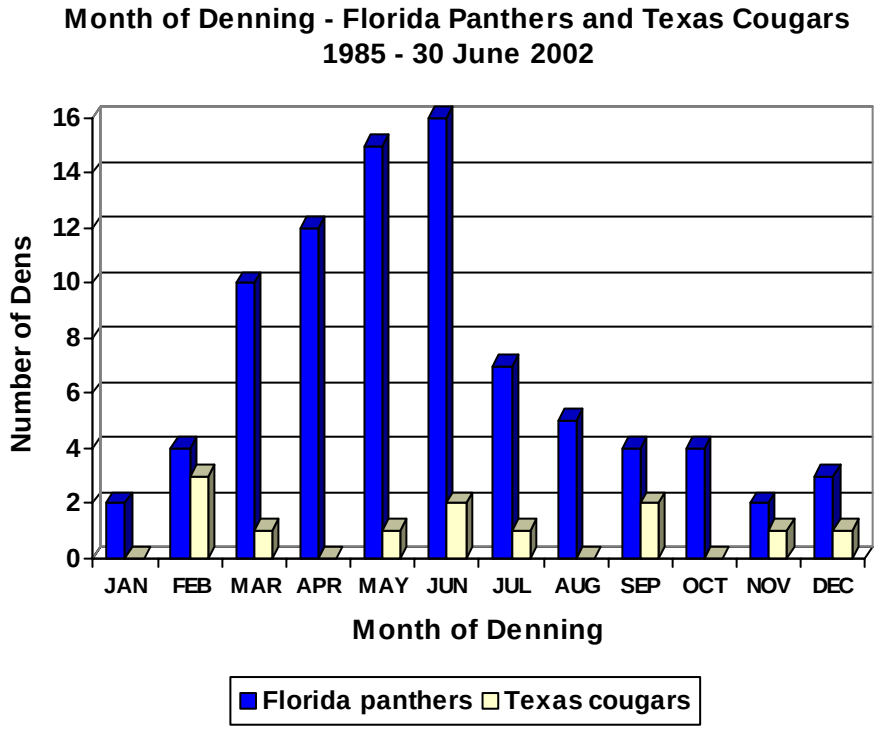

Figure 1

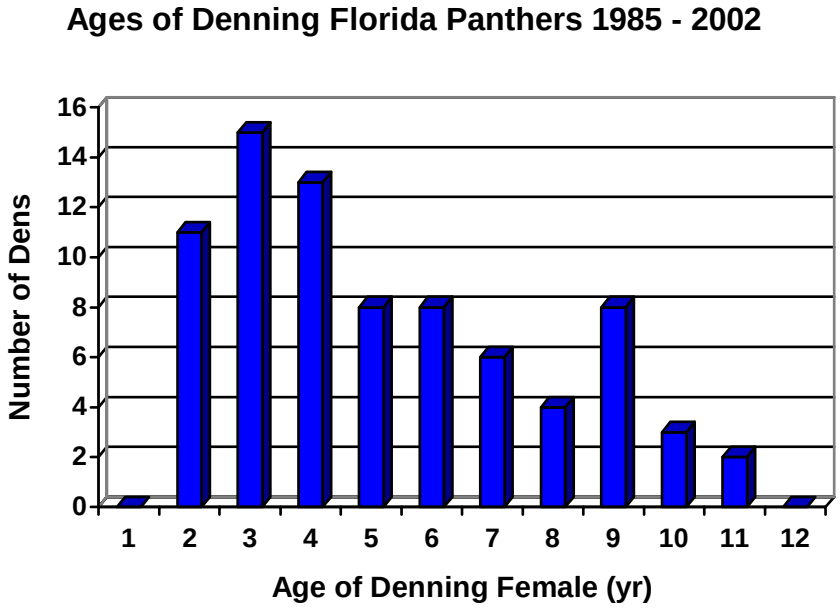

Figure 2

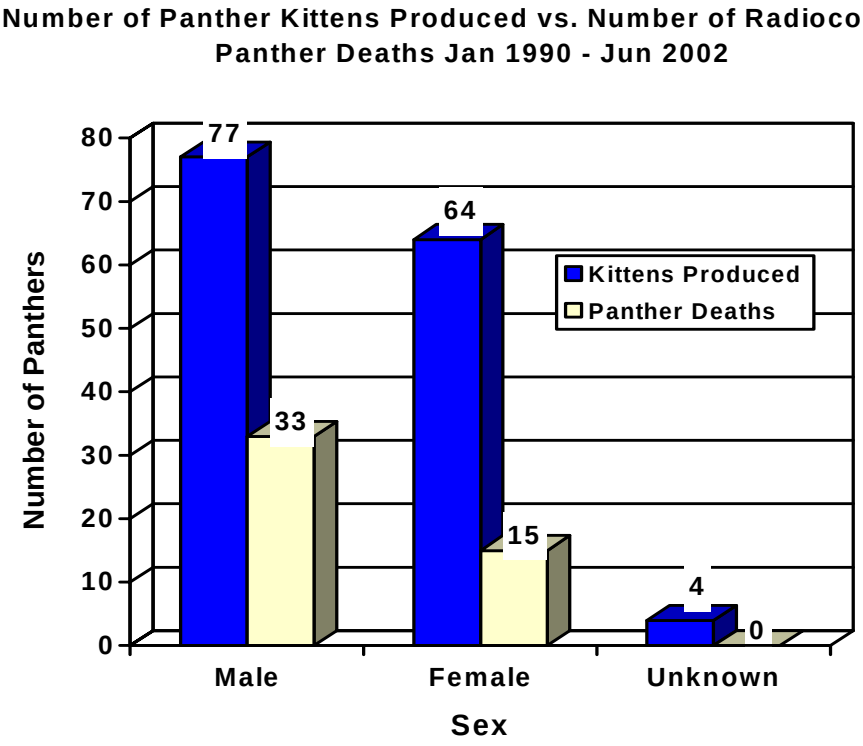

Figure 3

Florida Panther and Texas Cougar Descendant Kitten Survival

We have visited 60 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 27 of these litters (Table 14). 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; pers. comm. S. Linda). 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 40 radiocollared dependent-aged kittens, including 15 Texas cougar descendants (Table 15). Only 1 of these 40 kittens died before reaching independence for a 97.5% survival rate.

Florida Panther and Texas Cougar Mortality

Eight Florida panthers (5 radiocollared, 3 uncollared) died between 1 July 2001 and 30 June 2002. Male panthers FP96 and FP97 and female panther FP49 died of intraspecific aggression; male and female panthers FP92 and FP105, respectively, died of unknown causes. Three uncollared panthers were struck by vehicles and killed, however, no panther has been killed by vehicles in areas protected with wildlife underpasses and fencing. A brief description of these mortalities can be found in Appendix VI. All documented Florida panther and Texas cougar mortalities occurring in South Florida since 1972 are listed chronologically by cause of death in Appendix VII.

Sixty-five radiocollared panthers have died since 1981 and intraspecific aggression has accounted for 38% of these mortalities (Fig. 4).

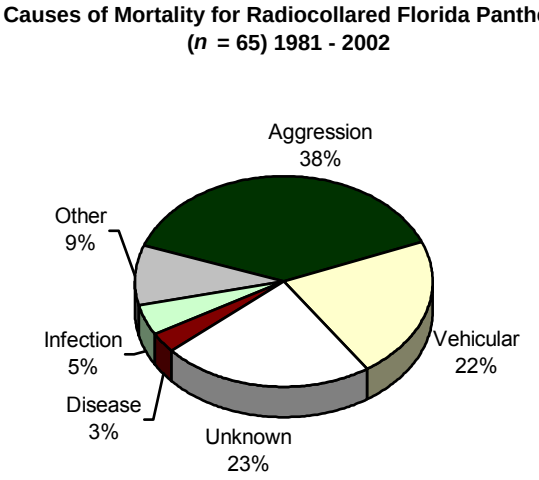

Figure 4

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 only found if they are caused by humans (e.g., vehicular trauma and the rare instances of illegal shootings). This bias is evident when 38 uncollared panther deaths (33 vehicular traumas and 5 illegal shootings) 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 VIII.

We estimated survivorship curves (the probability of surviving from 1 time interval to the next) based on ages-at-death for 20 female and 39 male panthers (Fig. 5). 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. These survivorship patterns were consistent with panther ecology where males compete for large home ranges

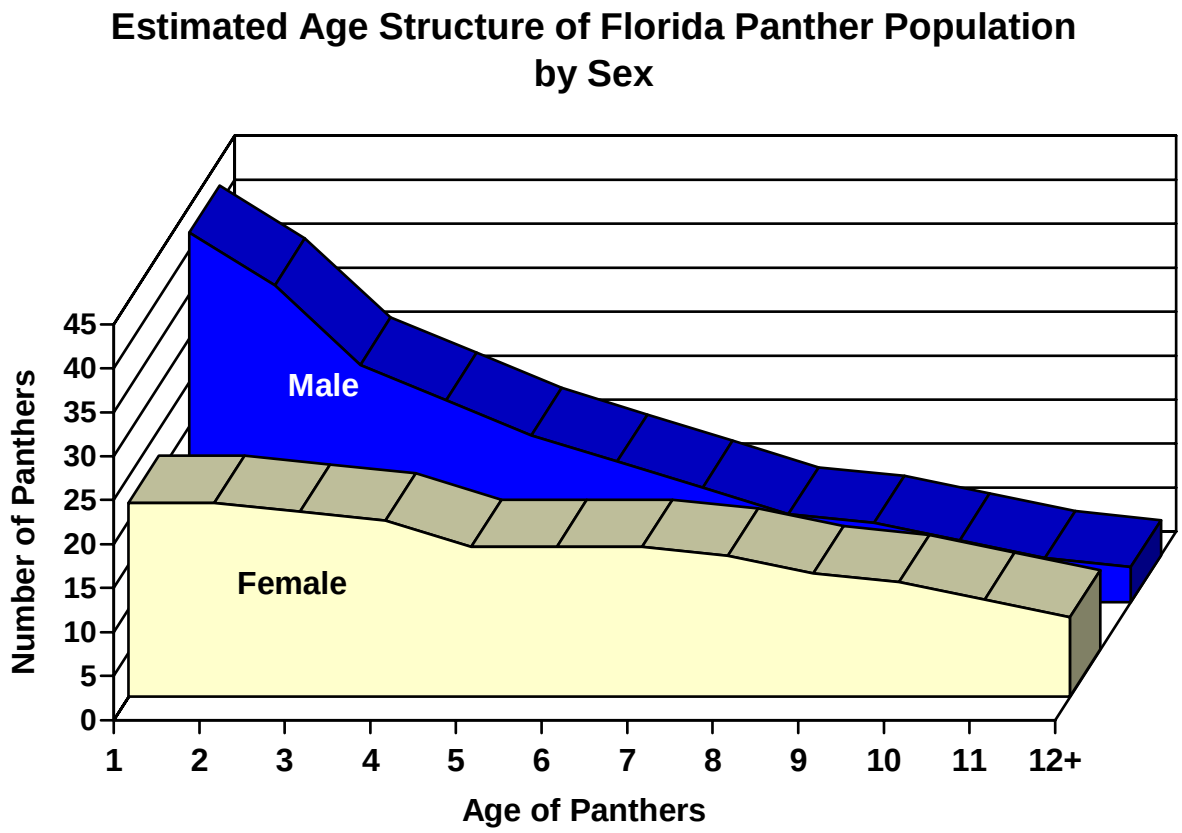

Figure 5

that overlap with females and where females are more tolerant of overlap with other females (Maehr et al. 1991).

Panther Dispersal Patterns

Four male and 2 female radiocollared panthers dispersed from their natal range and/or became independent during the 2001-2002 study period. Male panther FP96, born in April 2000 and radiocollared on 07 January 2001, became independent from FP78 after 8 August 2001. For the next 3 months, FP96 remained along the Ridge Road portion of FPNWR and interestingly, was often in the company of FP99, a similar-aged but unrelated young male (Appendix II, Fig. 7). FP96 began dispersing west and spent November and December 2001 on the western half of FPNWR. By the end of December 2001, FP96 began traveling north, crossing CR 846 south of Lake Trafford. FP96 was killed by an uncollared adult male on 17 January 2002, southwest of Lake Trafford.

Male panthers FP97 and FP99 and female FP106 are offspring of FP105 and were born sometime in early 2000. FP105 was not collared when she gave birth to these kittens. We captured FP97 on 19 January 2001 and one week later, captured FP99 (26 January 2001); FP105 and FP106 were captured 12 April 2001. FP106 separated from the family group after 27 April 2001, but the 2 male kittens remained with FP105 through June 2001. FP106 did not disperse away from her natal range and has remained in this area after the death of FP105 in January 2002 (Appendix II, Fig. 8).

FP97 was last observed with mom FP105 on 29 June 2001 and for the first 4 months of his independence, he remained in the vicinity of FP105's home range (Appendix II, Fig.9). These movements were west of SR29 and between FPNWR to the south and private lands to the north. In early November 2001, FP97 crossed SR29 to the east at Owl Hammock and continued moving slowly to the north. After crossing CR846 in late November, FP97 was killed by an adult uncollared male panther on 3 December 2001. Field sign suggests that the uncollared male was with an uncollared female panther.

FP99 separated from FP105 and FP97 on 29 June 2001. For the first 4 months of independence, he too remained in the vicinity of his natal range (FPNWR and private lands to the north)(Appendix II. Fig. 10). In mid-November 2001, FP99 dispersed north to Lake Trafford and proceeded west into the

Corkscrew Regional Ecosystem Watershed (CREW). FP99 remains centered in the CREW area, utilizing Southwest Regional airport property, Florida Gulf Coast University property, Audubon's Corkscrew Swamp Sanctuary, and other private properties surrounding the CREW as well. Interestingly, FP99 crossed I-75 to the west in Lee County in mid-December 2001 and wandered into an area between Colonial and Martin Luther King Boulevards in Ft. Myers. Within 2 days, FP99 reversed course, crossing I-75 back to the east and has made no further attempts at crossing the interstate since.

Female panther FP103 and male panther FP108 also became independent during the study period but data on their independence dates and movements were not provided by BCNP staff.

Status of Genetic Restoration

Since the introduction of 8 female Texas cougars in 1995, a minimum of 59 intercross animals have been produced; 15 are radiocollared and confirmed alive today. Three other intercrosses were captured and radiocollared, however, their transmitters have since failed; we consider these animals to be alive. Five intercrosses are known to have died: $FP74_{B\text{-}FL}$, $FP90_{F2}$, and K76 (♂ kitten of $FP66_{F1}$) died from vehicular trauma, and $FP84_{B\text{-}FL}$ and $FP92_{F2}$ died of unknown causes. Ten other intercross kittens are presumed dead based either on visual observations, tracking evidence, or their dam's behavior. Twenty-six intercrosses were last seen as kittens in dens and they may still survive in the southern Florida population (Appendix III). Therefore, we assume that up to 44 intercross *Puma* exist presently within a total estimated population of about 70-100 *Puma concolor* in southern Florida.

We have handled and marked with transponders all 17 F1 progeny and have radiocollared 10 of the 14 extant F1's. However, the transmitters on 3 ($FP66_{F1}$, $FP70_{F1}$, $FP71_{F1}$) of these cats have failed prematurely. We have also handled and marked with transponders all known F2 and backcross progeny. We have obtained genetic samples from 48 of 59 Texas cougar descendants (81%) and of the remaining 11 descendants, 6 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

X). Comparisons between field observations and genetic analyses continue and initial results indicate an increase in observed panther population genetic heterozygocity 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 matrilines are being lost as well.

Apparently, genetic introgression is reducing the occurrence of kinked tails (Table 16). Since October 1995, 39 of 62 (63%) kittens produced by Florida panthers had kinked tails (Table 11). In contrast, none of the 19 progeny produced by Texas cougars had kinked tails (Table 12). Among non-F1 intercrosses 4 of 47 (8.5%) individuals had kinked tails (Table 13).

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 16). Ten F1 progeny and 1 B-TX progeny have been handled at > 6 months-of-age and only 2 ($FP73_{F1}$ and $FP79_{F1}$) had a cowlick. Additionally, none of the 5 F2 progeny handled at > 6 months-of-age had a cowlick. However, 4 of 5 B-FL progeny handled at > 6 months-of-age 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 descendents of the introduced “Piper Stock”.

No Texas puma descendants in the Florida panther population have exhibited cryptorchidism (Charlton 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, Charlton 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.

One unintended consequence of genetic restoration appears to be a change in behavior during captures among intercrossed panthers. Our capture method involves the use of trained hounds to force a panther up into a tree. Panthers with some Texas cougar ancestry jump from these trees more often than original stock Florida panthers (P=0.0037) (Appendix IX) and as a result, might be more prone to capture-related injuries. The two male panthers (FP65F1, FP104) that suffered broken legs during capture activities in 2000-01, both jumped from trees and were of Texas descent. FWC is adopting the following 4 recommendations to mitigate panther capture risks:

1) Panthers should only be captured to achieve specific goals including allowing radiocollars to expire once the goals are met or using break-devices if the need is short-term.
2) Panther kittens should not be captured until they are >1 year-of-age.
3) Female panthers should not be captured if their kittens are <1 year-of-age.
4) Radiocollars for females <2 years-of-age and males <3 years-of-age should be equipped with break-away devices.

A full assessment of the problem and the above recommendations is contained in Appendix IX.

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 seventh 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 (2002) 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 1990-2002, 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 1979-2002 was intraspecific aggression.

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

Table 1. Summary of Florida panther captures during the 2001-2002 Florida Fish and Wildlife Conservation Commission's capture season (November 2001 - April 2002).

Cat ID[a]	Sex	Capture Date	Capture Location[b]	Age	Weight (lb.)	Physical Condition[c]	Kinked Tail	Cowlick	Descended Testicles	Vaginal Papillomas	Capture Comments and Medical Notes
FP60	M	06 Mar 2002	FSSP	6 yr	118		Y	Y	2	N/A	
FP67	F	22 Apr 2002	PL	3 yr 10 mos	81		N	Y	N/A		Pregnant.
FP78	F	14 Dec 2001	FPNWR	4-5 yr	74		Y	Y	N/A		
$FP87_{B\text{-}FL}$	F	03 Nov 2001	SBICY	2 yr 6 mos	80		N	Y	N/A		Dam of FP108. At least one other kitten treed during pursuit.
$FP93_{BTX}$	F	28 Feb 2002	SBICY	3 yr	90		N	N	N/A		Captured to replace suspected malfunctioning transmitter. With uncollared male. Pregnant.
FP96	M	01 Nov 2001	FPNWR	19 mos	92		Y	Y	2	N/A	Fitted with "break-away" collar.
FP99	M	06 Nov 2001	FPNWR	21 mos	102		Y	Y	2	N/A	Fitted with "break-away" collar.
FP103	F	13 Mar 2002	SBICY	22 mos	55		N	N	N/A		
FP107	F	01 Nov 2001	FPNWR	19 mos	74		Y	Y	N/A		Incidental capture during pursuit of FP99.
FP108	M	03 Nov 2001	SBICY	11 mos	74		N	Y	2		Incidental capture during pursuit of FP87. Fitted with "break-away" collar.
FP109	M	10 Feb 2002	OKSSF	10 yr	148		Y	U	1	N/A	Fitted with GPS collar.
FP109	-	20 Feb 2002	OKSSF	-	-		-	-	-	-	Recaptured to correct poor battery connection on GPS transmitter.
FP110	F	13 Feb 2002	OKSSF	14 mos	74		N	Y	N/A		Fitted with GPS collar. Independent offspring of FP82.
FP111	M	14 Feb 2002	OKSSF	8-10 yr	128		Y	N	1	N/A	Fitted with GPS collar.
FP112	F	25 Feb 2002	NBICY	3 yr 6 mos	84		Y	Y	N/A		Fitted with GPS collar. Uncollared male also treed,

but not collared.

[a]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.

[b]ENP = Everglades National Park; BCSIR = Big Cypress Seminole Indian Reservation; FPNWR = Florida Panther National Wildlife Refuge; NBICY = Big Cypress National Preserve north of Interstate 75; FSSP = Fakahatchee Strand State Preserve; SBICY = Big Cypress National Preserve south of Interstate 75; PL = private lands north of Bear Island.

[c] I=excellent, II=good, III=fair, IV=poor, V=grave

[d] University of Florida Veterinary Medical Teaching Hospital

Table 2. Summary of Florida panther capture-related injuries by year (1990-2002)

Year	Moderate (%)[a]	Severe (%)[b]	Removal (%)[c]	Mortality (%)
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
Total	**38 (18.4%)**	**2 (1%)**	**3 (1.4%)**	**1 (0.5%)**

[a]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° to <108°F], hypoxia [lack of oxygen] without respiratory arrest).

[b]Severe injuries: Injuries or conditions that were life-threatening but treated in the field (e.g., severe hyperthermia [≥108°F], respiratory arrest, fractures, penetration of thorax or abdomen with dart).

[c]Injuries necessitating removal for treatment/evaluation: Fractures.

Table 3. Individual and mean serum biochemical values for adult and juvenile Florida panthers and Texas cougars captured 1 July 2000 to 30 June 2002.

Cat ID[a]	P4[b] ng/ml	BUN[c] mg/dl	creat[d] mg/dl	TP[e] g/dl	alb[f] g/dl	bili[g] mg/dl	ALP[h] u/l	ALT[i] u/l	AST[j] u/l	chol[k] mg/dl	Ca[l] mg/dl	P[m] mg/dl	Na[n] meq/ml	K[o] meq/ml	Cl[p] meq/ml	Glob[q] g/dl	trig[r] mg/dl	CPK[s] u/l	Mg[t] meq/ml	Osm.[u] mosm/l
FP60		59	1.6	7.5	3.1	0.1	24	31	46	124	9.3	4.5	157	4.1	117	4.4	283	279	2.2	328
FP67	14.6	33	2.7	7.1	2.9	0.1	<3	28	39	116	9.3	6.8	161	5.2	117	4.2	36	393	1.6	333
FP78	4.8	32	2	8.7	3.1	0.2	8	34	50	147	10.5	4.8	151	4.3	118	5.6	17	205	2	308
$FP87_{B\text{-}FP}$		54	2	7.6	5	0.1	12	92	137	137	9.9	6.1	154	4.4	106	2.6	14	397	2.3	322
$FP93_{B\text{-}TX}$	19.0	60	1.6	6.8	3.1	0.1	6	181	294	129	9.3	6.4	150	4.8	111	3.7	56	300	1.8	323
FP96		31	2.6	7.8	3.3	0.1	25	65	117	136	10	7.2	151	4.4	116	4.5	18	472	1.7	311
FP99		35	2.2	8.8	3.7	0.2	26	41	66	137	10.3	6.9	172	5	126	5.1	31	868	2.3	347
FP103	2.6	34	2.7	5.3	2.9	0.2	15	33	41	95	9.8	4.6	153	4.1	127	2.9	12	703	1.8	309
FP107		31	2.3	7	3	0.1	33	25	34	127	10.1	7.7	158	5.2	115	4	24	529	1.8	324
$FP108_{B\text{-}FPxf1}$		71	1.4	6.3	4.3	0.1	87	30	33	141	10.2	8.4	156	4.9	109	2	17	360	2.2	330
FP109		16	2.8	7.8	3.3	0.3	7	43	55	87	10.1	3.5	150	4.9	117	4.5	18	179	1.2	300
FP110	1.6	27	2.1	6.6	3.1	0.1	46	28	35	137	10.2	6.9	154	4.2	120	3.5	23	272	1.7	313
FP111		28	3.1	7.2	3.1	0.2	8	43	51	148	9.6	5.3	154	4.4	116	4.1	12	655	1.6	314
FP112		29	1.8	6.4	2.8	0.2	16	36	42	108	8.8	4.8	152	3.6	118	3.6	51	388	1.5	313
Mean	**NA**	**38.57**	**2.21**	**7.21**	**3.34**	**0.15**	**22.36**	**50.71**	**74.29**	**126.36**	**9.81**	**5.99**	**155.21**	**4.54**	**116.64**	**3.91**	**43.71**	**428.57**	**1.84**	**319.64**
STD	**NA**	**15.2**	**0.5**	**0.9**	**0.6**	**0.06**	**21.5**	**40.0**	**68.0**	**18.0**	**0.5**	**1.4**	**5.6**	**0.46**	**5.5**	**0.93**	**67.7**	**192.0**	**0.32**	**11.9**

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

Table 4. Individual and mean hematological values for adult and juvenile Florida panthers and Texas cougars captured 1 July 2001 to 30 June 2002.

Cat ID[a]	Hb[b] g/dl	HCT[c] %	WBC[d] 10^3/µl	RBC[e] 10^6/µl	MCV[f] fl	MCH[g] pg	MCHC[h] g/dl	polys[i] /µl	polys %	bands[j] /µl	bands %	lymphs[k] /µl	lymphs %	monos[l] /µl	monos %	eos[m] /µl	eos %	basos[n] /µl	basos %
FP60	11.6	35.5	12.1	7.69	46	15.1	32.7	9801	81	0	0	1573	13	121	1	605	5	0	0
FP67	8.9	30.2	6.2	6.58	46	13.5	29.5	3844	62	0	0	1426	23	186	3	744	12	0	0
FP78	9.6	29.8	7.8	6.71	44	14.3	32.2	5928	76	0	0	1014	13	312	4	546	7	0	0
$FP87_{B\text{-}FP}$	12.3	37.4	9.2	8.1	46	15.2	32.9	6808	74	0	0	1656	18	276	3	460	5	0	0
$FP93_{B\text{-}TX}$	10.7	31.9	6.8	6.59	48	16.2	33.5	4556	67	0	0	1496	22	272	4	476	7	0	0
FP96	11.4	37.5	7.3	8.04	47	14.2	30.4	4818	66	0	0	2117	29	365	5	0	0	0	0
FP99	10	31.9	13.6	7.09	45	14.1	31.3	11152	82	0	0	1496	11	544	4	408	3	0	0
FP103	8.8	24.5	7.4	5.44	45	16.2	35.9	5994	81	0	0	1036	14	370	5	0	0	0	0
FP107	11.2	37	9.4	7.86	47	14.2	30.3	6862	73	0	0	2162	23	376	4	0	0	0	0
$FP108_{B\text{-}FPxf1}$	10.9	29.8	9.9	6.26	48	17.4	36.6	6534	66	0	0	2574	26	792	8	0	0	0	0
FP109	13.9	43.3	15.2	9.85	44	14.1	32.1	13376	88	0	0	1064	7	152	1	608	4	0	0
FP110	11.5	35.7	7.1	7.9	45	14.6	32.2	3479	49	0	0	2485	35	568	8	568	8	0	0
FP111	11.4	36.6	9.6	7.27	50	15.7	31.1	7680	80	0	0	1248	13	192	2	480	5	0	0
FP112	9.1	28.6	9.7	6.53	44	13.9	31.8	6305	65	0	0	2134	22	582	6	679	7	0	0
Mean	**10.81**	**33.55**	**9.38**	**7.28**	**46.07**	**14.91**	**32.32**	**6938.36**	**72.14**	**0**	**0**	**1677.21**	**19.21**	**364.86**	**4.14**	**398.14**	**4.5**	**0**	**0**
STD	**1.4**	**4.7**	**2.6**	**1.0**	**1.7**	**1.1**	**1.9**	**2701.3**	**9.9**	**0**	**0**	**510.3**	**7.5**	**186.9**	**2.1**	**265.5**	**3.5**	**0**	**0**

[a]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.

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

Table 5. Individual and mean serum biochemical values for neonatal (<3 wks) Florida panthers captured 1 July 2001 to 30 June 2002.

Kitten[a]	BUN[b] mg/dl	creat[c] mg/dl	TP[d] g/dl	alb[e] g/dl	bili[f] mg/dl	ALP[g] u/l	ALT[h] u/l	AST[i] u/l	chol[j] mg/dl	Ca[k] mg/dl	P[l] mg/dl	Na[m] meq/ml	K[n] meq/ml	Cl[o] meq/ml	Glo[p] g/dl	trig[q] mg/dl	CPK[r] u/l	Mg[s] meq/ml	Osm.[t] mosm/l
K109	24	0	4.8	2.1	0.3	222	18	33	150	8.1	7.8	132	4.8	81	2.7	117	207	1.5	271
K110	24	0	4.5	2.4	0.3	237	24	27	150	8.7	9.3	135	5.7	81	2.1	174	171	1.5	277
K111	27	0.3	4.8	2.4	0.3	234	24	39	150	8.4	9.9	138	5.1	81	2.4	132	258	1.5	285
K113	21	0	5.1	3	0.3	105	18	42	174	10.2	9.3	159	5.7	108	2.1	45	297	2.7	326
K114	27	0	5.1	3	0.3	129	18	54	189	9.6	9.9	147	5.7	99	2.1	36	330	1.5	306
K115	25	0.5	5.3	2.9	0.2	96	24	47	195	11.4	9.3	154	6	116	2.4	56	270	2.3	317
K116	30	0	5.1	3	0.3	90	18	42	177	9.9	10.8	147	5.1	99	2.1	45	279	3.6	304
K121	30	0	4.8	3	0.3	72	33	75	252	9	8.4	138	6	96	1.8	843	525	2.7	288
K122	30		4.8	2.7	0.6	<3	30	96	273	7.5	8.1				2.1	771	417	2.7	
K123	24	0.3	4.5	2.4	0.1	153	9	24	276	9.3	8.4	147	4.2	99	2.1	81	372	1.8	298
K128	24		4.8	2.7	0.3	177	18	36	180	9.9	9	129	5.1	99	2.1	231	213	2.4	267
K129	30	0.3	5.1	3	0.3	204	15	42	195	10.5	9	105	4.2	78	2.1	288	300	2.4	224
Mean	**26.3**	**0.1**	**4.9**	**2.7**	**0.3**	**143.3**	**20.8**	**46.4**	**196.8**	**9.4**	**9.1**	**139.2**	**5.2**	**94.3**	**2.2**	**234.9**	**303.3**	**2.2**	**287.6**
STD	**3.0**	**0.2**	**0.2**	**0.3**	**0.1**	**71.0**	**6.3**	**19.6**	**43.7**	**1.1**	**0.8**	**13.9**	**0.6**	**11.9**	**0.2**	**267.0**	**94.1**	**0.6**	**26.8**

[a] 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; B-FL subscript denotes offspring of F1 x Florida panther mating.

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

Table 6. Individual and mean hematological values for neonatal (<3 wks) Florida panthers captured 1 July 2001 to 30 June 2002.

Kitten[a]	Hb[b] g/dl	HCT[c] %	WBC[d] 10^3/µl	RBC[e] 10^6/µl	MCV[f] fl	MCH[g] pg	MCHC[h] g/dl	polys[i] /µl	polys %	bands[j] /µl	bands %	lymphs[k] /µl	lymps %	monos /µl	monos %	eos[l] /µl	eos %	basos[m] /µl	basos %
K109	9.8	29.2	8.9	4.7	62	20.9	33.6	5340	60	0	0	2492	28	1068	12	0	0	0	0
K110	10.7	30.2	7	5.11	59	20.9	35.4	3570	51	0	0	2590	37	840	12	0	0	0	0
K111	8.5	25.5	7.4	4.26	60	20	33.3	3404	46	0	0	2516	34	888	12	592	8	0	0
K113	9	26.5	5	4.5	59	20	34	2050	41	0	0	2050	41	350	7	550	11	0	0
K114	8.8	26.9	5.6	4.62	58	19	32.7	1792	32	0	0	1688	48	504	9	616	11	0	0
K115	9.3	27.3	4.2	4.86	56	19.1	34.1	2520	60	0	0	1092	26	588	14	0	0	0	0
K116	8.8	26.2	5	4.57	57	19.3	33.6	2400	48	0	0	2600	52	0	0	0	0	0	0
K121	8.6	23.6	4.5	4.16	57	20.7	36.4	2565	57	0	0	990	22	270	6	675	15	0	0
K122	10.3	29.9	4.8	5.3	56	19.4	34.4	3648	76	0	0	816	17	48	1	288	6	0	0
K123	10.7	31.9	5.6	5.54	58	19.3	33.5	2912	52	0	0	2464	44	224	4	0	0	0	0
K128	9.3	26.2	6.5	4.55	58	20.4	35.5	4160	64	0	0	1885	29	455	7	0	0	0	0
K129	8	22	4.9	4.22	52	19	36.4	3185	65	0	0	1176	24	539	11	0	0	0	0
Mean	**9.3**	**27.1**	**5.8**	**4.7**	**57.7**	**19.8**	**34.4**	**3128.8**	**54.3**	**0**	**0**	**1863.3**	**33.5**	**481.2**	**7.9**	**226.8**	**4.3**	**0**	**0**
STD	**0.8**	**2.7**	**1.3**	**0.4**	**2.4**	**0.7**	**1.2**	**944.9**	**11.4**	**0**	**0**	**661.2**	**10.5**	**316.5**	**4.4**	**282.0**	**5.4**	**0**	**0**

[a] 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; B-FL subscript denotes offspring of F1 x Florida panther mating.

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

Table 7. Reciprocal serum antibody titers to feline panleukopenia virus (FPV), feline calicivirus (FCV), and feline viral rhinotracheitis virus (FVR) and presence of antibody to feline immunodeficiency virus (FIV) in Florida panthers and Texas cougars sampled in south Florida, 2001-2002. Positive titers are indicated by (P).

Cat ID[a]	Previously Vaccinated	FPV	FCV	FVR	FIV (kela)[b,d]	FIV (wblot)[c,d]
FP60	Yes	10 (P)	48 (P)	8 (P)	E	P
FP67	Yes	20 (P)	32 (P)	16 (P)	N	N
FP78	Yes	80 (P)	512 (P)	8 (P)	E	P
FP87	Yes	40 (P)	96 (P)	4	N	N
FP93	Yes	10	64 (P)	6 (P)	N	N
FP96	Yes	10	512 (P)	16	P	P
FP99	Yes	2560 (P)	48 (P)	6 (P)	ND	P
FP103	Yes	20 (P)	32 (P)	16 (P)	N	N
FP107	No	10	128 (P)	64	E	P
FP108	No	10	32	32	N	P
FP109	No	640 (P)	32 (P)	4	N	N
FP110	No	10	24 (P)	4	N	N
FP111	No	320 (P)	32	32	N	N
FP112	No	640 (P)	64	64	N	N

[a]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.

[b]Presence of antibodies determined by ELISA

[c]Presence of antibodies determined by Western Blot

[d] P=positive, N=negative, E=equivocal

Table 8. Mean semen characteristics in the Florida panther, Texas cougar, and $FP79_{F1}$ (J. Howard, unpubl. data).

	Florida Panthers (n = 16)	Texas Cougars (n = 9)	$FP79_{F1}$
Ejaculate volume (ml)	0.7 ± 0.1	2.0 ± 0.3	2.1
Sperm concentration/ml (x 10^6)	4.8 ± 1.4	15.4 ± 4.4	44.4
Sperm motility (%)	38.2 ± 6.7	49.4 ± 6.2	75
Sperm progression (0-5, 5=best)	2.3 ± 0.3	3.2 ± 0.2	3.5
Normal sperm (%)	6.5 ± 0.7	14.0 ± 3.5	25.0
Abnormal acrosome (%)	41.8 ± 2.2	10.0 ± 2.0	10.0

Table 9. Semen characteristics for $FP65_{F1}$ (L. Penfold, unpubl. data).

	$FP65_{F1}$	Florida Panthers (n = 16) (Barone et al., 1994)
Ejaculate volume (ml)	1.6	0.7 ± 0.1
Sperm concentration/ml (x 10^6)	726 x 10^6	4.8 ± 1.4
Sperm motility (%)	70	38.2 ± 6.7
Sperm progression (0-5, 5=best)	3.5	2.3 ± 0.3
Normal sperm (%)	6	6.5 ± 0.7
Abnormal acrosome (%)	6	41.8 ± 2.2

Table 10. Summary of neonate kittens handled at Florida panther dens 01 July 2001 – 30 June 2002. Skin biopsies were obtained from all kittens and all kittens were marked with subcutaneous transponder identification chips.

Dam ID[a]	Kitten ID	Location[b]	Date Handled	~ Age	Weight	Kinked Tail	Comments
FP49	K107	NBCNP	27 Aug 2002	3 wk	2 lbs 7 oz	N	Dermatitis on crown, tip of tail
FP77	K108	NBCNP	30 Aug 2002	4 wk	4 lbs 0 oz	N	No significant observations when handled. Kitten appeared in good health.
$FP73_{F1}$	K109♂	NBCNP	03 Mar 2002	1 wk	2 lbs 1 oz	N	No significant observations when handled. Kitten appeared in good health.
	K110♂	NBCNP	03 Mar 2002	1 wk	2 lbs 3 oz	N	No significant observations when handled. Kitten appeared in good health.
	K111♀	NBCNP	03 Mar 2002	1 wk	1lbs 15 oz	N	No significant observations when handled. Kitten appeared in good health.
$FP95_{F1}$	K112♂	ENP	21 Apr 2002	3.5 wks	3 lbs 5 oz	N	No significant observations when handled. Kitten appeared in good health.
$FP93_{B\text{-}TX}$	K113♀	SBCNP	23 Apr 2002	2.5 wks	3 lbs 0 oz	N	No significant observations when handled. Kitten appeared in good health.
	K114♀	SBCNP	23 Apr 2002	2.5 wks	3 lbs 2 oz	N	No significant observations when handled. Kitten appeared in good health.
	K115♂	SBCNP	23 Apr 2002	2.5 wks	3 lbs 0 oz	N	No significant observations when handled. Kitten appeared in good health.
	K116♀	SBCNP	23 Apr 2002	2.5 wks	3 lbs 3 oz	N	No significant observations when handled. Kitten appeared in good health.
FP78	K117♀	FPNWR	30 Apr 2002	3 wks	2 lbs 7 oz	Y	Dermatitis on crown.
	K118♀	FPNWR	30 Apr 2002	3 wks	2 lbs 12 oz	Y	Dermatitis on crown.
	K119♀	FPNWR	30 Apr 2002	3 wks	2 lbs 10 oz	Y	No significant observations when handled. Kitten appeared in good health.
	K120♂	FPNWR	30 Apr 2002	3 wks	3 lbs 9 oz	Y	No significant observations when handled. Kitten appeared in good health.
FP101	K121♂	BCSIR	9 May 2002	1.5 wks	2 lbs 5 oz	N	Mild dermatitis on crown. Otherwise appeared in good health.
	K122♀	BCSIR	9 May 2002	1.5 wks	1 lb 7 oz	N	Mild dermatitis on crown. Otherwise appeared in good health.
FP83	K123♂	FSSP	12 May 2002	3.5 wks	3 lbs 8 oz	N	No significant observations when handled. Kitten appeared in good health.
FP106	K124♀	FPNWR	27 May 2002	1.5 wks	1 lb 11 oz	Y	No significant observations when handled. Kitten appeared in good health.

Dam ID[a]	Kitten ID	Location[b]	Date Handled	~ Age	Weight	Kinked Tail	Comments
	K125♂	FPNWR	27 May 2002	1.5 wks	1 lb 2 oz	Y	No significant observations when handled. Kitten appeared in good health.
	K126♂	FPNWR	27 May 2002	1.5 wks	1 lb 6 oz	Y	No significant observations when handled. Kitten appeared in good health.
FP55	K127♀	SBCNP	30 May 2002	1.5 wks	1 lb 3 oz	N	No significant observations when handled. Kitten appeared in good health.
FP75	K128♂	NBCNP	6 June 2002	1.5 wks	2 lbs 10 oz	Y	No significant observations when handled. Kitten appeared in good health.
	K129♂	NBCNP	6 June 2002	1.5 wks	2 lbs 6 oz	Y	No significant observations when handled. Kitten appeared in good health.
FP112	K130♂	NBCNP	15 June 2002	1 wk	1 lb 11 oz	Y	No significant observations when handled. Kitten appeared in good health.
	K131♂	NBCNP	15 June 2002	1 wk	1 lb 9 oz	Y	No significant observations when handled. Kitten appeared in good health.
FP67	K132♀	PL	18 June 2002	1.5 wks	2 lbs 10 oz	Y	No significant observations when handled. Kitten appeared in good health.
	K133♂	PL	18 June 2002	1.5 wks	2 lbs 5 oz	Y	No significant observations when handled. Kitten appeared in good health.
	K134♂	PL	18 June 2002	1.5 wks	2 lbs 9 oz	Y	No significant observations when handled. Kitten appeared in good health.
FP107	K135♂	FPNWR	7 July 2002	1.5 wks	1 lb 0 oz	Y	Small, lethargic. Grade I-II systolic murmur. Anemic.
	K136♀	FPNWR	7 July 2002	1.5 wks	1 lb 6 oz	Y	Small, light coloration. Anemic.

[a] 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] BCSIR = Big Cypress Seminole Indian Reservation; FPNWR = Florida Panther National Wildlife Refuge; OSSF = Okaloacoochee Slough State Forest; NBCNP = Big Cypress National Preserve north of Interstate 75; SBCNP = Big Cypress National Preserve south of Interstate 75; PL = Private lands.

Table 11. Kittens produced by female Florida panthers from October 1995 to 20 June 2002.

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
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
FP77	May 2000	3	1♀:2♂	0 Yes: 3 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
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		**2.3/63**	**24♀:37♂:2 UNK**	**Yes: 39 No: 23 UNK: 1**

Table 12. F1 kittens produced by female Texas cougars from October 1995 to 30 June 2002.

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
Mean/Total		**1.5/17**	**12♀: 5♂**	**0 Yes: 17 No**

Table 13. Documented litters with Texas cougar ancestry produced since October 1995 not including 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 / $FP79_{F1}$
	May 2002	1	1♀:0♂	0 Yes: 1 No	Florida backcross / $FP79_{F1}$
$FP61_{F1}$	Mar 1999	1	0♀:1♂	0 Yes:1 No	Florida backcross / FP16
$FP66_{F1}$	Sep 1998	3	1♀:2♂	0 Yes:3 No	Florida backcross / FP72
	Dec 1999	3	2♀:1♂	0 Yes:3 No	Florida backcross / FP59
$FP70_{F1}$	Jun 1999	3	2♀:1♂	0 Yes:3 No	F2 / $FP79_{F1}$
$FP71_{F1}$	Jun 1999	4	2♀:2♂	0 Yes:4 No	F2 / $FP79_{F1}$
$FP73_{F1}$	?	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 / $FP65_{F1}$
$FP83_{F1}$	Apr 2002	1	0♀:1♂	0 Yes: 1 No	F1 / Unknown
$FP87_{B\text{-}FL}$	Jan 2001	3	1♀: 2♂	0 Yes: 3 No	Unclassified[b] / $FP79_{F1}$
$FP88_{F2}$	May 2001	4	2♀: 2♂	0 Yes: 4 No	Unclassified / Unknown
FP93	Apr 2002	4	3♀:1♂	0 Yes: 4 No	Texas backcross / $FP79_{F1}$
$FP95_{F1}$	Mar 2002	1	1♀:0♂	0 Yes: 1 No	F1 (ENP) / $FP85_{B\text{-}FL}$
FP102	Jun 2001	2	0♀:2♂	0 Yes: 2 No	Unclassified/ $FP79_{F1}$
TX107	Mar 1999	3	2♀:1♂	0 Yes:3 No	Texas backcross / $FP79_{F1}$
Mean/Total		**2.5/47[c]**	**22♀:25♂**	**4 Yes: 43 No**	

[a] 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.

[b] Descendant of Texas cougar, however, ancestry cannot be classified.

[c] Mean and Total does not include dens of $FP73_{F1}$ that were not visited.

Table 14. Occurrence of kinked tails and cowlicks among Florida panthers and Texas cougar descendents.

Ancestry	N	Kink		Cowlick	
		Yes	No	Yes	No
FLA	185	135 (76.7%)	41 (23.3%)	92 (80.0%)	23 (20.0%)
F-1	17	0 (0 %)	17 (100%)	2 (20.0%)	8 (80.0%)
F-2	7	0 (0%)	7 (100%)	0 (0%)	5 (100%)
Back-FL	15	3 (20.0%)	12 (80.0%)	4 (80.0%)	1 (20%)
Back-TX	3	0 (0%)	3 (100%)	0 (0%)	1 (100%)
EVER	18	6 (33.3%)	12 (66.7%)	1 (8.3%)	11 (91.7%)
Unclassified	22	0 (0%)	22 (100%)	1 (50%)	1 (50%)

Table 15. Litter size at birth and at 6 months-of-age for select female Florida panthers and Texas cougar descendants.

Dam ID[a]	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
FP69	FLA	1999	3	2
FP77	FLA	2000	3	1
FP78	FLA	2000	2	2
$FP61_{F1}$	TX	1999	1	1
$FP66_{F1}$	TX	1998	3	0
$FP66_{F1}$	TX	1999	3	2
$FP70_{F1}$	TX	1999	3	3
$FP71_{F1}$	TX	1999	4	3
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

[a] FP denotes panthers captured for radiocollaring; TX denotes Texas cougars used for Panther Genetic Restoration;F1 subscript denotes Florida panther x Texas cougar offspring.

Table 16. Survival to independence of radiocollared Florida panther and Texas cougar descendant kittens.

Panther ID	Ancestry	Capture Age (months)	Death Age (years)	Reached Independence	Date Born	Date Died
FP10	FLA	5	1.5	TRUE	8/1985	1/27/1987
FP16	FLA	13	14.1	TRUE	12/1985	1/3/2000
FP19	FLA	9	11.6	TRUE	5/1986	12/2/1997
FP22	FLA	5	4.8	TRUE	10/1986	7/20/1991
FP29	FLA	6	4.0	TRUE	5/1988	5/27/1992
FP30	FLA	9	1.9	TRUE	3/1988	1/29/1990
FP34	FLA	10	5.7	TRUE	3/1988	11/15/1993
FP42	FLA	11	6.1	TRUE	5/1989	6/22/1995
FP43	FLA	9	2.3	TRUE	7/1989	10/31/1991
FP44	FLA	6	2.6	TRUE	11/1990	7/6/1993
FP45	FLA	6	7.7	TRUE	11/1990	8/2/1998
FP47	FLA	6	1.6	TRUE	7/1991	2/19/1993
FP48	FLA	4		TRUE	10/1991	
FP50	FLA	8	2.6	TRUE	5/1991	12/6/1993
FP52	FLA	6	3.3	TRUE	10/1991	1/14/1995
FP53	FLA	10	0.9	FALSE	4/1992	2/26/1993
FP54	FLA	10		TRUE	4/1992	
FP58	FLA	8	3.0	TRUE	4/1994	3/30/1997
FP59	FLA	6		TRUE	6/1995	
FP60	FLA	5		TRUE	10/1995	
FP61	TX	8		TRUE	7/1996	
FP62	FLA	6		TRUE	9/1996	
FP64	FLA	8	2.5	TRUE	9/1996	3/26/1999
FP65	TX	11		TRUE	12/1996	
FP66	TX	12		TRUE	12/1996	
FP67	FLA	8		TRUE	6/1997	
FP69	FLA	9		TRUE	5/1997	
FP70	TX	10		TRUE	5/1997	
FP71	TX	10		TRUE	5/1997	
FP75	FLA	7		TRUE	6/1998	
FP83	TX	8		TRUE	6/1999	
FP85	TX	10		TRUE	3/1999	
FP86	TX	8		TRUE	6/1999	
FP87	TX	10		TRUE	4/1999	
FP88	TX	9		TRUE	6/1999	
FP90	TX	9	1.9	TRUE	6/1999	4/26/2001
FP91	TX	9		TRUE	6/1999	
FP92	TX	10		TRUE	6/1999	9/2001
FP93	TX	14		TRUE	2/1999	
FP94	TX	10		TRUE	7/1999	

Panther ID	Ancestry	Capture Age (months)	Death Age (years)	Reached Independence	Date Born	Date Died
FP96	FLA	9	1.7	TRUE	4/2000	1/17/2002
FP97	FLA	~11	1.7	TRUE	UNK	12/02/2001
FP99	FLA	~11		TRUE	UNK	
FP103	FLA	~7		TRUE	UNK	
FP106	FLA	~13		TRUE	UNK	

APPENDICES

Appendix I. List of radio-instrumented Florida panthers and Texas cougars in southern Florida from 10 February 1981 to 30 June 2002.

Appendix II. Figures (1-13) of radiotelemetry locations and home ranges of Florida panthers and Texas cougars in southern Florida 1 July 2001 to 30 June 2002.

Appendix III. Texas cougars and known intercross *Puma concolor* in the south Florida population.

Appendix IV. List of panther kittens, including Texas intercrosses, handled at dens since 1992.

Appendix V. List of all known dens of radio-instrumented female Florida panthers and Texas cougars in southern Florida from June 1985 to 30 June 2002.

Appendix VI. Summary of Florida panther mortalities in southern Florida from 1 July 2001 to 30 June 2002.

Appendix VII. Summary of Florida panther mortalities and injuries in southern Florida from 8 March 1978 to 30 June 2002.

Appendix VIII. Locations of vehicular-related mortalities of Florida panthers from February 1972 – June 2002.

Appendix IX. Mitigating risks associated with the capture and handling of Florida panthers.

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

Appendix XI. 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 2002.

Cat ID[a]	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area[b]	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, Scofields, 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[a]	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area[b]	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	-	-
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[a]	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area[b]	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	-	-
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	-	-

Cat ID[a]	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area[b]	Death Date	Cause of Death
TX106	F	09 Apr 1995	-	-	-	-	PSSF, FPNWR, FSSP	-	-
TX107	F	04 May 1995	-	-	-	-	SBCNP	18 Jan 2001	Pneumonia
TX108	F	26 Jul 1995	-	-	-	-	ENP	-	-
$FP61_{F1}$	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
$FP65_{F1}$	M	19 Nov 1997	11 mos.	Dec 1996	TX101	FP45	Okaloacoochee Slough	-	-
$FP66_{F1}$	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	-	-
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	-	-
$FP70_{F1}$	F	25 Feb 1998	10 mos.	May 1997	TX107	-	SBCNP	-	-
$FP71_{F1}$	F	05 Mar 1998	10 mos.	May 1997	TX107	-	SBCNP	-	-
FP72	M	24 Apr 1998	2.5	-	-	-	BCSIR	23 Dec 1998	Intraspecific aggression
$FP73_{F1}$	F	12 Nov 1998	3	Sep 1995	TX101	-	BCSIR	-	-
FP74	M	12 Nov 1998	1.5	-	$FP73_{F1}$	-	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	-	-
$FP79_{F1}$	M	03 Mar 1999	3.5	Sep 1995	TX101	-	BCNP	-	-

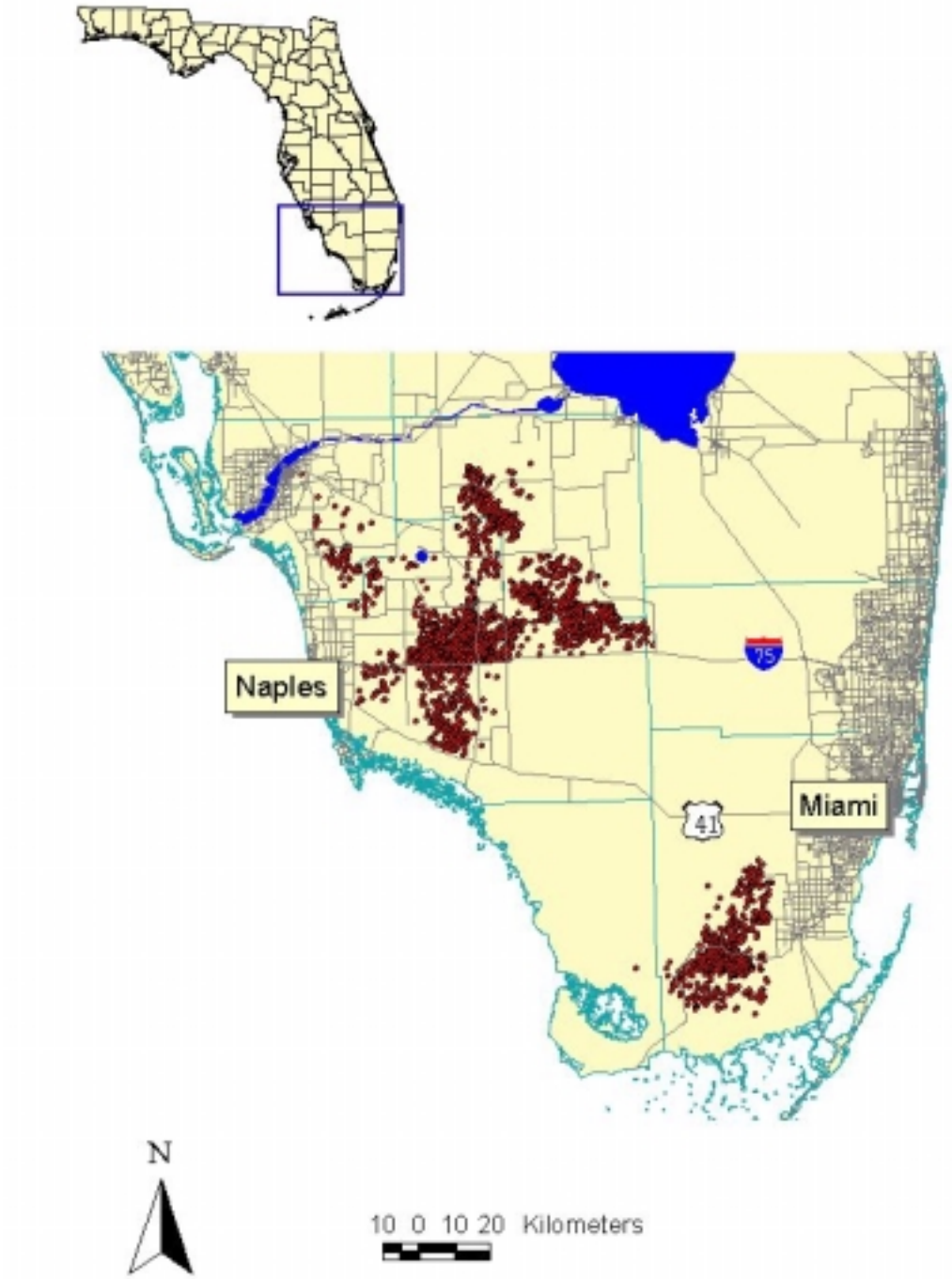
Cat ID[a]	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area[b]	Death Date	Cause of Death
FP80	F	14 Jan 2000	4.0	-	-	-	BCSIR	10 Feb 2000	Vehicle (BCSIR)
FP81	M	14 Jan 2000	4.0	-	-	-	BCSIR, Hendry Co. private lands	-	-
FP82	F	25 Jan 2000	3.0	-	-	-	Okaloacoochee Slough	-	-
$FP83_{F1}$	F	24 Feb 2000	8 mos.	Jun 1999	TX106	FP54	FSSP	-	-
$FP84_{B-FL}$	M	11 Feb 2000	1.0	-	$FP73_{F1}$	-	Dispersed from BCSIR to Fisheating Creek	20 Apr 2000	Unknown
$FP85_{B-FL}$	M	17 Feb 2000	10-11 mos.	Mar 1999	$FP61_{F1}$	FP16	ENP	-	-
$FP86_{F2}$	F	21 Feb 2000	8 mos.	Jun 1999	$FP71_{F1}$	$FP79_{F1}$	SBCNP	-	-
$FP87_{B-FL}$	F	28 Feb 2000	10 mos.	Apr 1999	FP55	$FP79_{F1}$	SBCNP	-	-
$FP88_{F2}$	F	02 Mar 2000	9 mos.	Jun 1999	$FP70_{F1}$	$FP79_{F1}$	SBCNP	-	-
FP89	M	02 Mar 2000	2.5	-	-	-	SBCNP	9 Nov 2000	Intraspecific aggression
$FP90_{F2}$	M	08 Mar 2000	9 mos.	Jun 1999	$FP71_{F1}$	$FP79_{F1}$	SBCNP	26 April 2001	Vehicle (US27 Terrytown)
$FP91_{F2}$	F	17 Mar 2000	9 mos.	Jun 1999	$FP70_{F1}$	$FP79_{F1}$	SBCNP	-	-
$FP92_{F2}$	M	06 Apr 2000	10 mos.	Jun 1999	$FP70_{F1}$	$FP79_{F1}$	SBCNP	Sep 2001	Unknown
$FP93_{B-TX}$	F	10 Apr 2000	14 mos.	Feb 1999	TX107	$FP79_{F1}$	SBCNP	-	-
$FP94_{F1}$	F	01 May 2000	10 mos.	Jul 1999	TX105	FP16	ENP	-	-
$FP95_{F1}$	F	07 Nov 2000	2.8 yrs.	Nov 1998	TX108	FP16	ENP	-	-
FP96	M	07 Jan 2001	9 mos.	Apr 2000	FP78	FP59	FPNWR	01/17/2002	Intraspecific aggression
FP97	M	19 Jan 2001	11 mos.	-	FP105	-	FPNWR	12/02/2001	Intraspecific aggression
FP98	M	25 Jan 2001	3	-	-	-	Bear Island, Hendry Co. private lands	-	-
FP99	M	26 Jan 2001	11 mos.	-	FP105	-	FPNWR	-	-
FP100	M	31 Jan 2001	4	-	-	-	NBCNP, BCSIR	-	-
FP101	F	5 Feb 2001	2	-	-	-	NBCNP, BCSIR	-	-

Cat ID[a]	Sex	Capture Date	Age at First Capture	Birth Date	Dam	Sire	Use Area[b]	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	-	-
FP107	F	01 Nov 2001	19 mos.	Apr 2000	FP78	FP59	FPNWR	-	-
FP108	M	03 Nov 2001	11 mos.	Jan 2001	$FP87_{B\text{-}FL}$	$FP79_{F1}$	BCNP-N of Oasis	-	-
FP109	M	02 Feb 2002	10+	-	-	-	OK Slough	-	-
FP110	F	13 Feb 2002	13 mos.	Dec 2000	FP82	$FP65_{F1}$	OK Slough	-	-
FP111	M	14 Feb 2002	10	-	-	-	OK Slough	-	-
FP112	F	25 Feb 2002	3-4	-	-	-	Bear Island	-	-

[a] 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.

[b] 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.

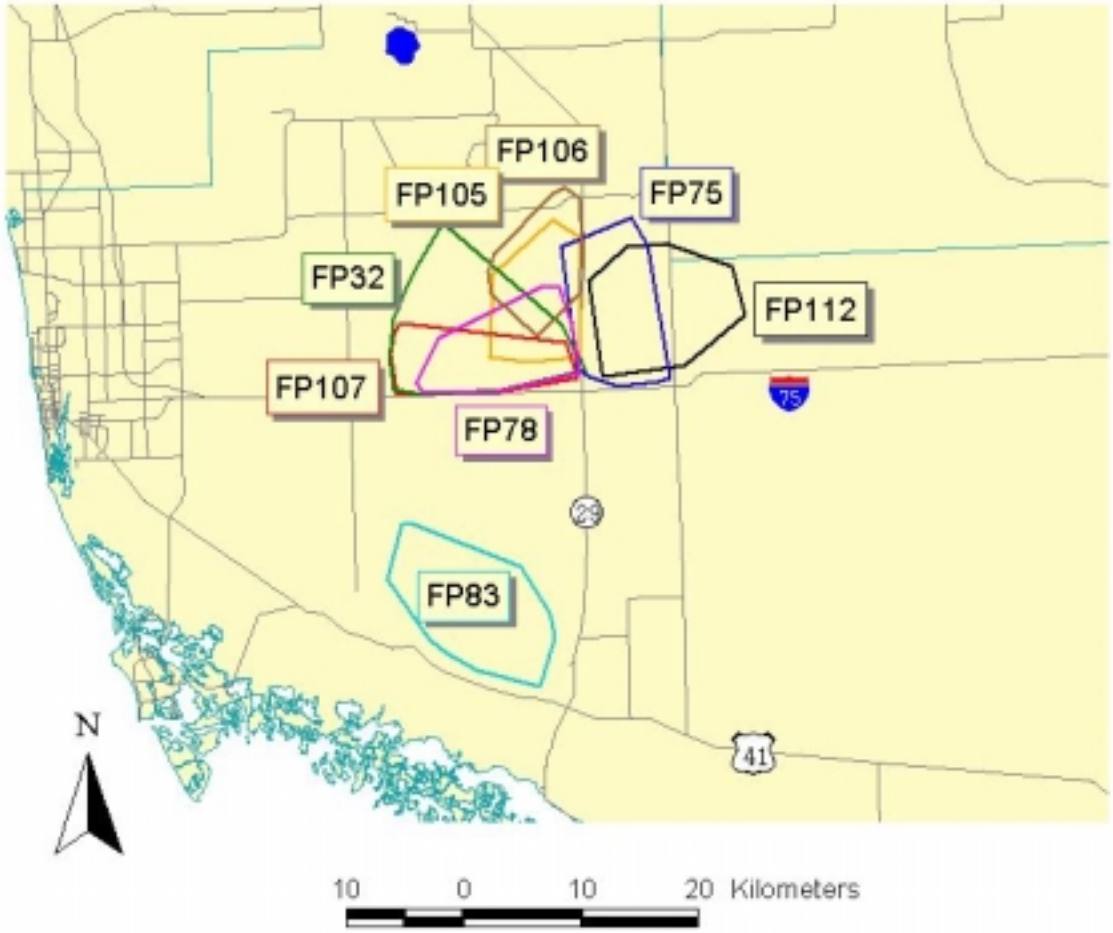
Locations of all Radiocollared Florida Panthers from 01 July 2001 – 30 June 2002



Appendix II, Figure 1

Minimum Convex Polygon Home Ranges of Radiocollared Adult Female Florida Panthers in Southern Florida from 01 July 2001 – 30 June 2002

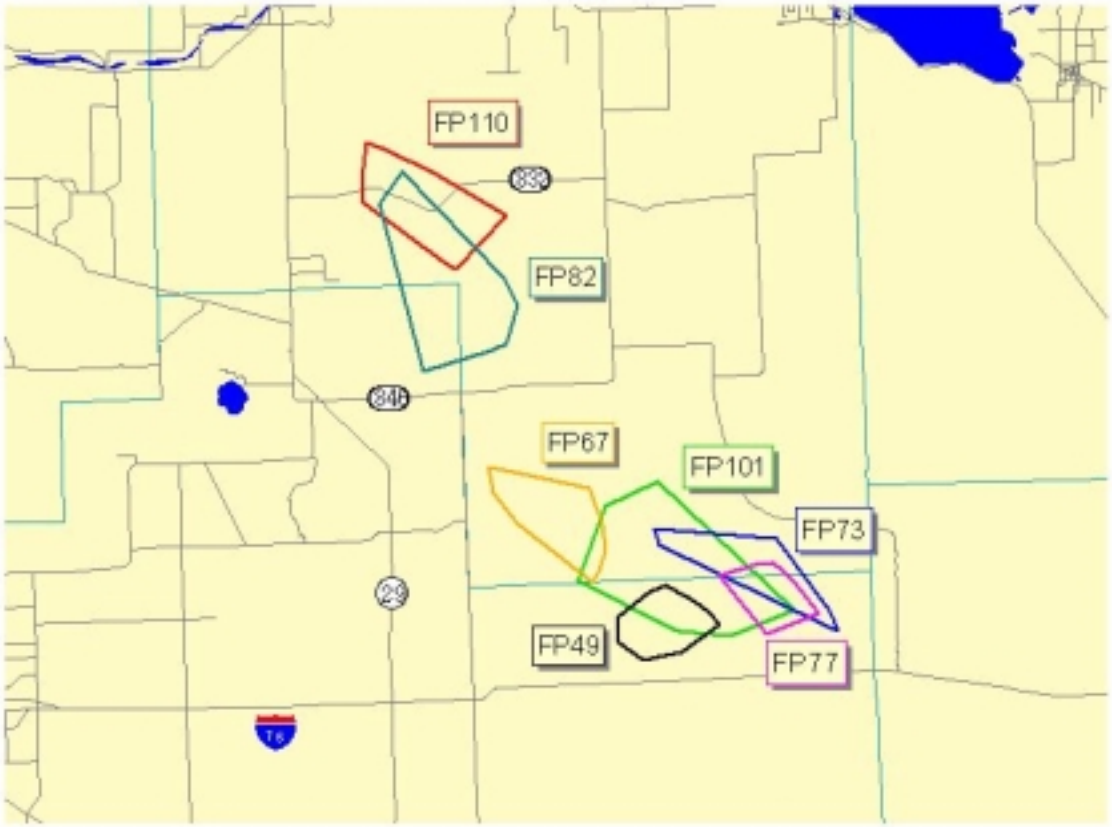
Cat ID	MCP (km^2)
FP32	147.3
FP75	96.4
FP78	82.7
FP83	120.2
FP105	75.4
FP106	64.8
FP107	73.9
FP112	111.5

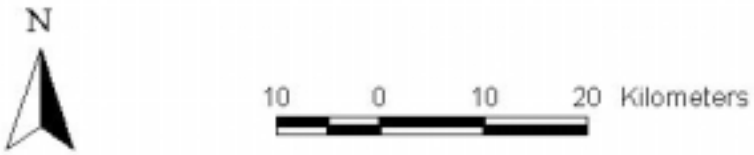


Appendix II, Figure 2

Minimum Convex Polygon Home Ranges of Radiocollared Adult Female Florida Panthers in Southern Florida from 01 July 2001 – 30 June 2002

Cat ID	MCP (km^2)
FP49	45.6
FP67	65.7
$FP73_{F1}$	64.1
FP77	35.1
FP82	137.8
FP101	171.1
FP110	84.5

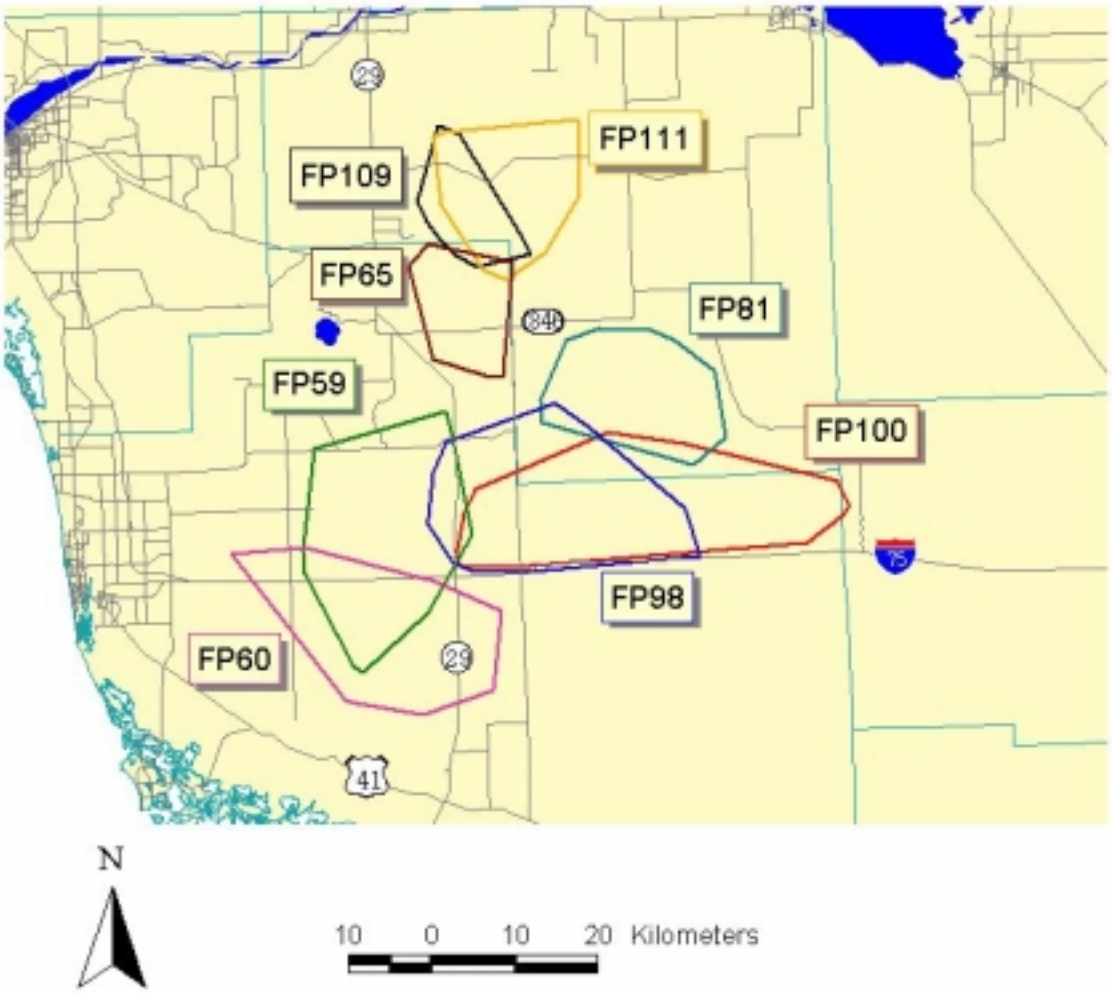




Appendix II, Figure 3

Minimum Convex Polygon Home Ranges of Radiocollared Adult Male Florida Panthers in Southern Florida from 01 July 2001 – 30 June 2002

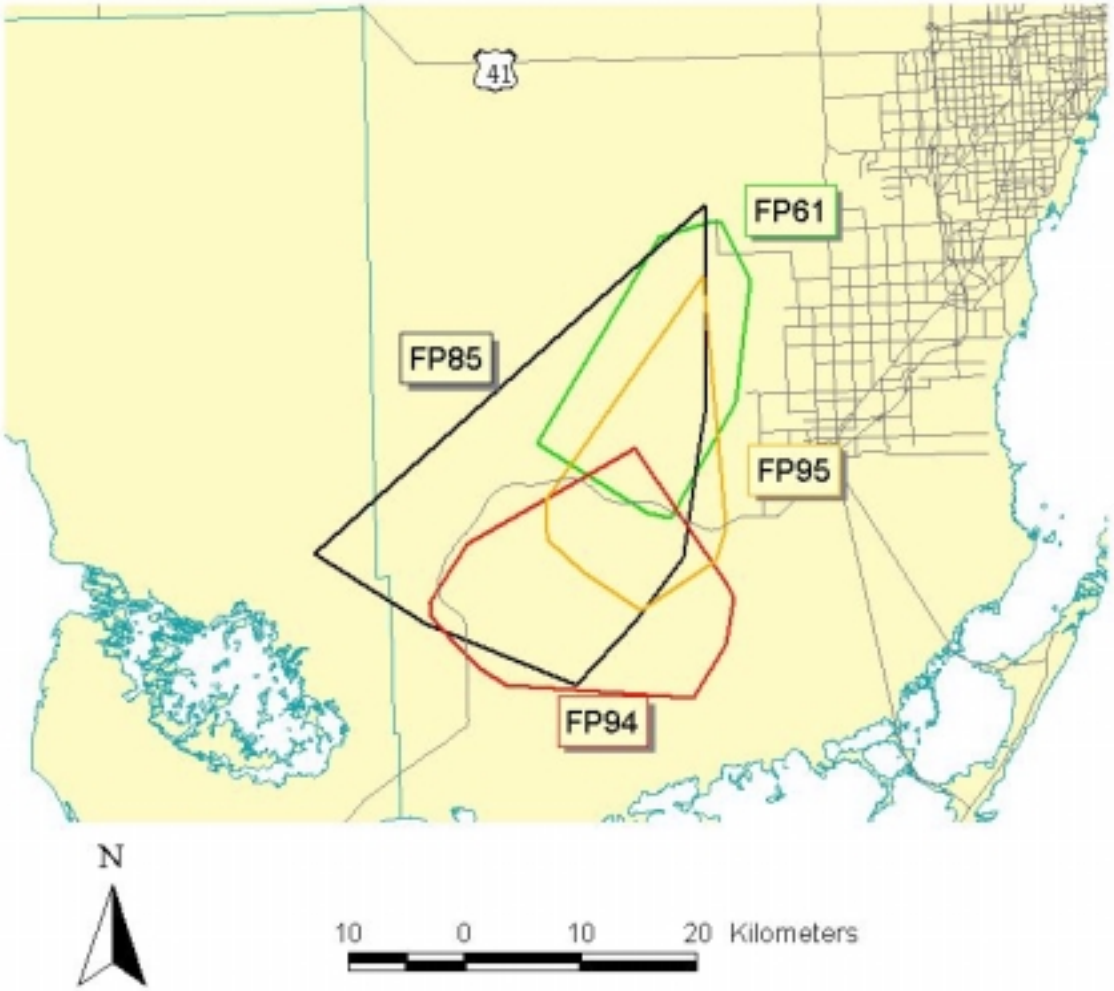
Cat ID	MCP (km^2)
FP59	432.6
FP60	398.1
$FP65_{F1}$	147.5
FP81	262.4
FP98	458.1
FP100	526.9
FP109	124.0
FP111	247.5



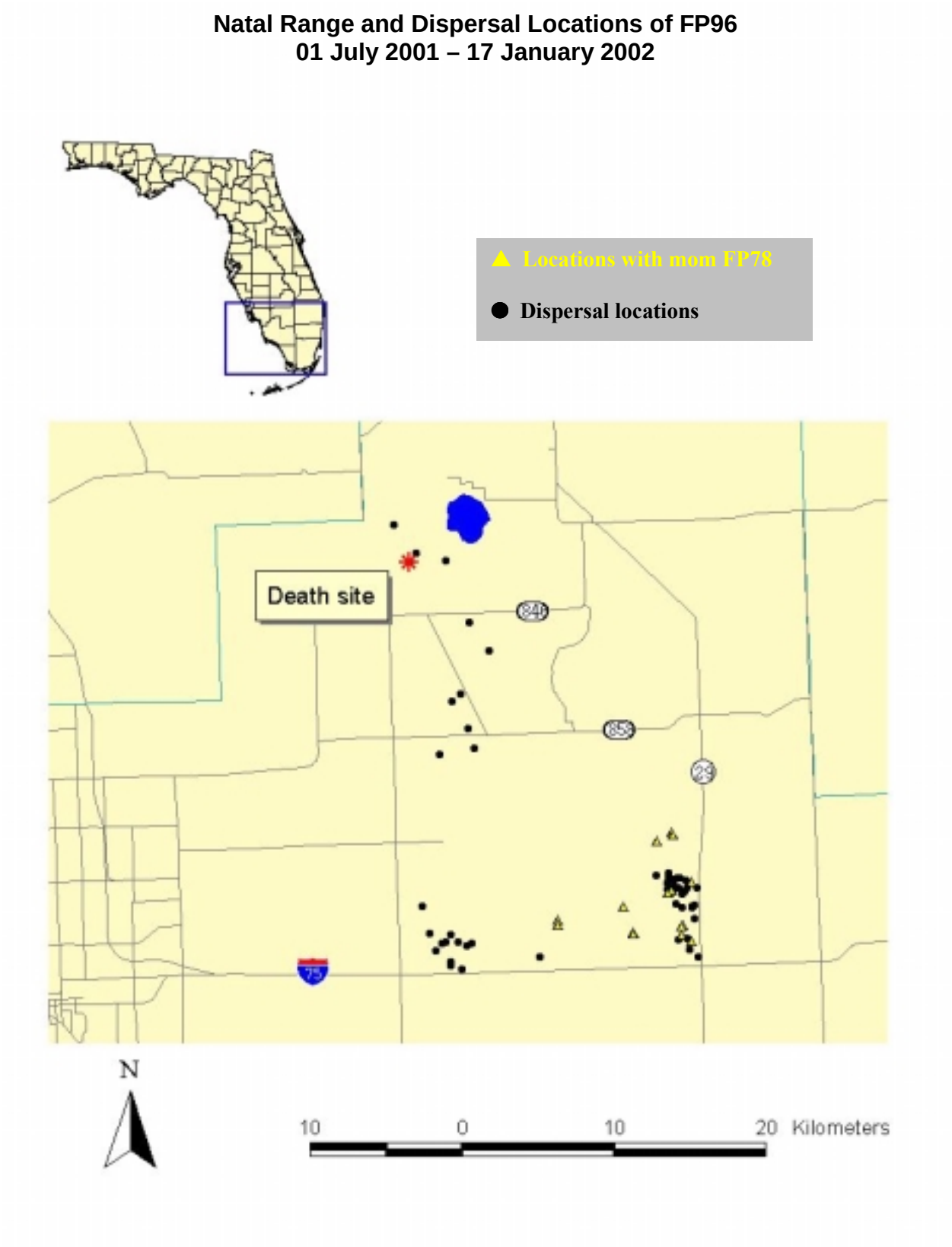
Appendix II, Figure 4

Minimum Convex Polygon Home Ranges of Radiocollared Florida Panthers in Everglades National Park from 01 July 2001 – 30 June 2002

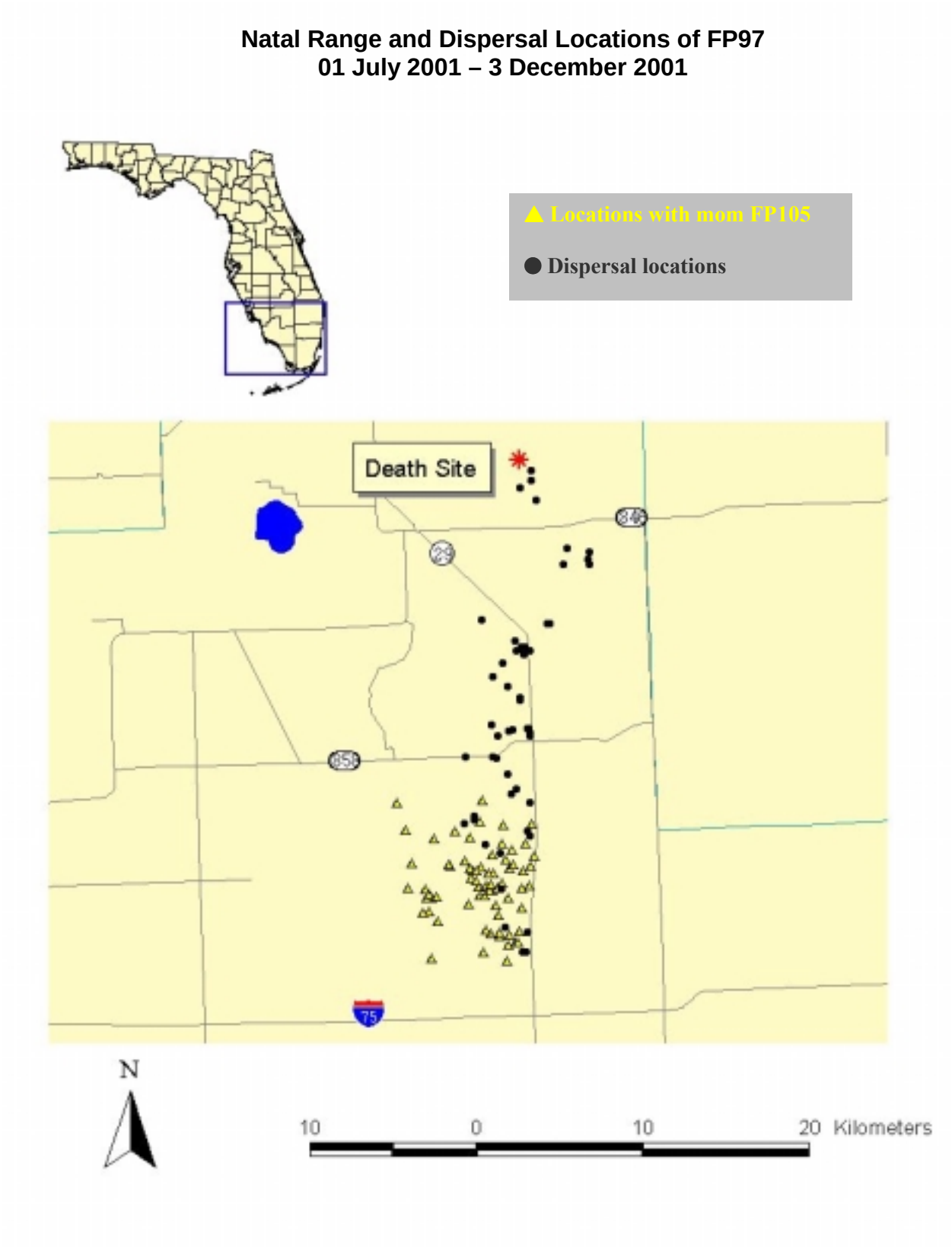
Cat ID	MCP (km^2)
$FP61_{F1}$	270.5
$FP85_{B-FL}$	691.0
$FP94_{F1}$	368.6
$FP95_{F1}$	248.4



Appendix II, Figure 5

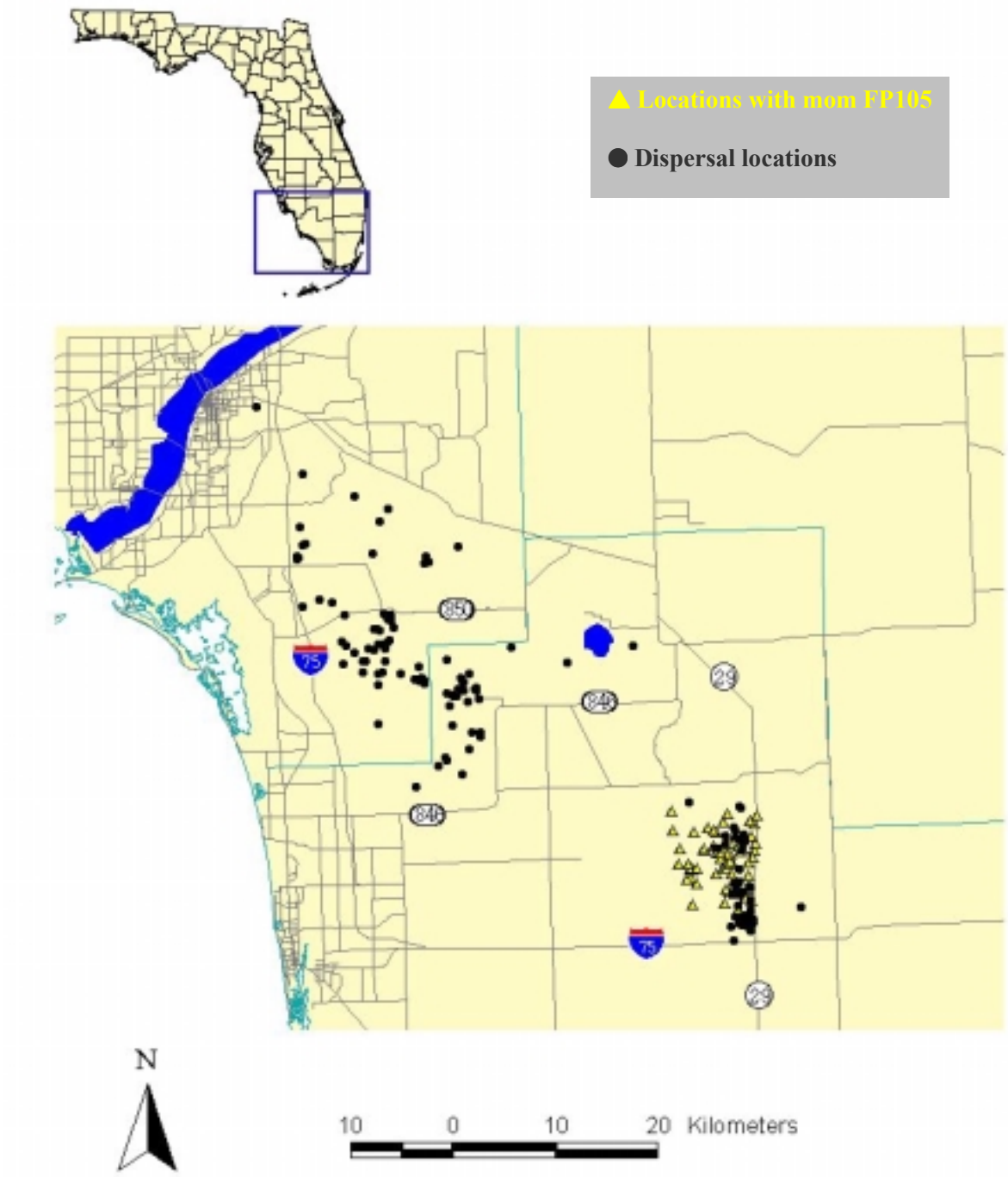


Appendix II, Figure 6

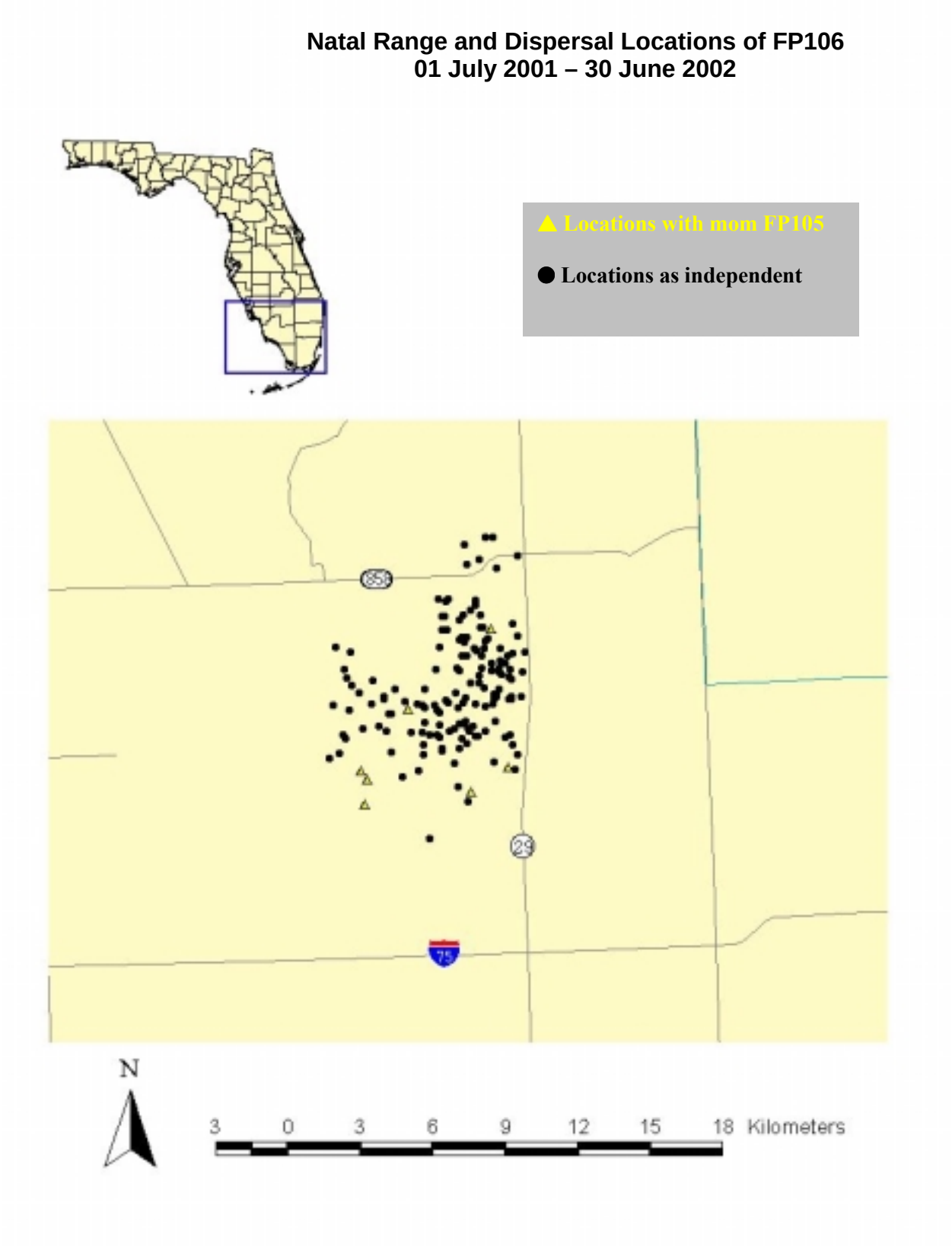


Appendix II, Figure 7

Natal Range and Dispersal Locations of FP99
01 July 2001 – 30 June 2002



Appendix II, Figure 8



Appendix II, Figure 9

Minimum Convex Polygon Home Ranges for Remaining Female Texas Puma 2001-02

Cat ID	MCP (km^2)
TX105	380.1
TX106	467.4
TX108	178.0

Appendix II, Figure 10

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

ID	Sex	Dam	Sire[1]	Birth	Gen.	Status[2]	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_1	A	Released after rehab 1/24/2002	Y	Y
FP110	F	FP82	FP65	12/00	B-FL	A		Y	Y
K87	F	FP82	FP65	12/00	B-FL	a		N	Y
K88	M	FP82	FP65	12/00	B-FL	a		N	Y
FP66	F	TX101	FP45	12/96	F_1	a		Y[3]	Y
K52	M	FP66	FP72	9/98	B-FL	d	Not observed after handled at den. Dam re-bred early.	-	N
K53	F	FP66	FP72	9/98	B-FL	d		-	N
K54	M	FP66	FP72	9/98	B-FL	d		-	N
K76	M	FP66	FP60	12/99	B-FL	D	Roadkill 2/00	-	Y
K77	F	FP66	FP60	12/99	B-FL	a		N	Y
K78	F	FP66	FP60	12/99	B-FL	a		N	Y
FP73	F	TX101	FPx	9/95	F_1	A	Litters in 98 and 99	Y	Y
FP74	M	FP73	FPx	6/98	B-FL	D	May have littermates; Roadkill 9/99	Y(Dead)	Y
FP84	M	FP73	FPx	2/99	B-FL	D	May have littermates; Died 4/00	Y(Dead)	Y
K109	M	FP73	FPx	3/02	X	a	Still with dam	N	Y
K110	M	FP73	FPx	3/02	X	a		N	Y
K111	F	FP73	FPx	3/02	X	a		N	Y
FP79	M	TX101	FPx	9/95	F_1	A	Sired 26 known offspring	Y	Y
FP87	F	FP55	FP79	4/99	B-FL	A	First litter 1/01 at 22 mo's of age	Y	Y
K89	F	FP87	FP79	1/01	X	a		N	Y
FP108	M	FP87	FP79	1/01	X	A		N	Y
K91	M	FP87	FP79	1/01	X	a		N	Y
K61	M	FP55	FP79	4/99	B-FL	a	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	a	Still with dam	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	A	2 offspring; no adult male in area	Y	Y
K34	F	TX105	FP16	9/96	F_1	?	Not observed after independence	N	N
FP94	F	TX105	FP16	8/99	F_1	A	Independent	Y	Y
TX106	F			1991±2y	TX	A	6 offspring; current den 3/01	Y	Y
K23	F	TX106	FP51	11/95	F_1	?	Not observed after independence	N	N
K47	M	TX106	FP51	2/98	F_1	d	Disappeared after male entered area	N	N
K62	F	TX106	FP54	6/99	F_1	d	No sign when sibling found	N	Y
FP83	F	TX106	FP54	6/99	F_1	A	Independent; undetected den 10/00?	Y	Y
K123	M	FP83	FPx	4/02	B-FL	a	Still with dam	N	Y
K92	F	TX106	FP60	3/01	F_1	a		N	Y
K93	M	TX106	FP60	3/01	F_1	a		N	Y
TX107	F			1992±2y	TX	D	5 offspring; contracepted; died 1/01	Y (Dead)	Y
FP70	F	TX107	FPx	5/97	F_1	a	Collar out 1/00	Y[3]	Y
FP92	M	FP70	FP79	6/99	F_2	D	Died September 2001	Y	Y
FP88	F	FP70	FP79	6/99	F_2	A	Independent	Y	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_2	A	Independent	Y	Y
FP71	F	TX107	FPx	5/97	F_1	a	Collar out 7/00	Y[3]	N
K69	M	FP71	FP79	6/99	F_2	d	Presumed dead based on sign	N	Y
K70	F	FP71	FP79	6/99	F_2	a	No sign since independence	N	Y
FP86	F	FP71	FP79	6/99	F_2	A	Independent	Y	Y
FP90	M	FP71	FP79	6/99	F_2	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	Still with dam	N	Y
K114	F	FP93	FP79	4/02	X	a		N	Y

ID	Sex	Dam	Sire[1]	Birth	Gen.	Status[2]	Notes	Collared	Genetic Samples
K115	M	FP93	FP79	4/02	X	a		N	Y
K116	F	FP93	FP79	4/02	X	a		N	Y
TX108	F			1992±2y	TX	A	3 offspring; no adult male in area	Y	Y
FP61	F	TX108	FP16	7/96	F_1	A	With 1 kitten	Y	Y
FP85	M	FP61	FP16	3/99	B-FL	A	Inbred	Y	Y
FP95	F	TX108	FP16	1/98	F_1	A	One kitten seen with dam prior to independence; captured 11/00.	Y	Y
K46	M	TX108	FP16	1/98	F_1	d		N	N

[1] 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_1 or other intercross.

[2] 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

[3] Radiotransmitter failed

Appendix IV. List of panther kittens, including Texas intercrosses, handled at dens since 1992.

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[a]	K01	M	not marked	4/7/1992	14-21	FP28	2/10/1993	FP54	a[b]	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	$FP73_{F1}$	A	N	N
TX101	K19	M	F79CB9	10/10/1995	21	unknown	3/3/1999	$FP79_{F1}$	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	$K23_{F1}$	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	
FP19	K27	F	114DAFE (11363DC)	4/17/1996	24	FP54/FP51			u	Y	
FP19	K28	F	11EOD50	4/17/1996	24	FP54/FP51			u	Y	
FP56	K29	F?	11EAB72T	8/14/1996	14	FP45			d	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	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			u	Y	
TX105	$K34_{F1}$	F	11EAO30T	10/4/1996	30-35	FP16			u	N	
TX101	$K35_{F1}$	M	12AFFBF	12/21/1996	4	FP45	11/19/1997	$FP65_{F1}$	A	N	N
TX101	$K36_{F1}$	F	142581A	12/21/1996	4	FP45	12/9/1997	$FP66_{F1}$	a	N	N
FP40	K37	M	1146911	5/14/1997	21	FP45			u	N	
TX107	$K38_{F1}$	F	1311B3B	6/4/1997	30+	unknown	3/5/1998	$FP71_{F1}$	a	N	N
TX107	$K39_{F1}$	F	771B4D	6/4/1997	30+	unknown	2/25/1998	$FP70_{F1}$	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	$K45_{F1}$	F	1D1DFDOT	2/11/1998	21	FP16		$FP95_{F1}$	A	N	N
TX108	$K46_{F1}$	M	143E96ET	2/11/1998	21	FP16	11/7/2000		u	N	
TX106	$K47_{F1}$	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	
$FP66_{F1}$	$K52_{B-FL}$	M	1D21638T	10/2/1998	12	FP72			d	N	
$FP66_{F1}$	$K53_{B-FL}$	F	1C49E48T	10/2/1998	12	FP72			d	N	
$FP66_{F1}$	$K54_{B-FL}$	M	1D2CBC3T	10/2/1998	12	FP72			d	N	
FP49	K55	M	1211046	2/23/1999	25	unknown			d	N	
TX107	$K56_{B-TX?}$	F	1327679T	3/11/1999	21+	$FP79_{F1}$?			u	N	
TX107	$K57_{B-TX?}$	M	14245FOT	3/11/1999	21+	$FP79_{F1}$?			u	N	
TX107	$K58_{B-TX?}$	F	12A9FE5T	3/11/1999	21+	$FP79_{F1}$?	4/10/2000	$FP93_{B-TX?}$	A	N	N
$FP61_{F1}$	K59	M	1EFF6EFT	4/6/1999	14	FP16	1/17/2000	$FP85_{B-FL}$	A	N	N
FP55	K60	F	1EFFA75T	5/10/1999	24-26	$FP79_{F1}$?	2/28/2000	$FP87_{B-FL?}$	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
FP55	$K61_{B\text{-}FL?}$	M	1EFF978T	5/10/1999	24-26	$FP79_{F1}$?			u	Y	
TX106	$K62_{F1}$	F	114C9D7T	6/18/1999	14	FP54/FP60			D	N	
TX106	$K63_{F1}$	F	12AFC11T	6/18/1999	14	FP54/FP60	2/8/2000	$FP83_{F1}$	A	N	N
$FP70_{F1}$	K64	F	1E2EB33T	6/23/1999	10-12	$FP79_{F1}$	3/2/2000	$FP88_{F2}$	A	N	N
$FP70_{F1}$	K65	M	703A4AT	6/23/1999	10-12	$FP79_{F1}$	4/6/2000	$FP92_{F2}$	A	N	N
$FP70_{F1}$	K66	F	1EFFF55T	6/23/1999	10-12	$FP79_{F1}$	3/17/2000	$FP91_{F2}$	A	N	N
$FP71_{F1}$	K67	M	1E2EBFET	7/4/1999	17	$FP79_{F1}$	3/8/2000	$FP90_{F2}$	D	N	N
$FP71_{F1}$	K68	F	20509A9T	7/4/1999	17	$FP79_{F1}$	2/21/2000	$FP86_{F2}$	A	N	N
$FP71_{F1}$	$K69_{F2}$	M	1E2F6B7T	7/4/1999	17	$FP79_{F1}$			d	N	
$FP71_{F1}$	$K70_{F2}$	F	1E2DF2BT	7/4/1999	17	$FP79_{F1}$			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	
$FP66_{F1}$	$K76_{B\text{-}FL}$	M	1D2C5F6T	12/24/1999	14	FP60			D	N	
$FP66_{F1}$	$K77_{B\text{-}FL}$	F	1F00067T	12/24/1999	14	FP60			u	N	
$FP66_{F1}$	$K78_{B\text{-}FL}$	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	$K86_{B\text{-}FL}$	F	1E2F17ET	1/3/2001	14	$FP65_{F1}$	2/13/2002	FP110	A	N	N
FP82	$K87_{B\text{-}FL}$	F	1E2EFB7T	1/3/2001	14	$FP65_{F1}$			u	Y	
FP82	$K88_{B\text{-}FL}$	M	1F00D57T	1/3/2001	14	$FP65_{F1}$			u	N	
$FP87_{B\text{-}FL}$	K89	F	20501C5T	2/7/2001	14-21	$FP79_{F1}$			u	N	
$FP87_{B\text{-}FL}$	K90	M	1E2F06B	2/7/2001	14-21	$FP79_{F1}$	11/3/2001	FP108	A	N	N
$FP87_{B\text{-}FL}$	K91	M	1F071F4T	2/7/2001	14-21	$FP79_{F1}$			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
TX106	$K92_{F1}$	F	600DBE9	3/17/2001	14-16	FP60			u	N	
TX106	$K93_{F1}$	M	600CCC4	3/17/2001	14-16	FP60			u	N	
$FP88_{F2}$	K94	M	1E2EB3DT	5/25/2001	21	?			u	N	
$FP88_{F2}$	K95	F	1EFF463T	5/25/2001	21	?			u	N	
$FP88_{F2}$	K96	M	1F00576T	5/25/2001	21	?			u	N	
$FP88_{F2}$	K97	F	204F878T	5/25/2001	21	?			u	N	
FP67	K98	F	11D5AFD	5/26/2001	21	?			u	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	$FP79_{F1}$			u	N	
FP102	K106	M	600E036	7/12/2001	21	$FP79_{F1}$			u	N	
FP49	K107	M	000600F828	8/27/2001	21	?			u	N	
FP77	K108	M	000600F0EA	8/30/2001	30	?			u	N	
$FP73_{F1}$	K109	M	000600FD77	3/3/2002	7	?			u	N	
$FP73_{F1}$	K110	M	0001E2D9E2T	3/3/2002	7	?			u	N	
$FP73_{F1}$	K111	F	000600A2C9	3/3/2002	7	?			u	N	
$FP95_{F1}$	K112	F	0001E2E9D3T	4/21/2002	25	$FP85_{B-FL}$			u	N	
$FP93_{B-TX}$	K113	F	0001EFF813T	4/23/2002	18	$FP79_{F1}$			u	N	
$FP93_{B-TX}$	K114	F	000600CC53	4/23/2002	18	$FP79_{F1}$			u	N	
$FP93_{B-TX}$	K115	M	0001F071E4T	4/23/2002	18	$FP79_{F1}$			u	N	
$FP93_{B-TX}$	K116	F	0001F01C76T	4/23/2002	18	$FP79_{F1}$			u	N	
FP78	K117	F	000600CDB3	4/30/2002	21	FP59			u	Y	
FP78	K118	F	000600DB01	4/30/2002	21	FP59			u	Y	
FP78	K119	F	000600E3E3	4/30/2002	21	FP59			u	Y	
FP78	K120	M	0001F01D1CT	4/30/2002	21	FP59			u	Y	
FP101	K121	M	000204F9EAT	5/9/2002	10	?			u	N	
FP101	K122	F	0001E2D6FDT	5/9/2002	10	?			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
FP83	K123	M	000631AED6	5/12/2002	28	?			u	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	$FP79_{F1}$			u	N	
FP75	K128	M	000600E84B	6/6/2002	10	FP100/FP98			u	Y	
FP75	K129	M	00060101BC	6/6/2002	10	FP100/FP98			u	Y	
FP112	K130	M	0001EFF497T	6/15/2002	7	FP100/FP98			u	Y	
FP112	K131	M	000600E4CE	6/15/2002	7	FP100/FP98			u	Y	
FP67	K132	F	000600D0F1	6/18/2002	10	?			u	Y	
FP67	K133	M	000600EBA8	6/18/2002	10	?			u	Y	
FP67	K134	M	000600E776	6/18/2002	10	?			u	Y	
FP107	K135	M	0006010509	7/7/2002	9-10	?			u	Y	
FP107	K136	F	000600F465	7/7/2002	9-10	?			u	Y	

[a] 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.

[b] 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.

Appendix V. List of all known dens of radio-instrumented female Florida panthers and Texas cougars in southern Florida from June 1985 to June 2001. Kitten numbers preceded with K indicate natal den was visited.

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
FP09	Jun 1985	Golden Gate Estates	?	?	1	FP10♂	Unknown
	Jun 1987	FSSP	454.4, 2891.3	hardwood hammock	1E	-	FP12
	May 1989	FSSP	461.1, 2878.6	mixed swamp	?	-	Unknown
	Jul 1990	FSSP	462.3, 2882.2	mixed swamp	2	#202♂[c],203♂	FP37
	Jun 1993	FSSP	456.0, 2873.8	hardwood hammock	Unsuccessful ?	-	FP51
FP11	May 1986	NBCNP (Bear Island)	468.1, 2896.4	pine/palmetto	3	FP19♀	FP12
	May 1988	Bear Island	468.1, 2896.4	pine/palmetto	1?	FP29♂	FP20
	Apr 1990	Bear Island	469.9, 2898.7	pine/palmetto	1?	♀(roadkill)	FP12
	Jul 1991	Price's	469.8, 2907.1	hardwood hammock	1?	FP47♂	FP12
	Mar 1993	Bear Island	468.9, 2896.2	hardwood hammock	?	-	FP12?
FP14	Apr 1989	Long Pine Key	537.2, 2799.2	hardwood hammock	2	FP42♂, ?	FP16
	Mar 1991	Long Pine Key	536.9, 2808.0	hardwood hammock	Unsuccessful		FP16
FP15	May 1988	Long Pine Key	525.1, 2807.2	hardwood hammock	Unsuccessful		FP16

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
FP19	Mar 1988	Price's	468.1, 2906.0	Hardwood hammock	4	FP30♂	FP13
	Jul 1989	FPNWR	460.6, 2893.7	Hardwood hammock	1?	FP43♂	FP12
	Nov 1990	Rock Spring Island	460.6, 2902.7	Pine/palmetto	2	#205♀[c], FP45♂	FP12
	Mar 1992	NE Hog Pond	459.8, 2900.7	Pine/palmetto	2	1♀ (UFP21), FP53♂	FP12
	May 1994	FPNWR	464.6, 2902.9	Pine/palmetto	2	K12♀,K13♀	FP51?
	Apr 1996	Barfield's	463.1, 2904.5	Palmetto/oaks	2	K27♀,K28♀[d]	FP54, FP51?
FP23	Aug 1992	Raccoon Point	502.3,2877.3		2	#209♀[c],#210♂[c]	FP42
	Dec 1992	Raccoon Point			1	FP55♀	FP42
FP31	Mar 1989	Catherine Island	454.0, 2907.0	Pine/palmetto	3	FP34♂, FP35♂	FP12
	Jul 1990	Regency Farms	459.9, 2903.9	Pine/palmetto	2	#201♂[c],#204♀[c]	FP12
	Sep 1991	Barfield's	464.7, 2906.0	Hardwood hammock	2	FP48♀, FP52♀	FP12
FP32	Mar 1989	Catherine Island	457.1, 2898.6	pine/palmetto	unsuccessful?	-	Unknown
	May 1992	FPNWR	457.4, 2897.4	pine/palmetto	1	#208♀[c]	FP12
	Apr 1996	FPNWR		pine/palmetto	1	Dead ♀	
FP36	Mar 1990	BCSIR	492.5, 2906.2	Hardwood hammock	?	-	Unknown
	May 1991	NBCNP	491.1, 2899.0	Pine/palmetto	2	#207♂[c], FP50♂	FP26

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
	Oct 1993	N of BCSIR	489.1, 2909.4	Pine/palmetto	1	-	FP26, FP34
	Jun 1995	Canoe Lake Strand	502.8, 2901.3	Pine/palmetto	?	-	FP45?
	Feb 1996	Wilson Cypress	499.8, 2895.4	Pine/palmetto	3 (remains of 4th)	K24♀,K25♂,K26♂[d]	FP45
FP40	Nov 1990	Baker's Grade	487.1, 2896.3	pine/palmetto	2	#206♀[c], FP44♂	FP26
	Mar 1992	Baker's Grade	485.0, 2897.7	pine/palmetto	2	FP54♂ (K01), K02♂	FP28?
	Jun 1993	Baker's Grade	486.9, 2896.9	pine/palmetto	3	K03♂,K04♀,K05♀	FP26
	?	?	?	?	2	FP60♂, ♀ tracks	Unknown
	May 1997	NBCNP	488.1, 2899.2	pine/palmetto	2	FP69♀, K37♂[d],	FP45
FP48	Oct 1993	Bear Island	475.9, 2901.6	pine/palmetto	3	K06♂,K07♀,K08♀	FP12
	Jun 1995	Dozier Hammock	482.1, 2903.6	pine/palmetto	2	FP59♂,K17♀[d]	Unknown
	Sep 1996	NE Doctor's Ham.	480.2, 2904.0	vines/ferns	3	FP62♂,FP64♂,K33♂[d]	Unknown
	Jun 1998	NBCNP (Bear Island)	476.3, 2899.2	pine/palmetto	2	K51♂[d], FP75♀	FP68 or FP45
	Oct 1999	NBCNP (N of Bear Island campground)	476.1, 2896.1	Palmetto, myrtle	2	K74♀, K75♀[d]	FP63 or FP68
FP49	Jan 1999	NBCNP	497.3, 2897.6	pine/palmetto	1	Abandoned K55♂[d]	Unknown
	Aug 2001	BCNP Addition Lands	495.4, 2900.8	pine/palmetto	1	K107♂	Unknown
FP52	Jul 1993	Sadie Cypress	467.8, 2918.6	mixed swamp	2	1♂ (roadkill)	FP46

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
	Jul 1994	Sadie Cypress	469.6, 2919.0	Cypress swamp	?	-	Unknown
FP55	Apr 1995	SBCNP	483.7, 2871.8	pine/palmetto	2	K14♀,K15♀	FP42
	Sep 1997	SBCNP (N Burns Lake)		pine/palmetto	1	K44♂[d]	Unknown
	Feb 1998	SBCNP (N Monument Lake)		pine/palmetto	3	FP102♀,K49♀,K50♂[d]	Unknown
	Apr 1999	BCNP	479.5, 2876.8	Palmetto/myrtle	2	$FP87_{B\text{-}FL}$♀, K61♂[d]	Unknown
	Jun 2001	NE Airplane Prairie BCNP	481.0, 2882.0	Palmetto	1	K104♂[d]	$FP79_{F1}$
	May 2002	SBCNP	479.9, 2874.3	pine/palmetto	1	K127♀	FP79
FP56	Apr 1994	Baker's Grade	485.8, 2897.3	pine/palmetto	3	K09♂,K10♀,K11♂	Unknown
	Oct 1995	North BCSIR	490.7, 2901.6	pine/palmetto	3	K20♂,K21♂,K22♂[d]	FP45
	Aug 1996	North BCSIR	490.7, 2907.4	Palmetto	2	K29♀?,K30♀?[d]	FP45
	Jun 1997	Bakers Grade	485.9, 2897.6	pine/palmetto	4	K40♂,K41♀,K43♂, FP67♀[d]	FP45
FP57	Jun 1998	FSSP	461.2,2880.6	mixed swamp	?	Den not visited	FP54
$FP61_{F1}$	Mar 1999	Long Pine Key	537.3, 2810.7	Hardwood hammock	1	$FP85_{B\text{-}FL}$♂	FP16
$FP66_{F1}$	Sep 1998	Belle Meade	438.7, 2893.6	pine/palmetto	3	K52♂,K53♀,K54♂[d]	FP72
	Dec 1999	Private lands	464.1, 2909.1	Cypress, cabbage	3	K76♂,K77♀,K78♀[d]	FP60
FP67	Aug 2000	Private lands	486.1, 2910.7	palmetto	2	K84♂, K85♀	Unknown

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
	May 2001	Private lands	486.2, 2909.8	pine/palmetto	4	K98♀,K99♂,K100♂, K101♂[d]	Unknown
	June 2002	Private lands	481.6, 2909.3	palmetto	3	K132♀, K133♂, K134♂[d]	Unknown
FP69	Jul 1999	NBCNP (NE of Baker's Camp)	485.5, 2902.0	Palmetto	3	K71♂,K72♀,K73♀[d]	Unknown
$FP70_{F1}$	Jun 1999	SBCNP (NE of Monument Lake)	491.2, 2865.7	pine/palmetto	3	$FP88_{F2}$♀, $FP92_{F2}$♂, $FP91_{F2}$♀[d]	$FP79_{F1}$
$FP71_{F1}$	Jun 1999	SBCNP	497.7, 2893.8	pine/palmetto	4	$FP90_{F2}$♂, $FP86_{F2}$♀, K69♂, K70♀[d]	$FP79_{F1}$
$FP73_{F1}$	?	?	?	?	?	$FP74_{B\text{-}FL}$♂	-
	Feb 1999	BCSIR	?	?	?	$FP84_{B\text{-}FL}$♂	-
	Feb 2002	Addition Lands	507.9, 2900.0	palmetto	3	K109♂, K110♂, K111♀[d]	Unknown
FP75	Mar 2000	Private lands			Unsuccessful	-	
	Jun 2001	Bear Island, BCNP	466.8, 2899.4	pine/palmetto	2	K102♂,K103♂[d]	FP59
	May 2002	Bear Island, BCNP	466.0, 2894.8	palmetto	2	K128♂, K129♂	FP98, FP100
FP77	May 2000	NBCNP	501.3, 2900.1	Palmetto	3	K81♂,K82♀,K83♂[d]	Unknown
	Aug 2001	Addition Lands	502.6, 2903.9	pine/palmetto	1	K108♂	Unknown
FP78	Apr 2000	FPNWR	464.5, 2896.9	Pine/cabbage	2	FP107♀[d], FP96♂	FP59
	Apr 2002	FPNWR	457.5, 2897.7	pine/palmetto	4	K117♀, K118♀, K119♀, K120♂	FP59
FP82	Dec 2000	OK Slough	472.6, 2933.6	sawgrass marsh	3	K86♀,K87♀,K88♂[d]	$FP65_{F1}$

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
FP83	Apr 2002	FSSP	460.8, 2871.5	fern bed	1	K123♂	Unknown
FP87	Jan 2001	SBCNP	496.6, 2868.6	palmetto	3	K89♀,FP108♂,K91♂[d]	$FP79_{F1}$
FP88	May 2001	Loop Unit, BCNP	500.2, 2855.8	sawgrass marsh	4	K94♂,K95♀,K96♂, K97♀[d]	Unknown
FP93	Apr 2002	Turner River Unit, BCNP	484.5, 2874.5	palmetto	4	K113♀, K114♀, K115♂, K116♀	FP79
FP95	Mar 2002	ENP (Long Pine Key)	533.7, 2807.6	Brazilian pepper	1	K112♀	FP85
FP101	Apr 2002	BCSIR	494.3, 2905.2	pine/palmetto	2	K121♂, K122♀	Unknown
FP102	June 2001	Monument Lake	491.4, 2865.6	mixed swamp	2	K105♂,K106♂[d]	$FP79_{F1}$
FP106	May 2002	FPNWR	464.5, 2903.2	hardwood hammock	3	K124♀, K125♂, K126♂	Unknown
FP107	June 2002	FPNWR	452.2, 2894.4	pine palmetto	2	K135♂, K136♀	Unknown
FP112	June 2002	Bear Island, BCNP	473.3, 2901.6	palmetto	2	K130♂, K131♂	FP98, FP100
TX101	Sep 1995	BCSIR	500.0, 2906.9	pine/palmetto	2	$FP73_{F1}$♀, $FP79_{F1}$♂	Unknown
	Dec 1996	BCSIR	499.4, 2907.6	Palmetto/oak	2	$FP65_{F1}$♂, $FP66_{F1}$♀	FP45
TX105	Sep 1996	ENP (Long Pine Key)	523.2, 2808.0	tropical hardwood	1	K34♀[d]	FP16
	Jul 1999	ENP (Long Pine Key)		Brazilian pepper	?	$FP94_{F1}$♀	FP16
TX106	Nov 1995	South Blocks	447.1, 2885.2	Cypress/mixed	1	K23♀[d]	FP51
	Feb 1998	28th A & DeSoto	447.8, 2895,7	vines/cabbage	1	K47♂[d]	FP54, FP59?

Cat ID[a]	Den Date	Location[b]	UTM Coordinates	Habitat	No. of Kittens	Kittens Handled	Sire
	Jun 1999	PSSF	453.6, 2891.6	Cabbage	2	K62♀[d], $FP83_{F1}$♀	FP54
	Mar 2001	FPNWR	453.4, 2896.2	pine/palmetto	2	K92♀,K93♂[d]	FP60
TX107	May 1997	SBCNP (N of Oasis)	496.5, 2869.1	pine/palmetto	2	$FP70_{F1}$♀,$FP71_{F1}$♀	Unknown
	Feb 1999	SBCNP (N of Buckskin Prairie)	493.8, 2875.7	pine/palmetto	3	K56♀,K57♂[d], $FP93_{B\text{-}TX}$♀	$FP79_{F1}$
TX108	Jun 1996	ENP (Long Pine Key)	532.3, 2809.3	tropical hardwood	?	$FP61_{F1}$♀	FP16
	Feb 1998	ENP (Long Pine Key)		tropical hardwood	2	$FP95_{F1}$♀,K46♂[d]	FP16

[a] 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.

[b] 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.

[c] Kittens removed from wild into captive breeding program.

[d] Kittens marked with transponders.

Appendix VI. Summary of Florida panther and Texas cougar mortalities in southern Florida from 1 July 2000 to 30 June 2001.

Florida Panther 49.--The carcass of this 12-year-old female was discovered on 1 January 2002 on the Addition Lands of the BCNP following detection of a mortality signal. An uncollared Florida panther was seen near FP49 when biologists moved in to recover the carcass. It was assumed that this was the 4-5 mo-old kitten of FP49. Trained hounds were used to tree the panther which turned out to be an adult male. FP49 had been partially fed upon and intraspecific aggression is the suspected cause of death. Her kitten is assumed not to have been alive at the time of FP49's death. Congenital defects included a cowlick and cleft in the spleen.

Florida Panther 92.—The carcass of this 2-year-old subadult male was recovered from the Corkscrew Regional Ecosystem Watershed following detection of a mortality signal 21 September 2001. The telemetry flight on this date was the first since the 11 September terrorist attacks. The panther likely died at least a week before discovery and due to advanced decomposition the cause of death could not be determined.

Florida Panther 96.--The carcass of this approximately 2-year-old subadult male was found on Big Corkscrew Island on 18 January 2002 following detection of a mortality signal. Necropsy findings (cranial puncture) indicated intraspecific aggression as the cause of death although there was no field sign indicating a fight. Panther hair collected embedded in claws was saved for possible genetic analysis. Telemetry data from 16 January indicated the panther was alive and approximately 0.7 km from the carcass collection site. Congenital defects included a kinked tail, cowlick, and cleft in the spleen.

Florida Panther 97.—The carcass of this approximately 2-year-old subadult male was found on private land (Gopher Ridge Grove) on 3 December 2001 following detection of a mortality signal. Necropsy findings indicated intraspecific aggression as the cause of death and field sign supported this conclusion. Panther hair collected embedded in claws was saved for possible genetic analysis. Telemetry data from 30 November indicated the panther was alive and approximately1.4 km from the carcass

collection site. The testes, epididymides, and ductus deferens were removed for semen evaluation prior to necropsy. Congenital defects included a kinked tail, cowlick, and cleft in the spleen.

Florida Panther 105.--The carcass of this approximately 7-year-old female was found on FPNWR on 16 January 2002 following detection of a mortality signal. The panther was in approximately 1 ft of water in a relatively open marsh with little or no associated field sign. The panther was in the second trimester of pregnancy with 3 fetuses and in good condition. The few significant findings at necropsy included bruising under the neck and some bleeding into the chest and pericardial sac. Histopathologic examination of SQ tissue from the ventral neck were consistent with hemorrhage occurring before death. Death occurred by drowning secondary to an acute underlying disorder – suspected to be snake envenomization or blunt trauma (intraspecific aggression). Further diagnostic tests are pending. Telemetry data indicated the panther was alive at approximately the same location two days prior to carcass collection. Congenital defects included a kinked tail and cowlick. The spleen was in two parts – the cause of which is likely congenital.

Florida panther 202.—FP202 was a 12-year-old male that was removed from the wild in 1991 as part of a captive breeding program. The panther was on loan from White Oak Plantation and died unexpectedly of unknown causes 10 February 2002 at the Jacksonville Zoo.

Uncollared Florida Panther 43.—This approximately 2-year-old uncollared male was injured by vehicular trauma on CR846 on 17 August 2001. The panther was transported to the VMTH for surgical repair of vertebral (L7) fractures. However, neurological deficits did not improve and the panther was euthanized on 29 August 2001. Congenital defects included a cleft in the spleen and kinked tail. No transponder chip was present.

Uncollared Florida Panther 45.—This approximately 3-year-old uncollared male died from vehicular trauma on SR27 just north of Palmdale on 5 April 2002. The panther was in good to excellent physical condition. Congenital defects included a kinked tail, unilateral cryptorchidism, and two clefts in the spleen. No transponder chip was present.

Uncollared Florida Panther 46.--This 6-month-old uncollared male panther kitten died from vehicular trauma on 10 April 2002 on SR29 0.5 miles north of Deep Lake. This location is just a few hundred meters north of the end of the SR29 wildlife fence. The mother was uncollared and the kitten had not been previously handled. The number of siblings is unknown. Congenital defects included unilateral cryptorchidism (although eventual normal descent would have been likely), kinked tail, cowlick, and a cleft in the spleen.

Florida Panther 49.--The carcass of this 12-year-old female was discovered on 1 January 2002 on the Addition Lands of the BCNP following detection of a mortality signal. An uncollared Florida panther was seen near FP49 when biologists moved in to recover the carcass. It was assumed that this was the 4-5 mo-old kitten of FP49. Trained hounds were used to tree the panther which turned out to be an adult male. FP49 had been partially fed upon and intraspecific aggression is the suspected cause of death. Her kitten is assumed not to have been alive at the time of FP49's death. Congenital defects included a cowlick and cleft in the spleen.

Florida Panther 92.—The carcass of this 2-year-old subadult male was recovered from the Corkscrew Regional Ecosystem Watershed following detection of a mortality signal 21 September 2001. The telemetry flight on this date was the first since the 11 September terrorist attacks. The panther likely died at least a week before discovery and due to advanced decomposition the cause of death could not be determined.

Florida Panther 96.--The carcass of this approximately 2-year-old subadult male was found on Big Corkscrew Island on 18 January 2002 following detection of a mortality signal. Necropsy findings (cranial puncture) indicated intraspecific aggression as the cause of death although there was no field sign indicating a fight. Panther hair collected embedded in claws was saved for possible genetic analysis. Telemetry data from 16 January indicated the panther was alive and approximately 0.7 km from the carcass collection site. Congenital defects included a kinked tail, cowlick, and cleft in the spleen.

Florida Panther 97.—The carcass of this approximately 2-year-old subadult male was found on private land (Gopher Ridge Grove) on 3 December 2001 following detection of a mortality signal.

Necropsy findings indicated intraspecific aggression as the cause of death and field sign supported this conclusion. Panther hair collected embedded in claws was saved for possible genetic analysis. Telemetry data from 30 November indicated the panther was alive and approximately1.4 km from the carcass collection site. The testes, epididymides, and ductus deferens were removed for semen evaluation prior to necropsy. Congenital defects included a kinked tail, cowlick, and cleft in the spleen.

Florida Panther 105.--The carcass of this approximately 7-year-old female was found on FPNWR on 16 January 2002 following detection of a mortality signal. The panther was in approximately 1 ft of water in a relatively open marsh with little or no associated field sign. The panther was in the second trimester of pregnancy with 3 fetuses and in good condition. The few significant findings at necropsy included bruising under the neck and some bleeding into the chest and pericardial sac. Histopathologic examination of SQ tissue from the ventral neck were consistent with hemorrhage occurring before death. Death occurred by drowning secondary to an acute underlying disorder – suspected to be snake envenomization or blunt trauma (intraspecific aggression). Further diagnostic tests are pending. Telemetry data indicated the panther was alive at approximately the same location two days prior to carcass collection. Congenital defects included a kinked tail and cowlick. The spleen was in two parts – the cause of which is likely congenital.

Florida panther 202.—FP202 was a 12-year-old male that was removed from the wild in 1991 as part of a captive breeding program. The panther was on loan from White Oak Plantation and died unexpectedly of unknown causes 10 February 2002 at the Jacksonville Zoo.

Uncollared Florida Panther 43.—This approximately 2-year-old uncollared male was injured by vehicular trauma on CR846 on 17 August 2001. The panther was transported to the VMTH for surgical repair of vertebral (L7) fractures. However, neurological deficits did not improve and the panther was euthanized on 29 August 2001. Congenital defects included a cleft in the spleen and kinked tail. No transponder chip was present.

Uncollared Florida Panther 45.—This approximately 3-year-old uncollared male died from vehicular trauma on SR27 just north of Palmdale on 5 April 2002. The panther was in good to excellent

physical condition. Congenital defects included a kinked tail, unilateral cryptorchidism, and two clefts in the spleen. No transponder chip was present.

Uncollared Florida Panther 46.--This 6-month-old uncollared male panther kitten died from vehicular trauma on 10 April 2002 on SR29 0.5 miles north of Deep Lake. This location is just a few hundred meters north of the end of the SR29 wildlife fence. The mother was uncollared and the kitten had not been previously handled. The number of siblings is unknown. Congenital defects included unilateral cryptorchidism (although eventual normal descent would have been likely), kinked tail, cowlick, and a cleft in the spleen.

Appendix VII. Summary of Florida panther and Texas cougar mortalities and injuries in southern Florida from 2 February 1972 to 30 June 2002.

Cat ID[a]	Date	Sex	Age at Death	Location
			Vehicular Mortalities	
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[a]	Date	Sex	Age at Death	Location
Vehicular Mortalities (continued)				
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
$FP74_{B\text{-}FL}$	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 E 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
$FP90_{F2}$	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[a]	Date	Sex	Age at Death	Location
		Vehicular Mortalities (continued)		
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
		Vehicular Injuries		
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	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
		Shootings		
UFP02	8 Mar 1978	M	2-3	L-28, Dade County
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
		Shooting Injuries		
FP09	??-??-86	F	not fatal	Golden Gate Estates, So. of SR 84, Collier Co.
		Intraspecific Aggressions		
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

Cat ID[a]	Date	Sex	Age at Death	Location
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.
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 $FP79_{F1}$
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
FP96	15 Jan 2002	M	1.75	N end Big Corkscrew Island
			Other or Unknown Causes	
UFP03	01 Feb 1979	M?	unknown	Gannet Strand (Fl. Museum of Natural History)
FP06	16 Apr 1982	M	6-7	NE BCNP - unknown cause

Cat ID[a]	Date	Sex	Age at Death	Location
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
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
FP19	02 Dec 1997	F	11.5	FPNWR (Merry Xmas) - ruptured aorta
FP21	26 Dec 1997	F	11-12	White Oak – euthansia
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

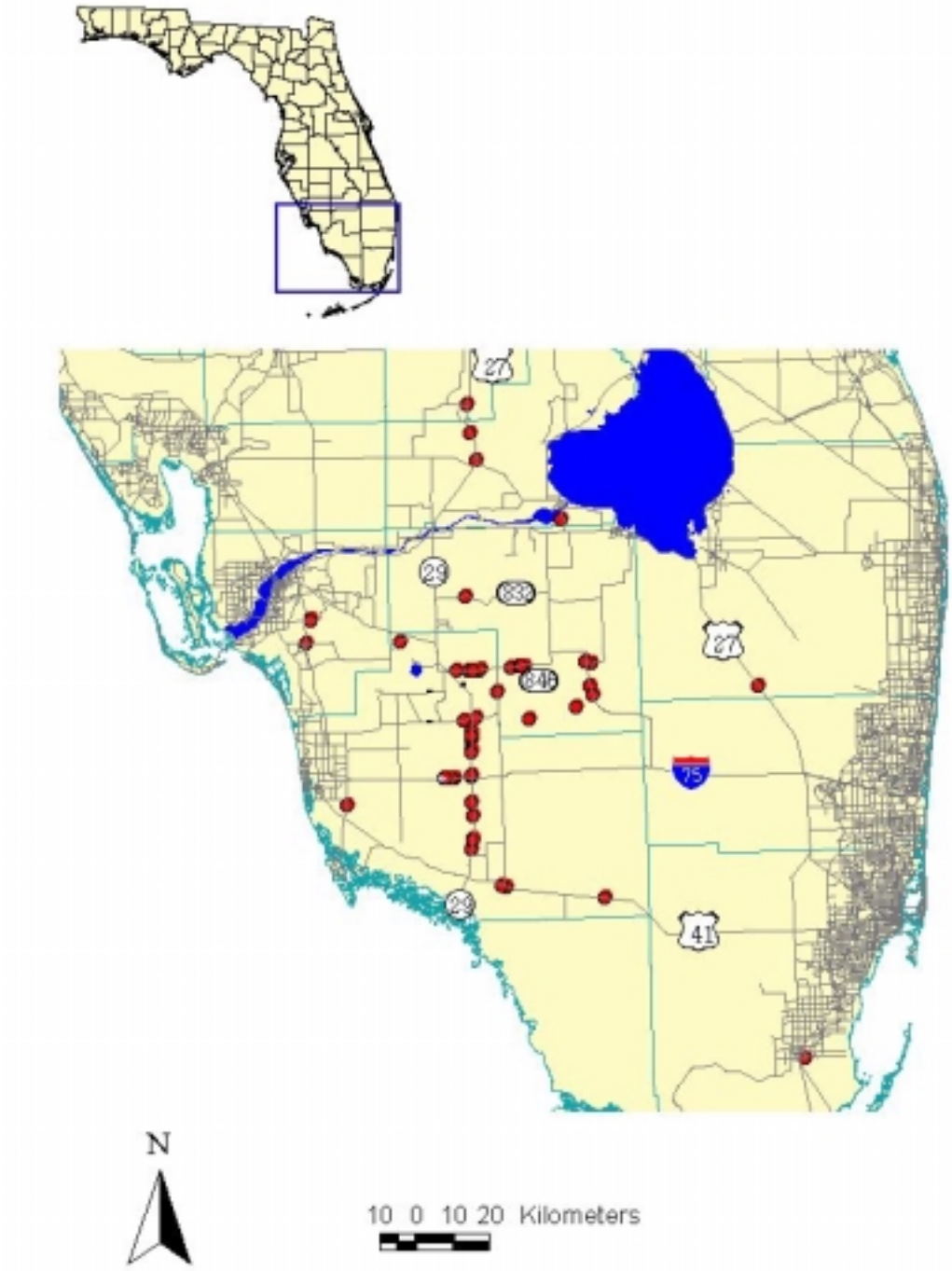
Cat ID[a]	Date	Sex	Age at Death	Location
FP68	01 Mar 2000	M	5-7	NBCNP W of Tangerine tram--unknown
TX101	29 Mar 2000	F	-	BCSIR ¼ mi W of game pen, ¾ mi S of canal-unknown
$FP84_{B\text{-}FL}$	20 Apr 2000	M	14 mos.	Fisheating Creek WMA, N side of creek, 5 mi W of US 27-unknown
FP23	1 Dec 2000	F	14	BCNP 2 mi E of Turkey Foot – unknown
TX107	18 Jan 2001	F	8-9	BCNP 11 Mile Rd.-unknown
FP92	Sep 2001	M	2.2	N Flint Pen Strand, CREW

[a] 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.

[b] 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 VIII

Locations of Vehicular-Related Mortalities of Florida Panthers
February 1972 – June 2002



Appendix IX.

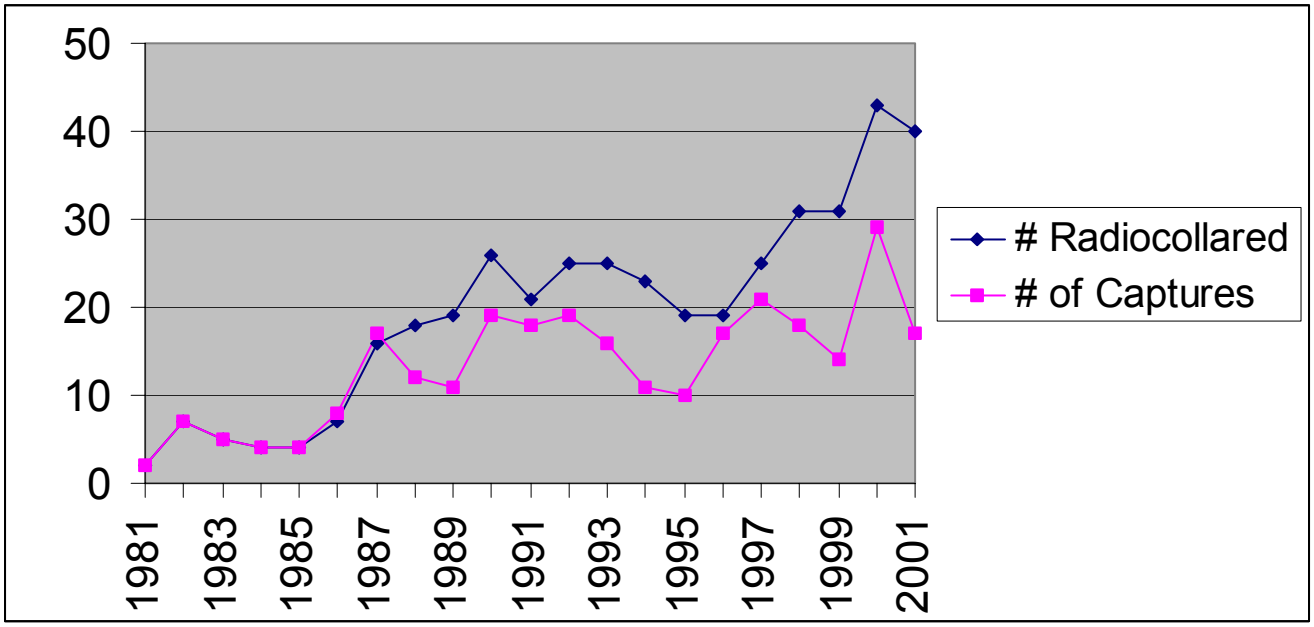
Mitigating Risks Associated with the Capture and Handling of Florida Panthers

Florida Fish and Wildlife Conservation Commission
Bureau of Wildlife Diversity Conservation
Panther Section

7 September 2001

The Florida Fish and Wildlife Conservation Commission (FWC) initiated intensive research efforts to study Florida panthers in 1981. These efforts required the use of trained hounds to tree panthers and remotely-injected chemicals to immobilize the cat for bio-medical examinations and affixing radiocollars. Since 1981, FWC has immobilized 106 panthers over 260 times with only 1 known fatality. We have collected a tremendous body of data on panther health, fecundity, mortality, food habits, social structure, home range dynamics, habitat use, distribution, and dispersal, and these data are being employed in recovery efforts today. FWC and the National Park Service have collected over 55,000 panther relocations via aerial telemetry since 1981.

Florida panther genetic restoration began in 1995 with the release of 8 breeding-aged female Texas cougars into the existing panther population. The goal was to recruit 2 offspring from each cougar into the population with the long-term goal of achieving a genetically more resilient panther population. In order to monitor the effects of genetic restoration, FWC has increased the number of panther captures and the number of panthers monitored with radiocollars.



Given the quality and quantity of panther data available, we think it prudent to re-evaluate current panther capture procedures and offer recommendations on how we can minimize risk without compromising future information needs. There are 3 areas of risk associated with the capture and radiocollaring of Florida panthers: 1) mortality or injury due to adverse reaction to immobilizing chemicals or from capture-induced trauma, 2) abandonment of kittens or other disruption of family structure, and 3) loss of contact with or access to young radiocollared panthers whose collars need to be re-sized to accommodate growth. Each of these areas will be discussed below along with alternative strategies to reduce these risks.

1) Mortality or injury due to adverse reaction to immobilizing chemicals or from capture-induced trauma

In 1983, a panther was killed during capture activities. As a result, FWC created a formal panther capture team, including a wildlife veterinarian who is equipped to treat a variety of emergencies including heat stress, lacerations, respiratory distress, and fractures. Furthermore, specialized gear such as capture nets and wildlife cushions and experienced tree-climbers add an extra measure of safety. All of these preparations, however, cannot eliminate capture risks.

During routine panther capture activities this past season (November 2000 – April 2001), we had 2 panthers suffer broken legs, both of which were descendents of the female Texas cougars. These panthers are still recuperating from their injuries at White Oak Conservation Center. Prior to these cases, we have only removed 1 other panther from the wild to treat a capture-related injury (needle embedded in bone) and this cat was released within 24 hours. FWC panther capture team members have noted that the Texas cougars and their descendants have been more energetic in avoiding capture by hounds and these observations were confirmed statistically. Texas cougars and their descendants jumped from trees more often than Florida panthers ($P<0.0037$) (see Attachment 1 for a more complete analysis) and we believe this energetic avoidance contributed to the leg fractures. Therefore, we now may be facing a greater risk of injuring Florida panthers during capture activities than we faced in the 15 years prior to genetic restoration.

The only way to eliminate capture risks is to not capture panthers. In lieu of an unlikely cessation of panther captures, we can take steps to reduce the number of captures without sacrificing monitoring needs. Panthers should only be captured if they are needed to achieve specific goals. If an individual panther is no longer needed as a study animal, say a female panther past reproductive age, its radiocollar should be allowed to expire instead of conducting yet another capture. Break-away devices could also be considered if the need for a study animal is short-term. New advances in VHF radiocollars may allow monitoring of study animals for 5 years or more and we should be more willing to capture an adult animal once, gather appropriate biological samples and monitor the animal until either the radiocollar or the panther dies.

2) Abandonment of kittens or other disruption of family structure

FWC has captured and radiocollared 49 dependent-aged panther kittens since 1986 ranging in age from 4 to 18 months. Our capture efforts caused the abandonment of at least 2 of these kittens; 1 was raised successfully in captivity and released and the other died of infection in captivity shortly after its capture. There are other examples where our activities may have caused an early break-up of a family group. Given these concerns, FWC adopted a

protocol to minimize anesthesia and data collection during kitten captures in order to try to get the kitten returned to its family group as soon as possible. Although our protocol has lessened the chance of disrupting family bonds, kitten captures continue to be the most stressful panther activities for both panthers and researchers.

Injuring a kitten during capture activities would be further complicated by the cat's dependence upon its mother. One of the 2 panthers that suffered broken legs during capture activities was a dependent-aged 6-month-old male kitten. This kitten had to be removed to captivity and the fracture has healed without complications. However, we cannot release this cat until we ensure that he has the hunting skills necessary for survival as an independent cat. We have witnessed panthers as young as 9-10 months-of-age becoming independent, but never as young as 6 months.

Capturing kittens < 1 year-of-age necessitates additional captures to re-size radiocollars as the kittens grow in size. As an example, if we capture a 6 month-old male kitten, we have to recapture him 3 more times as he matures to his adult weight.

Kittens of radiocollared females should not be captured until they are at least 1 year-of-age so that complications such as abandonment will not necessitate removal from the wild, i.e., the kitten would be old enough to survive on its own. Further, the kitten will have been with its mother and siblings in the wild for at least a year—this would improve its odds for survival following return to the wild if an injury necessitating removal did occur. Logically, this concept extends to capturing adult females with dependent kittens. An injury to the mother necessitates not only her removal for treatment but also all kittens. The number of dependent kittens would likely be unknown and, provided they could all be successfully captured and transported, facilities to house them for an extended period may be limited. Finally, kittens raised for a portion of their life in captivity may result in less fear of humans, less social experience with other panthers, and less knowledge of the terrain. Exceptions to the above strategy should be made only if the need outweighs the risks and if resources (including financial) are available to house the panther until it is ready for return to the wild.

3) Loss of contact with or access to young radiocollared panthers whose collars need to be re-sized to accommodate growth

As was noted under item 2 above, the capture of sub-adult panthers leads to additional recaptures as the cats grow in size. To date, we have been successful at recapturing all panthers in need of larger collars, but on 1 occasion, awaiting permission from a landowner delayed the recapture to the point where the collar was beginning to abrade the skin causing some infection. Other delays in recapturing young panthers have resulted in collars being tighter than we would like. The recent premature failures of radiocollars and dispersal of some panthers onto inaccessible private lands may result in collars sized for juveniles permanently remaining on some adult panthers. If these conditions occurred with juvenile male panthers, serious health complications could arise as they double their size between initial collaring and adulthood.

We propose that all female panthers < 2 years-of-age and males < 3 years-of-age be fitted with radiocollars equipped with break-away mechanisms. Break-away devices are available from radiocollar manufacturers or can be fabricated in-house. Leather break-aways have been used on Florida black bears in the Ocala National Forest. Bear collars with 11-12 fr untreated leather lasted approximately 2 years in most adult females, but dramatic seasonal

weight changes resulted in a more rapid failure of break-aways in males. In some bears growth and/or weight changes resulted in the collars cutting into the skin although without obvious effects on condition or reproduction. In these cases the leather did stretch by approximately 30% but did not fail until months after skin injury occurred (based on a small number of remote camera photos). Collars may break-away before we had planned, but the loss of radio contact with a panther is more acceptable than having a radiocollar compromising panther health.

SUMMARY

The risk of injuring a Florida panther during capture has increased, perhaps as a result of behavioral changes following the implementation of genetic restoration. Panthers descended from the released female Texas cougars are more energetic in their attempts to avoid capture by hounds and tend to jump from trees during the pursuit. This energetic avoidance of capture was probably responsible for the leg fractures suffered by 2 panthers during the capture season 2000-01.

As a result of these capture-related injuries, we are recommending changes to our current capture season planning and decision-making. The 4 changes listed below will lead to fewer captures and therefore fewer panthers placed at risk.

5) Panthers should only be captured to achieve specific goals including allowing radiocollars to expire once the goals are met or using break-devices if the need is short-term.
6) Panther kittens should not be captured until they are >1 year-of-age.
7) Female panthers should not be captured if their kittens are <1 year-of-age.
8) Radiocollars for females <2 years-of-age and males <3 years-of-age should be equipped with break-away devices.

Exceptions to these changes should be reviewed on a case-by-case basis and should include an assessment of resources available to treat, house, and prepare an injured cat for return to the wild. Implementing these changes will not completely eliminate panther capture risks, but they should make our capture plans more defensible. The restrictions on handling either young panthers or panthers with kittens will ensure a quicker return to the wild should an injury occur.

MEMORANDUM

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

TO: Mr. Darrell Land, Panther Section Leader

DATE: May 11, 2001

SUBJECT: Analysis of Florida panther "energetic avoidance" data

As per your request, here is a quick analysis to explore "energetic avoidance" by descendants of Texas cougars.

Summary of results

The expected number of times jumped for descendants of Texas cougars was higher than for other Florida panthers ($P = 0.0037$).

Texas ancestry did not appear to affect the probability of jumping after dart ($P = 0.5698$), the probability of succumbing to tranquilizer while treed ($P = 0.4632$), or the probability of baying on ground ($P = 0.6518$).

There appeared to be strong panther-specific (i.e., individual) effects for the number of times jumped ($P = 0.0360$) and the probability of jumping after dart ($P = 0.0594$), but not for the probability of succumbing to tranquilizer while treed ($P = 0.3500$) or the probability of baying on the ground ($P = 0.3202$).

Methods

The data are given in Table 1; panthers for whom Texas ancestry was unknown were excluded from the analysis. All computations were performed using either the SAS System (SAS Inst. Inc., 1999) or R software (Ihaka and Gentleman, 1996) (a dialect of the S language [Becker et al., 1988; Chambers and Hastie, 1993]). In the following, variables are denoted by use of `this font`.

`NumberOfTimesJumped` was assumed to follow a Poisson distribution, and generalized linear mixed model (GLMM) methodology, as can be implemented in PROC NLMIXED in the SAS System, was performed. A log link and Poisson error distribution were specified, and a random panther-specific effect was included in the linear predictor.

A Bernoulli distribution was assumed for `JumpedAfterDart`, `LoweredOrFell`, and `BayedOnGround`. For each of these variables, GLMMs were fitted in which a logit link and Bernoulli error distribution were specified, and a random panther-specific effect was included in the linear predictor.

For each of the dependent variables, the linear predictor in the initial GLMM contained fixed effects terms for `Sex`, `TexasDescendant`, `Sex`×`TexasDescendant`, and linear trend in `Age`. All hierarchical reduced

models were also fitted. Akaike's information criterion (AIC) was used for comparing the fit among models; smaller values of AIC indicated better fit.

Results

Number of times jumped

AIC values for the fitted models were as follows:

Terms in model	AIC
`Sex`, `TexasDescendant`, `Sex`×`TexasDescendant`, `Age`	167.1662
`Sex`, `TexasDescendant`, `Age`	169.0813
`Sex`, `TexasDescendant`	168.1086
`Sex`, `Age`	175.6964
`TexasDescendant`, `Age`	167.4221
`Sex`	174.1410
`TexasDescendant`	166.7481
`Age`	175.1095
Intercept	173.9142

Thus, the fixed effects in the best GLMM according to AIC only included terms for `TexasDescendant`. Based on this model, we have the following:

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

		P–value for	95% CI limits for σ	
$\hat{\sigma}$	SE	H_0: $\sigma = 0$	Lower	Upper
0.474322	0.2184204	0.0360	0.032525	0.916119

The ratio of number of times jumped for Texas descendants to the number of times jumped for non-Texas descendants was:

Log scale					Back-transformed scale			
		95% CI limits		P–value for			95% CI limits[‡]	
Estimate	SE	Lower	Upper	H_0: ratio = 0	Estimate	SE[†]	Lower	Upper
1.058833	0.3427603	0.365535	1.752131	0.0037	2.8830	0.98818	1.4413	5.7669

[†]Obtained by application of the delta method.
[‡]Obtained by exponentiation of log scale CI limits.

The expected number of jumps were as follows:

	Mean number		95% CI limits	
`TexasDescendant`	of jumps	SE	Lower	Upper
Yes	1.201029	0.2502790	0.694792	1.707266
No	0.416589	0.1303480	0.152936	0.680243

Thus, the expected number of times jumped for descendants of Texas cougars was higher than for other Florida panthers ($P = 0.0037$) (Figure 1).

Jumped after dart

AIC values for the fitted models were as follows:

Terms in model	AIC
`Sex`, `TexasDescendant`, `Sex`×`TexasDescendant`, `Age`	98.9759
`Sex`, `TexasDescendant`, `Age`	97.5263
`Sex`, `TexasDescendant`	95.3197
`Sex`, `Age`	95.4899
`TexasDescendant`, `Age`	96.5883
`Sex`	93.5022
`TexasDescendant`	94.6079
`Age`	94.9381
Intercept	93.0669

Thus, according to AIC, the simple intercept model provided the best fit; the model was not improved by inclusion of any of the candidate predictors. Although AIC for the model containing a `Sex` effect was close to that of the simple intercept model, `Sex` was not significant ($P = 0.3040$).

Based on the GLMM in which the fixed effects included only terms for `TexasDescendant`, we have the following:

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

		P–value for	95% CI limits for σ	
$\hat{\sigma}$	SE	H_0: $\sigma = 0$	Lower	Upper
1.670396	0.8600318	0.0594	0.000000	3.409974

The ratio of the odds of jumping after dart 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: odds ratio = 0	Estimate	SE[†]	Lower	Upper
0.499584	0.8716470	−1.26349	2.262657	0.5698	1.6480	1.43651	0.2827	9.6086

[†]Obtained by application of the delta method.

The expected probability of jumping after dart for each group was as follows:

	Log(odds) scale				Back-transformed (i.e., probability) scale			
			95% CI limits				95% CI limits	
`TexasDescendant`	Estimate	SE	Lower	Upper	Estimate	SE[†]	Lower	Upper
Yes	−0.394034	0.6056851	−1.61915	0.831080	0.4027	0.14569	0.1653	0.6966
No	−0.893618	0.7417847	−2.39402	0.606783	0.2904	0.15285	0.0836	0.6472

[†]Obtained by application of the delta method.

Thus, there was no evidence that the probability of jumping after dart depended on Texas ancestry ($P = 0.5698$).

Lowered or fell

AIC values for the fitted models were as follows:

Terms in model	AIC
`Sex`, `TexasDescendant`, `Sex`×`TexasDescendant`, `Age`	96.3395
`Sex`, `TexasDescendant`, `Age`	95.2248
`Sex`, `TexasDescendant`	93.2365
`Sex`, `Age`	93.8628
`TexasDescendant`, `Age`	93.3259
`Sex`	91.9019
`TexasDescendant`	91.3550
`Age`	91.9298
Intercept	89.9861

Thus, according to AIC, the simple intercept model provided the best fit; the model was not improved by inclusion of any of the candidate predictors.

Based on the GLMM in which the fixed effects included only terms for `TexasDescendant`, we have the following:

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

		P–value for	95% CI limits for σ	
$\hat{\sigma}$	SE	H_0: $\sigma = 0$	Lower	Upper
0.785349	0.8302849	0.3500	0.000000	2.464758

The ratio of the odds of succumbing to tranquilizer while treed 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: odds ratio = 0	Estimate	SE[†]	Lower	Upper
−0.499966	0.6747659	−1.86481	0.864877	0.4632	0.6066	0.40928	0.1549	2.3747

[†]Obtained by application of the delta method.

The expected probability of succumbing to tranquilizer while treed for each group was as follows:

	Log(odds) scale				Back-transformed (i.e., probability) scale			
			95% CI limits				95% CI limits	
`TexasDescendant`	Estimate	SE	Lower	Upper	Estimate	SE[†]	Lower	Upper
Yes	0.575472	0.4521161	−0.339019	1.489963	0.6400	0.10416	0.4160	0.8161
No	1.075438	0.6360302	−0.211055	2.361930	0.7456	0.12063	0.4474	0.9139

[†]Obtained by application of the delta method.

Thus, there was no evidence that the probability of succumbing to tranquilizer while treed depended on Texas ancestry ($P = 0.4632$).

Bayed on ground

AIC values for the fitted models were as follows:

Terms in model	AIC
`Sex`, `TexasDescendant`, `Sex`×`TexasDescendant`, `Age`	92.2622
`Sex`, `TexasDescendant`, `Age`	90.8488
`Sex`, `TexasDescendant`	88.8702
`Sex`, `Age`	89.0414
`TexasDescendant`, `Age`	88.8582
`Sex`	87.0685
`TexasDescendant`	86.8720
`Age`	87.0573
Intercept	85.0966

Thus, according to AIC, the simple intercept model provided the best fit; the model was not improved by inclusion of any of the candidate predictors.

Based on the GLMM in which the fixed effects included only terms for `TexasDescendant`, we have the following:

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

		P–value for	95% CI limits for σ	
$\hat{\sigma}$	SE	H_0: $\sigma = 0$	Lower	Upper
0.867362	0.8614135	0.3202	0.000000	2.609735

The ratio of the odds of baying on ground 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: odds ratio = 0	Estimate	SE[†]	Lower	Upper
−0.299070	0.6575689	−1.629129	1.030989	0.6518	0.7415	0.48759	0.1961	2.8038

[†]Obtained by application of the delta method.

The expected probability of baying on ground for each group was as follows:

	Log(odds) scale				Back-transformed (i.e., probability) scale			
			95% CI limits				95% CI limits	
`TexasDescendant`	Estimate	SE	Lower	Upper	Estimate	SE[†]	Lower	Upper
Yes	−1.224629	0.5824621	−2.402770	−0.046488	0.2271	0.10224	0.0830	0.4884
No	−0.925559	0.6018728	−2.142962	0.291843	0.2838	0.12234	0.1050	0.5724

[†]Obtained by application of the delta method.

Thus, there was no evidence that the probability of baying on ground depended on Texas ancestry ($P = 0.6518$).

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Table 1: Data used in the analysis.

ID	Sex	Texas Descendant	Capture Date	Age	Number of times jumped	Jumped After Dart	Lowered or fell	Bayed on ground
100	M	N	01/31/01	4.0	0	N	Y	N
101	F	N	02/05/01	2.0	0	N	Y	N
102	F	N	02/20/01	3.0	1	Y	N	Y
103	F	N	03/13/01	0.9	1	Y	Y	N
104	F	U	04/02/01	0.5	2	Y	Y	N
32	F	N	02/03/89	2.0	1	Y	Y	N
			01/11/91	4.0	1	Y	N	Y
			02/08/93	6.0	0	N	Y	N
			02/19/97	10.0	1	Y	Y	N
			01/24/00	13.0	0	Y	N	Y
48	F	N	02/24/92	0.3	1	Y	N	Y
			01/05/93	1.2	0	N	Y	N
			05/05/94	0.5	0	N	Y	N
			01/09/95	3.2	1	Y	N	Y
49	F	N	02/25/92	2.0	0	N	Y	N
			02/01/00	10.0	0	N	Y	N
54	M	N	02/10/93	0.8	1	Y	N	Y
			05/05/93	1.1	3	Y	N	Y
			01/17/94	1.6	1	Y	N	Y
55	F	N	03/02/98	5.4	0	N	Y	N
			03/09/00	7.4	1	Y	Y	N
57	F	N	01/31/95	3.0	0	N	Y	N
			01/29/98	6.0	0	N	Y	N
59	M	N	01/07/96	0.6	1	Y	N	Y
			05/20/96	0.9	1	Y	N	Y
			02/11/99	3.8	0	N	Y	N
			02/15/01	5.5	0	N	Y	N
60	M	N	05/29/96	0.7	0	N	Y	N
61	F	Y	02/17/00	3.4	4	N	Y	N
62	M	N	03/25/98	1.5	0	N	Y	N
65	M	Y	11/19/97	0.9	1	Y	N	Y
			03/08/99	3.3	2	Y	Y	N
			11/17/00	4.0	3	Y	N	Y
67	F	N	01/19/98	0.7	0	N	Y	N
70	F	Y	02/25/98	0.8	2	N	Y	N
			03/30/98	1.0	2	N	Y	N
71	F	Y	03/05/98	0.8	3	N	Y	N
73	F	Y	01/10/00	4.4	2	N	Y	N

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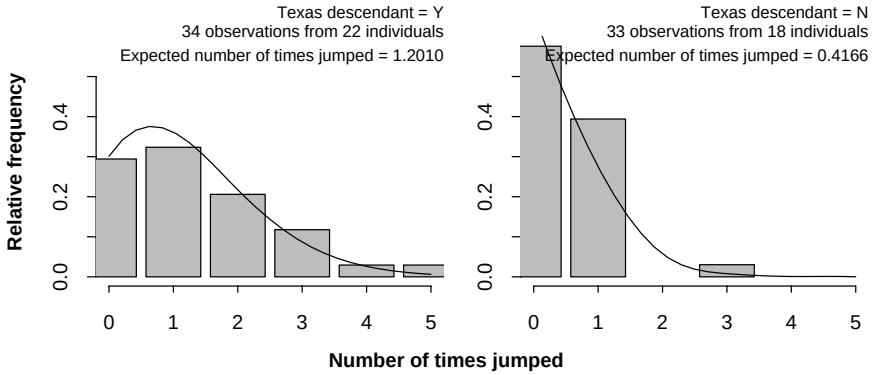
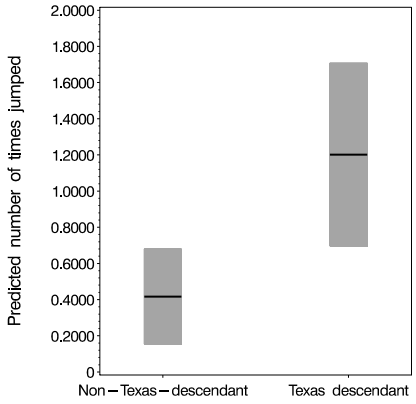
ID	Sex	Texas Descendant	Capture Date	Age	Number of times jumped	Jumped After Dart	Lowered or fell	Bayed on ground
75	F	N	05/09/00	2.0	0	N	Y	N
79	M	Y	03/03/99	3.4	0	N	Y	N
			11/15/00	5.0	0	N	Y	N
82	F	N	01/25/00	3.0	0	N	Y	Y
83	F	Y	02/08/00	0.7	1	N	Y	N
			02/24/00	0.7	1	Y	N	Y
			03/07/01	1.8	2	Y	N	N
84	M	Y	02/11/00	1.0	0	N	Y	N
85	M	Y	02/26/01	2.0	1	N	N	N
86	F	Y	02/27/01	1.7	0	N	Y	N
88	F	Y	03/01/01	1.8	1	Y	N	N
90	F	Y	03/08/00	0.7	0	N	Y	N
			01/15/01	1.6	0	N	Y	N
91	F	Y	03/17/00	0.8	1	Y	Y	N
			03/21/01	1.8	1	Y	N	N
92	F	Y	04/06/00	0.8	1	Y	N	Y
			01/12/01	1.5	0	N	Y	N
93	F	Y	04/10/00	1.1	0	N	Y	N
94	F	Y	05/01/00	0.8	1	Y	N	Y
95	F	Y	11/07/00	2.0	1	Y	N	Y
96	M	N	01/07/01	0.8	0	N	Y	N
97	M	U	01/19/01	0.9	0	N	Y	N
98	M	N	01/25/01	2.8	1	N	Y	N
99	M	U	01/26/01	0.9	0	N	Y	N
TX101	F	Y	12/17/96	5.0	3	Y	Y	N
			01/10/00	9.0	2	Y	N	Y
TX103	F	Y	01/12/99	8.0	3	N	Y	N
TX105	F	Y	12/01/97	4.0	1	Y	Y	N
			12/01/00	7.0	0	N	Y	N
TX106	F	Y	12/18/96	5.0	2	Y	N	Y
			01/21/00	9.0	5	Y	N	Y
TX108	F	Y	12/15/97	4.0	0	N	Y	N



(a) Fit of the GLMM for `NumberOfTimesJumped`. Curve indicates expected `NumberOfTimesJumped` based on the fit of the GLMM; bars indicate empirical relative frequencies of `NumberOfTimesJumped`.



(b) Predicted `NumberOfTimesJumped` based on the fit of the GLMM. Horizontal black lines within vertical gray bars indicate predicted `NumberOfTimesJumped`, vertical gray bars indicate 95% confidence intervals (CIs) for `NumberOfTimesJumped`.

Figure 1: Results of the fit of the GLMM for `NumberOfTimesJumped`; the fixed effects in the model included only terms for `TexasDescendant`.

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Appendix X.

Draft: August 21, 2002

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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 23 microsatellite loci of over 175 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 and 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 ours 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.

Once a robust analysis of potential parents has been completed, pedigrees will be completed to the extent possible for all animals. This will be the first step in a more rigorous analysis of the current situation and of possible future trends. For example, it is apparent that in spite of increases in molecular genetic variation in the Florida population following the introduction female pumas from Texas (average observed heterozygocity of 37% prior to the release of Texas pumas compared to 44% after the release) that certain matrilines of Florida panthers are being lost. In addition, physical traits will be traced in the pedigree to explore the occurrence of inheritable traits. The impact of the molecular genetic effects of the introduction of Texas females will be 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 are capable of breeding 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. Males disperse greater distances than females, who are more philopatric and the Everglades and Big Cypress populations might not be as isolated as previously hypothesized. Final analyses of these data are expected to be completed by the end of the year.

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