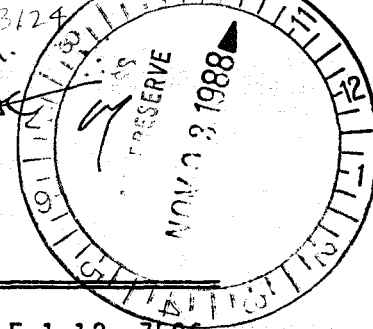


ANNUAL PERFORMANCE REPORT
Statewide Wildlife Research



State: Florida
Project Title: Panther Research
Section Title: Recovery Plan Implementation
Subsection Title: Florida Panther Recovery
Study Title: Florida Panther Biomedical Investigation
Period Covered: July 1, 1987 - June 30, 1988
Prepared By: Melody E. Roelke, D.V.M., Diagnostic Veterinarian Manager

Study No. E-1-12-7506
RECEIVED
OCT 27 1988
Executive Director's Office

ABSTRACT--Fourteen individual Florida panthers (Felis concolor coryi) were successfully immobilized for the purposes of radio-collaring and collection of biomedical information and/or for removal from the wild for rehabilitation. One hundred and five field days resulted in radio-collaring four new panthers. The physical condition, body weight, reproductive status, and blood and serum values all indicate that the panthers utilizing the private lands adjacent to the Bear Island Unit, Big Cypress National Preserve were in excellent health and in better condition than those previously studied in the Fakahatchee Strand State Preserve (FSSP). This north/south "health cline" continues to be associated with the type and abundance of prey taken. Seven panthers have died since December 1987 and human activity is responsible for the majority of all documented panther deaths (road killed 52%, illegally killed 15%). Seventy-five percent of all Florida panthers were exposed to feline panleukopenia virus, however, the prevalence was significantly higher in the FSSP/Big Cypress Swamp ecosystem than in the Everglades National Park ($p < 0.05$). Panthers were also exposed to feline calicivirus (56%) but there was no significant difference in prevalence by location ($p > 0.05$). In addition to the above two viruses, bobcats have antibodies to feline rhinotracheitis virus, which has not been reported in wild Florida felids before. In vitro fertilization experiments produced 141 oocytes (eggs) from seven female cougars. Following insemination, ten cleaved embryos resulted, including one sired by a captive Florida panther, which were transferred to two recipient females. Preliminary data from the panther/cougar population genetics study reveal that the species has abundant genetic diversity (minimum of 11 polymorphic loci), but F. c. coryi has fewer polymorphic loci than other wild subspecies examined. The results of the genetic study coupled with an increase in abnormal male reproductive traits (>90% abnormal spermatozoa and 33% cryptorchidism) raise serious concern for the reproductive potential and genetic health of this subspecies.

INTRODUCTION

The endangered Florida panther (Felis concolor coryi), declared the state mammal of Florida in 1982, is estimated to number less than fifty individuals (Hines et al., 1987) and currently is protected under both state and federal endangered species statutes. This remnant population of the subspecies that once occupied the entire southeastern United States is now isolated in the remote cypress swamps and hardwood hammocks of southern Florida, primarily in the Big Cypress Swamp and Everglades ecosystems (Belden, 1986). Human population growth in southern Florida with the concomitant loss of suitable panther habitat is the major threat to the continued survival of this rare mammal. A detailed review of the life history and status of the panther is presented in the United States Fish and Wildlife Service recovery plan (USFWS, 1987).

Given the critically small population size of this subspecies and the probable decreased genetic diversity, vitality, and lowered disease resistance that often accompanies inbreeding in mammals (O'Brien et al., 1985), the Florida panther is vulnerable to local population catastrophes that could lead to extinction in the wild such as occurred with the black-footed ferret (Mustela nigripes) in Wyoming (Williams et al., 1988). Very little published information exists concerning the basic physiology, reproduction, or disease agents of the Florida panther with the exception of one paper on parasites by Forrester et al. (1985).

In 1978 preliminary research on the diseases and parasites of wild panthers was initiated, and in 1983 this was expanded and intensified to

include a study of the medical management, health, and reproductive and genetic status of free-ranging Florida panthers. This collaborative effort between the College of Veterinary Medicine at the University of Florida and the Florida Game and Fresh Water Fish Commission supported a 3-year veterinary residency position in Wildlife Medicine from 1983 to 1986 (funded by the GFC). The continuation of the biomedical research since July 1, 1986 has been made possible by the funding of a full time wildlife veterinarian position with the Florida Game and Fresh Water Fish Commission.

As habitat loss throughout Florida continues to threaten all wildlife species, especially the already beleaguered panther, wildlife biologists and administrators will be forced to manage the remaining individuals in ways quite different from the classic wildlife management style. In otherwise abundant wildlife species, the population as a whole is managed, not the individual. However, if we hope rescue the Florida panther from extinction some rather intensive management strategies aimed at the individual will be necessary. From the biomedical stand point the immediate management measures must include:

- 1) enhancement of the probability of survival of all panthers by protecting them from identified pathogens (i.e. feline panleukopenia virus and hookworms) via the use of vaccines and anthelmintics;
- 2) treatment of medical problems aimed at the long term survival of the individual (i.e. fractures, abscesses, and other medical problems);
- 3) preservation of the maximum amount of genetic diversity possible, which should include collecting and freezing gametes from every individual handled for use in future artificial breeding efforts and as insurance against the catastrophic or demographic loss of the wild population.

This document also serves as the Annual Performance Report for the contract entitled "Studies on Certain Health and Reproductive Parameters of the Florida Panther", D.J. Forrester, principal investigator. This contract, covering July 1, 1987 through June 30, 1988 was between the Florida Game and Fresh Water Fish Commission and the Department of Infectious Diseases, College of Veterinary Medicine, University of Florida, Gainesville, Fl.

I wish to acknowledge the effort and support willingly given to this project by my assistants this past year: Stephen H. Parker, as my veterinary assistant for the entire field season and volunteer for Colorado mountain lion project; Bruce Hagedorn, wildlife graduate who assisted and cared for captive Florida panthers; Toni Ruth, wildlife graduate who assisted in the preparation of field capture supplies; and Vincent Gibaldi, junior veterinary student who assisted with preparation for the capture season and various other projects at the Wildlife Research Laboratory in Gainesville and who also volunteered on the Colorado mountain lion project.

METHODS AND MATERIALS

Field Capture Season

The main 1987-1988 Florida panther capture season spanned 4 months, January 4 through April 13, 1988 and entailed a total of 66 days in southwestern Florida and 33 days in the Everglades National Park (ENP). On January 7, 1988 the team was granted access to the private property of Jack Price of Sunniland where we captured #11 female for re-collaring. From January 8-16 the

capture team hunted in the Bear Island unit of the Big Cypress National Preserve (BI/BCNP) and on the Scofield ranch in Hendry County. Following the finding of fresh male panther sign, the capture team moved north to hunt on the private ranches in the vicinity of Archbold Biological station (Lake Placid south to Palmdale) in Glades county. This effort between January 18-30 culminated in the capture of #24 male panther. Reproductive physiologist Dr. JoGayle Howard from the National Zoological Park participated in the capture of #12 male on January 31 (in the FSSP) and #16 male on February 2 (in the ENP) for the purpose of collecting and freezing spermatozoa. During the capture of the #12 male, two visiting wildlife scientists (a veterinarian and a wildlife technician) from Bhutan, sponsored by the World Wildlife Fund, were present to observe our capture operations.

The next hunting effort, February 4-21, was on private land in the northern Fakahatchee Strand in and around the proposed USF&WS National Panther refuge east of SR 29 and north of SR 84, currently owned by Collier Enterprise. This included land referred to as "Fred Barfield's lease", the Fakahatchee Conservation Club, Catherine and Airplane Islands, and the Ford "Test-Track". We captured #25 male and documented an uncollared adult female with two kittens (approx. 6-8 months old) utilizing this area.

From February 22 to March 1 we shifted to the east of BI/BCNP and hunted on and around other land owned by Collier Enterprise, currently leased and referred to as the Noble Ranch. This effort yielded the capture of #26 male in southern Hendry County and the documentation of another uncollared female with two juvenile kittens, approx. 12 months old, utilizing the Noble Ranch.

The final 2 weeks of the southwestern Florida capture season were spent hunting in the northern Fakahatchee Strand (FSSP and private land).

Panther hunting in the Everglades National Park commenced on March 13 and ran until April 13, 1988. Two separate dog hunting teams were used to intensively hunt in the eastern portion of the ENP. One team hunted primarily in the "Hole-in-the-Donut" area of the park, and the other focused north of Pine Island in Taylor Slough and the eastern everglades. Several days were spent west of Shark River Slough in the western ENP, but no sign was found. A new female, #27, was captured in the eastern everglades and we believe that she was the only uncollared panther in the area we searched.

Two separate emergency capture events occurred associated with the ENP project following the regular capture season. On June 22, 1988 panther #23 female (20 months old) was rescued five weeks after her release following 11 months in captivity at White Oak Plantation. She had become stranded on an Island in the middle of Shark River Slough for 13 days when the water suddenly rose. The second capture occurred on July 23, 1988 after #21 female was struck by a car on Palm Drive east of Florida City. Initially evacuated to the Metro Miami Zoo for treatment and stabilization, she was transported by air to the College of Veterinary Medicine at Gainesville for surgical repair of a fractured femur.

At the completion of the southern Florida panther capture season, the veterinary team participated in a collaborative cougar project in southwestern Colorado. This project was led by Allen Anderson of the Colorado Division of Wildlife, and the goal was to capture eight radio-instrumented male cougars for

the purpose of collecting semen, blood, and skin biopsies. All of the animals and samples obtained were handled using the same protocol as developed in Florida so that they could be used as "normals" for comparing blood values, semen quality, and disease exposure endangered Florida panthers. Also, these samples will be included in the population genetics study and will help define the level of genetic diversity expected in an outbred, non-endangered breeding population of cougars.

Field Capture Technique

The primary objective of veterinary involvement on the capture team was to insure safe handling and proper medical management of panthers during the capture effort. The decision to immobilize a given panther following treeing by dogs was made only after carefully accessing the health status, physical condition, and level of stress experienced by that individual coupled with an evaluation of the ambient temperature, humidity, and other physical conditions that might harm the panther.

A compressed air Varior^R dart rifle (Telinject USA, Inc.) was utilized to immobilize the panthers and was found safe and effective under field conditions. Lightweight, atraumatic plastic darts were used to deliver ketamine hydrochloride (Ketamine^R 5-10 mg/kg) as the initial immobilizing agent.

Tranquilized panthers were then removed from the trees by hand, lowered by a rope, or allowed to fall into a catch-net and cushioned "crash bag". Once the panther was on the ground the vital signs and depth of anesthesia were evaluated. Intravenous administration of diazepam (Valium^R 0.06- 0.12mg/kg) and additional Ketamine and/or xylazine hydrochloride (Rompum^R 0.25- 0.5 mg/kg)

were used as needed to maintain an appropriate level of anesthesia to complete the procedure. An intravenous (IV) catheter was installed in the cephalic or saphenous vein and fluids were administered continuously.

After stabilization, each panther was given a thorough physical examination which included an evaluation of physical condition (muscling, fat, and hair coat) and reproductive status. Additionally, each animal was weighed, measured (body and tail length, neck and chest girth, foot pads, and teeth), tattooed, and radio-collared. Dental and foot impressions also were taken when possible. Biological samples were taken and included blood, feces, urine, hair, skin biopsies (for genetic analysis), ectoparasites, and swabs from pharynx, rectum, and vagina. Additionally, all adult males were electro-ejaculated to collect spermatozoa for seminal analysis. Semen was preserved by freezing for future artificial breeding attempts.

Following immobilization, collaring, and collection of biological data and samples, the panthers were placed in a nylon mesh tent and held until fully recovered.

For further details of the methods used in the capture and immobilization of panthers and the procurement of biological samples, please refer to Roelke et al. (1985).

Clinical Pathology Analysis

Four different clinical laboratories were utilized this year depending on the proximity to our field location. These included Diagnostic Services Inc. in Naples, Fl., James Archer Smith Hospital laboratory, in Homestead, Fl., Consulab, in Miami, Fl., and the Veterinary Medical Teaching Hospital labora-

tory (VMTH), in Gainesville, Fl. In many cases duplicate samples were shipped to two different labs to validate the results that were being obtained from the human hospital laboratories. In these cases the VMTH was used as the veterinary standard.

Sero-survey of Infectious disease agents

Serum samples from panthers and bobcats were submitted to Dr. Fred Scott of the Feline Health Center at Cornell University in Ithaca, New York to be tested for antibodies against six feline infectious disease agents: feline panleukopenia (FPL), feline calicivirus (FCV), feline rhinotracheitis virus (FVR), feline infectious peritonitis (FIP), feline leukemia virus (FeLV), and Toxoplasma gondii. Dr. Nicoletti of the College of Veterinary Medicine in Gainesville, screened the panther sera for antibodies to Brucella spp., and Dr. Gene Pirtle of the National Animal Disease Laboratory, U.S. Department of Agriculture in Ames, Iowa tested them for pseudorabies virus antibodies.

Fifty blood samples have been collected from 17 male and 15 female wild panthers since 1978. These samples were collected from panthers either live-captured and immobilized for radio-instrumenting purposes (N = 24), road-killed (N = 7), illegally killed (N = 2), killed during immobilization (N = 1), or killed by interspecific aggression (N = 1); some individuals were sampled as live animals and again at necropsy. Thirteen bled as live-captured animals were subsequently resampled; 12 as live re-captures (N=15), two of which were later sampled as road-kills, and one as a victim of aggression/cannibalism.

Chi-square tests on the prevalence of panleukopenia virus and calicivirus antibodies in the panthers were applied to determine the relationships of sex,

age, and location. Significance was accepted at $p \leq 0.05$. Detailed analysis of the bobcat data will be completed at a later time.

Genetic Analysis

Blood and tissue samples for genetic analysis were obtained from every Florida panther immobilized this year. The blood samples were processed and frozen for later analysis while the skin biopsies for fibroblast tissue culture were shipped by overnight air service to the National Cancer Institute.

Thus far, a total of 81 animals have been analyzed as part of the comparative Felis concolor population genetics study. These include 19 Florida panthers, 32 wild cougars of 9 different subspecific designations, and 21 captive cougars of unknown subspecific classification.

Wildlife biologists and veterinarians in several western states have been instrumental in procuring blood and tissue samples from their respective subspecies of wild cougar for inclusion in the Florida panther/puma population genetics research. The collaborative effort and contribution of the following people and institutions are acknowledged and greatly appreciated: Allen Anderson, Colorado Division of Wildlife, 10 SW Colorado Mt. Lions (F. c. hipolestes); Bob Gagliuso, Oregon State University, 13 SW Oregon Cougars (F. c. oregonensis/californica); Walt Van Dyke and Mark Hengen, Oregon State Department of Fish and Wildlife, 5 NE Oregon Cougar (F. c. missoulensis); Drs. Dave Jessup and Dave Hunter, California Game and Fish Department, 4 California Cougars (F. c. californica); Harley Shaw and Art Fuller, Arizona Game and Fish Department and Dr. Tom Boggs, 12 Arizona Mt. Lions (F. c. browni/azteca/kaibabensis); Ken Elowe and Bill Bates, Utah Division of Wildlife Resources and Dr.

Fred Lindsey, Wyoming Cooperative Research Unit, 2 Utah Mt. Lions (F. c. kaibabensis); and Roy McBride, 22 west Texas panthers (F. c. stanleyana).

Additionally, samples from twenty-one cougars held in various zoological institutions and in private ownership have been collected for genetic evaluation. Eight of the captives are alleged to have descended from wild Florida panthers captured in the 1940's in the Devil's Garden area east of Immokolee, Florida. These samples were provided by Dr. J. Edlund and Bert Wahl of Tampa, Fl. and Mike Jones and John George, Tallahassee Jr. Museum, Tallahassee, Fl.

The genetic analysis was initiated in August, 1986 at Dr. Steve O'Brien's laboratory at the National Cancer Institute in Frederick, Maryland. Isozyme extracts of red blood cells, leukocytes, and plasma were subjected to electrophoresis using starch or acrylamide gels. Histochemical and protein stains were used to identify enzymes of approximately 46-50 different loci. Polymorphic loci (genes) were identified as variants of electrophoretic mobility.

Analysis of the first 81 Felis concolor spp. collected has been approximately 80% completed. Considerable work is yet to be completed on the above samples as well as the additional ones collected this year.

Post Mortem Analysis

Eight dead Felis concolor specimens were retrieved from the wild this year (July 1987 through August 1988). When decomposition was not advanced, the cadavers were subjected to a complete post mortem examination. A complete exam included gross and microscopic examination of tissues, serology, bacteriology,

parasitology, and radiography. When the carcass was very fresh, attempts were made to collect and preserve living spermatozoa and skin. Hides and skeletal remains were deposited in the Florida State Museum (FSM). Dr. Maples of the FSM, a forensic pathologist, was consulted when the cause of death was not obvious or if we suspected some illegal activity. Seven of the dead panthers/cougars had been previously radio-instrumented. Of the un-collared animals, one was a road-kill which turned out to be a captive born/released animal of unknown origin, and the other was the skeletal remains of a male, presumed to be F. c. coryi, found by a hunter in Volusia County.

RESULTS AND DISCUSSION

MEDICAL MANAGEMENT OF WILD FLORIDA PANTHER

Field Capture of Free-Living Panthers

During 1987-88, twelve panthers were captured 15 times (Table 1). Twelve of these captures culminated in successful field immobilizations. These resulted in the radio-collaring of four new panthers: one sub-adult female in the Everglades National Park, one adult male east of the Bear Island unit of the Big Cypress National Preserve, one adult male west of SR 29 on private land (proposed USF&WS Florida panther refuge), and one adult male on private land in Glades county.

The current status and projected immobilization schedule for all radio-instrumented Florida panthers is given in Table 2. As of 30 June 1988, eighteen Florida panthers were part of our project. Three animals were being held in captivity and fifteen radio-instrumented, free-ranging panthers were

being monitored; 10 in southwestern Florida and 5 in the Everglades National Park. In the following three months, one captive and four wild panthers have died or have been removed from the wild due to injuries.

Ten other cougars (non-Florida panthers) have been obtained and utilized as part of the captive breeding effort and/or for release in the northern Florida Reintroduction Project (R.C. Belden, GFC). A list of all the cougars and the procedures performed on them is given in Table 3.

Rescue, Rehabilitation, and Release of Injured Wild Panthers

Two panthers, #20M and #23F, were rescued, rehabilitated, and returned to the wild this past year. One of these (#23) had to be recaptured and removed again six weeks after release. A third panther (#21), has been removed from the wild but is still recuperating from her injuries (Tables 1 and 2).

Male #20 was struck by a vehicle and dragged along on the pavement early last summer. He suffered severe abrasions and sloughing of skin over his carpus and forearm. His six week treatment in captivity at the Miami Metro Zoo included twice weekly bandage changes, curettage, and plastic surgery to close the four-inch circular defect.

While in captivity, a pronounced cardiac murmur was diagnosed. Cardiologists felt that the murmur was probably due to a valvular or septal defect, congenital in origin, and that it could limit his life span. Once released, this panther apparently lived a normal life and is believed to have sired a litter (D. Maehr, GFC, pers. comm.). One year after his return to the wild he died. The pathologists found a one centimeter defect in the wall between the

two atria of his heart. Although the heart did not have an abnormal shape, changes in his lungs were supportive of a vascular flow problem, and it is felt that the heart defect contributed to his death.

Female #23, had been removed from the ENP (9 months old) after becoming orphaned in June of 1987. She was kept at White Oak Plantation for 11 months in a relatively wild setting. In captivity, she demonstrated the ability to kill small prey (rabbits and fawns). After her release, daily radio-telemetry data indicated that she was active and made continual small movements (S. Bass, ENP, pers.comm.).

For four weeks #23 moved slowly in a northwesterly direction and was hunting on the small tree islands in the middle of the then dry Shark River Slough. In mid-June, 1988 monsoon-like rains caused the water level in the slough to rise quickly stranding #23. When recaptured because of concerns for her health, she was found to be in very poor physical condition and was removed from the wild.

The Everglades National Park and National Park Service have decided to re-release #23 in the ENP in January of 1989. The water level at that time is low and the capture team will be available if another rescue is required.

Physical condition and body weights of wild Florida panthers

After handling a number of live-captured panthers and a few well preserved dead ones over the past four years, it became apparent that there was a discrepancy in the physical condition between sexes and between animals of the same sex collected in different locations. A detailed analysis of this phenomenon lead to the prediction that panthers occupying land north of

Alligator Alley would be heavier, in better physical condition, and have more normal hematological values than those panthers occupying the southern Fakahatchee strand (Roelke et al., 1985).

For the past two capture seasons we have concentrated capture efforts on the private lands north of SR 84 (Alligator Alley) and in the Everglades National Park. Table 4 summarizes the capture data and compares body weights, physical condition, reproduction, and select hematology values between various capture locations. Of the various areas where the GFC has captured panthers since 1981, the private ranches east of Immokalee, Fl., owned by ALICO Inc. and Collier Enterprise, Inc., continue to yield the largest and healthiest Florida panthers. Males in these areas weigh > 140 lbs. and the female weighed 100 lbs. with packed cell volumes (red cells) of > 45%. Bear Island and the northern Fakahatchee strand support panthers in moderate-to-good condition with body weights ranging from 120-135 lbs. for males and 90-100 lbs. for females and PCV's ranging from 34-45%. ENP panthers are faring better than those in the FSSP. The two adult ENP females weigh 71-85 lbs. ($\bar{x}$ = 76) with PCV's of 33-36% while the FSSP females weigh only 66-77 lbs. ($\bar{x}$ = 72) and have PCV's of 25-34%.

In addition to the ALICO and Collier properties mentioned above, the land just north of the Bear Island Unit (BCNP) and east of Sunniland appears to be another area very favorable for panthers. Florida panther #11 is currently raising her second litter there since 1986. Female #19 (#11's 1986 offspring) has been living in this area since she was approximately 2 months old. Her body weight at different ages was compared to other young female panthers

(Table 5). Her weight at 18 mos. was greater than any of the three ENP females by 10-20 lbs. even though two of them were a year older. According to D. Maehr (pers. comm.), she conceived a litter at 19 months of age and is now raising four cubs. Her increased body weight and good health may be responsible for the early sexual maturation.

The most plausible explanation for the discrepancy in health between panthers living in different localities continues to be their plane of nutrition determined by the abundance of the available prey base.

Hematology and Serum Chemistry

The complete blood count (CBC) provides information about the two major cell types in the circulatory system, the red cells (erythrocytes) and the white cells (leukocytes). An analysis of the red cells, or hemogram, can detect the presence or absence of anemia by evaluation of the total number of erythrocytes, the hemoglobin level, the packed cell volume (expressed as the percentage of cellular elements in whole blood) and the size and shape of the individual erythrocytes. The packed cell volume (PCV) can be used by itself as an indicator of anemia, however, hemoglobin, total erythrocyte count, and the PCV are interrelated and generally will all elevate or decline together.

An analysis of the white cells, or leucogram, supplies information relevant to cases of systemic inflammation, stress, infection, certain parasitic diseases or immune suppression. This is accomplished by considering both the total number of leukocytes as well as the distribution and type of cells present.

Tables 6 to 16 display the hematology results and Tables 20 to 32 contain serum chemistry results for all panthers captured this season. The tables also include blood values from previous years for those animals. Tables 17-19 and 33-34 contain hematology and serum chemistry data, respectively, from two Arizona, nine Colorado, and six Oregon wild caught cougars. In many cases there are multiple test results for the same date. This is because either the samples were taken at different times during the anesthetic procedure and the effects of time and drugs were being evaluated or duplicate samples were sent to different laboratories to validate the results. A detailed analysis of these data will be included in the final report.

INFECTIOUS AND PARASITIC DISEASE RESEARCH-FLORIDA PANTHER

Sero-epidemiology Research

Fifty serum samples obtained from thirty-two wild Florida panthers collected between 1978 and 1988 were screened serologically for eight infectious disease agents known to be important to felidae and/or reported previously as endemic to other wildlife species in Florida. A summary of the disease agents, serologic test methods, source and type of antigens used, number of samples tested, positive antibody thresholds, and references for the detailed test procedure is presented in Table 35.

A. Feline Panleukopenia Virus

The most significant documented infectious disease agent to which the panthers are exposed is feline panleukopenia (Tables 36 & 37). Antibodies to this virus or a closely related parvovirus were detected in the serum from 25

of 32 (78%) different panthers. Prior to this study there have been no reports of the occurrence of this virus in free-ranging cougar populations.

Feline panleukopenia virus (FPL), a parvovirus, also known as feline distemper, is a highly contagious, devastating viral disease primarily involving domestic cats causing mortality chiefly in immunologically naive adults and young kittens. All members of the family Felidae are considered susceptible and definitive diagnoses have been made in several species of non-domestic felids. Of notable importance is the occurrence of the disease in the captive cougar (Felis concolor sp.) and wild bobcats in Florida (Felis rufus) (Bittle 1981; Wallach and Boever 1983; Wassmer 1982). Other susceptible wild carnivores which occupy the same habitat as the Florida panther and could serve as reservoir hosts for parvovirus are the raccoon, feral cat, otter, and mink (Roelke et al., 1985).

Infection usually occurs by ingestion or inhalation of virus in feces, vomitus, or urine from infected individuals. The virus is extremely hardy and can survive for more than a year at room temperature. Therefore, in addition to direct contact with a shedding individual, habitat contamination could be a very plausible "reservoir" source of the virus.

To date no panther deaths have been attributed to panleukopenia virus. This does not diminish the potential importance of this virus to the panther population. Until recently the majority of the animals we have sampled were "post exposure", antibody positive, surviving adults. The group of panthers we are most concerned about are the sero-negative animals, particularly the kittens and juveniles. Many factors including the immune status, innate

resilience to disease, nutritional status, and other concurrent infections act in concert within the individual to influence the outcome of an exposure to FPL. For a detailed discussion of this disease entity, please refer to Roelke et al. (1985).

With the accumulation of serology data, it has become apparent that panthers in the Fakahatchee Strand and Big Cypress Swamp (FS/BCS) physiographic area are exposed to FPL to a greater degree than panthers in the Everglades National Park (ENP). To date, 19 of 21 (90%) panthers that inhabit the FS/BCS have tested seropositive for FPL compared to only 3 of 7 (43%) panthers from the ENP. The prevalence of FPL titers was compared between these two major geographic regions and was found to be significantly different ($\chi^2_1 = 7.472$, $p = 0.006$, Table 38 and 39A). The prevalence of FPL was not effected by the sex of the panther ($\chi^2_1 = 2.169$, $p = 0.141$) but was influenced by age ($\chi^2_3 = 9.719$, $p = 0.0271$). There was a 3.37 times greater probability of panthers becoming seropositive (exposed) with each successive age class.

The sample of panthers from any one location within the Big Cypress ecosystem was too small for us to apply statistical scrutiny, however 64% (7 of 11) of the panthers that reside primarily in the Fakahatchee Strand (both north and south of SR 84) have high FPL titers ($\geq 1:1,000$) compared to only 25% (2 of 8) of those residing primarily in Bear Island and the adjacent private lands to the north (Table 39 B). Titers of these magnitudes maintained over a period of years within the Fakahatchee Strand may indicate that the panthers are experiencing recurrent exposure causing an anamnestic response, acting much like a "booster" vaccination.

Several factors could be responsible for the dramatic difference in the prevalence of FPL between the FS/BCS and the ENP:

- 1) The heavily vegetated, dense habitat of the Fakahatchee Strand and lack of penetrating insolation (and UV light) could create a microclimate environment more conducive to enhanced viral survival than the open sawgrass and cypress prairies of the ENP;
- 2) The panthers in the FS/BCS tend to utilize abandoned logging roads that are raised above the water level of the swamp. These serve as well delineated corridors, predictable pathways over which many animals walk and defecate (panthers, bobcats; otters, and raccoons) increasing the chance of viral exposure. This is contrasted sharply with the roadless wilderness and lack of established animal pathways in the ENP;
- 3) Or possibly, cycling of the virus and the frequency of exposure is dependent on the density and relative "viral shedding" ability of the carnivore hosts. Felids and raccoons shed virus for a limited time following exposure (Barker et al. 1983), whereas mink have been documented to shed for up to a year (Bouillant 1965). The mink population in southern Florida is exceedingly low and probably plays a minimal role, however, another mustelid, the otter, is abundant, particularly in the Fakahatchee Stand State Preserve.

These factors warrant further investigation for they may be very important to our understanding of the dynamics of this disease and its implications to panther management with respect to kitten survival and vaccination regimes.

B. Feline Calicivirus

Florida panthers are exposed to another potentially pathogenic feline virus, feline calicivirus (FCV). This is primarily an upper respiratory virus, and is usually quite mild. However, certain strains can cause severe oral lesions, pneumonia, and death. Eighteen of 32 (56%) panthers had antibodies to this virus (Table 36 and 37). Recovered animals can harbor and shed the virus for considerable time, however, unlike FPL it does not survive outside the animal host and must rely on close physical contact with saliva and aerosolized respiratory fluids for transmission to occur.

There was no significant difference in the prevalence of FCV between the major geographic areas (FS/BCS and ENP $\chi^2_1 = 1.766$, $p = 0.184$), the age ($\chi^2_3 = 0.44$, $p = 0.93$), or sex ($\chi^2_1 = 3.388$, $p = 0.066$) of the panthers (Table 38 and 40). This diffuse presence of the virus throughout the panther population without regard to age and sex supports the same route of transmission that occurs in domestic cats from mother to offspring and not from the environment. The significance of this virus to Florida panthers is unknown at this time.

C. Pseudorabies Virus

Pseudorabies (PRV) is an infectious, viral disease that infects the central nervous system of many mammals (Trainer, 1981) and has been demonstrated to cause 100% mortality in experimentally infected domestic cats (Horpath and Papp 1967). All naturally infected cats showing clinical signs invariably die, usually before any immune response can be detected (Pedersen 1986). Therefore, the fact that all the panthers were sero-negative could

indicate that those individuals had never encountered the virus and not that the virus was absent in their environment (Table 36 and 37).

The course of the disease in domestic cats is extremely rapid (24-36 hr), and if it were to follow a similar course in the elusive free-ranging panther, the clinical phase would undoubtedly be missed. Also, it would be unlikely to retrieve a fresh carcass so that an accurate histological and virological diagnosis could be made. In fact, 3 of 16 dead radio-instrumented panthers have died of "unknown" causes (Roelke, unpublished data) principally because the high decomposition rate in sub-tropical Florida rapidly reduced the carcasses to bones and hair, rendering them useless for all but the coarsest of examination.

Becker et al. (1988) have reported serologic evidence of PRV in feral hogs (Sus scrofa) from Collier (30% of 20) and Glades (51% of 51) counties as did Nettles (1984) from Hendry County. These three counties in southern Florida (plus unsampled Dade County with a very low hog density) harbor the core breeding population of Florida panthers. Tozzini et al. (1982) demonstrated that four experimentally infected wild hogs did not show any clinical disease but shed the virus in saliva and nasal discharge for 1-2 weeks, and subsequent infection occurred in contact animals. In areas where hogs are abundant they are a primary prey item of the Florida panther (Belden, 1986 and Roelke et al. 1986), and it would therefore be possible for them to contract the virus from persistently infected and/or shedding hogs.

PRV exposure has been demonstrated in other wild carnivores from Florida including three of 57 (5.3%) raccoons (Procyon lotor) and 2 of 20 (10%) black

bear (*Ursus americanus*) (M. Roelke and E. Pirtle, unpublished data, Roelke et al. 1986, and Pirtle et al. 1986). Raccoons are an important food item in certain regions of the panthers' range (Belden 1986, Roelke et al. 1986, and O. Bass, unpublished data), and in light of the research by Platt et al. (1983), the raccoon may be an important reservoir host and therefore a potential threat to the Florida panther.

Despite the possible involvement of other species, the feral hog poses the greatest threat of PRV exposure for the Florida panther. It appears that in areas of suitable panther habitat where there are dense populations of largely seropositive feral hogs (greater than 50% positive for PRV), Florida panthers are either entirely absent or exist at a very low density. Fisheating Creek (Glades County) and Myakka River State Park (Sarasota County) follow this pattern.

Belden et al. (1988) documented a high hog density in the Fisheating Creek Wildlife Management Area (FEC) for the years 1979-1983. In 1982-83, 191 of 295 (65%) adult hogs tested positive for pseudorabies antibodies (P. Gibbs, pers. comm.). Further, Becker et al. (1988) reports that 51% ($n = 26/51$) of the hogs tested positive in 1986-87. The panther density throughout the past decade has remained exceedingly sparse in the area. Field searches in 1977-78 (Belden, 1978), 1984-85 (J. Roof, unpublished data), and 1987-88 (D. Maehr, APR FY 87/88) have resulted in documenting only one male panther in the area, with one additional young male road killed in 1983 (R.C. Belden, unpublished data).

A similar scenario exists in the Myakka River State Park. Continued high hog density and the associated habitat alteration of the park's land prompted

the establishment of a hog eradication program a number of years ago. Nettles (1984) reported seropositive hogs from Sarasota county (between 1978-83) and Becker et al. (1988) reported that 73 of 134 (55%) hogs tested in 1986-87 were positive for PRV. Despite numerous citizen reports of panthers in this region and the documented panther range less than 50 miles to the east, there has not been a single confirmed (body or evidence) record from this area since at least 1977 (Belden, 1978 and pers. comm. and Ken Alvarez, pers. comm.).

Although the impact of PRV on the panther is largely conjecture at this time, there is circumstantial evidence that suggests that hogs carrying pseudo-rabies virus could be acting to limit and delineate the distribution of panthers in southern Florida. Proving this will be difficult, but it could be one of the more important diseases threatening the panther and certainly begs investigation.

INFECTIOUS DISEASE RESEARCH-SMALL CARNIVORE

The bobcat is susceptible to the same disease agents as the Florida panther, and because it is much more abundant than the panther, it can serve as a very useful "sentinel" to indicate the presence and prevalence of certain infectious diseases and possibly detect the entry of a new one.

Eleven bobcats were captured during the 1987/88 south Florida panther capture season: five on private land in Highlands County, three on private ranches north of BI/BCNP in Hendry and Collier counties, two in the northern Fakahatchee Strand/Bear Island-BCNP, and one from the Deep Lake Strand area (Turner River Road). Serum from these 11 animals (plus 15 from 1986/87) was screened for antibodies to six feline infectious disease agents: feline pan-

leukopenia virus (FPL), feline calicivirus (FCV), feline rhinotracheitis virus (FVR), feline infectious peritonitis, feline leukemia virus, and Toxoplasma gondii (Table 41).

Since 1984, 82 southern Florida bobcats have been screened for antibodies against FPL resulting in an overall prevalence of 48% (Roelke et al., 1986). Like the panther, the proportion of the population exposed to FPL is much higher in the FS/BCS than in the ENP, 70+% versus 14%, respectively (see discussion above under panther).

The magnitude of the prevalence of FPL is consistently lower in the bobcat than it is in the panther (i.e. overall = 78% panther versus 48% bobcat). Rather than indicating some significant difference in susceptibility to the virus between the two hosts, it probably is more reflective of the virus's natural history.

Once an animal mounts an antibody response to FPL it is detectable virtually throughout their lifetime. Therefore, the longer the animal lives, assuming "exposure opportunities" continue to occur, seropositive animals will accumulate in the population. The panther lives longer than the bobcat in the wild (8-12 years for panthers v.s. 2-5 years for bobcats) (T. Hardisky pers. comm.), therefore there is greater potential for exposure (viz. all panthers greater than 5 years of age regardless of location are seropositive). Also, the panther's home range encompasses a much larger area than does the bobcat's and therefore they would have a greater probability of encountering the virus in their travels.

The prevalence of feline calicivirus in the bobcat is similar to the panther (54% and 56%, respectively) and it has a similar, ubiquitous distribution pattern in all habitats sampled.

Probably the most significant serological finding this year is that a new virus, feline rhinotracheitis virus, has entered the feline picture. This virus can cause mild to severe oral and ocular lesions, upper and lower respiratory disease, and chronic sinusitis/rhinitis in domestic cats and captive exotic felids.

Antibodies to this virus have not been detected in bobcats prior to 1988. However, 46% (n = 5/11) of the 1988 animals were seropositive for FRV, with the highest titer from an animal in Highlands County (Table 41.) We have never sampled from that population before so no comment can be made as to the timing of its entry into the bobcats. However, this year was the first time that FVR has been detected in any animals from Collier County, suggesting that it may be entering from the north.

FVR antibodies have been detected in several panthers following vaccination with killed FVR in 1987 and 1988, and although there is no way to discriminate between a natural and a vaccine exposure, until we have information to the contrary we have assumed it to be the latter (Table 37, panthers #08, #09, #11, #14, and #15).

The significance of this new virus to the free-ranging felids is not known at this time. However, the usefulness of utilizing the bobcat as a sentinel is demonstrated, for we have now been alerted to another potential threat for the panther, information we could not have gained from the panther alone.

REPRODUCTION AND GENETICS RESEARCH

Male Reproduction

Five male panthers were captured this past field season. All were electro-ejaculated in order to obtain semen for evaluation. Preliminary results indicate that all the males were similar to those previously examined and exhibit an exceedingly high proportion of abnormal sperm forms (>90%), with the major defect involving the acrosome or head of the spermatozoa.

In addition to the seminal defects the Florida panther exhibits, the males also suffer from a high rate of cryptorchidism where one testicle does not descend properly into the scrotum. Thus far, 4 of 12 (33.3%) males examined since 1984 have expressed this trait. In two necropsied specimens (#04 & #20), the retained testicle was located just outside of the abdominal cavity, within the inguinal canal. Retained testicles are generally atrophied and sterile, as both of these were, due to the high body temperature. In the domestic cat this trait is known to be genetically controlled, recessive, and passed on by the female. The fact that this trait is apparently so prevalent is highly suggestive of an inbred population.

More males must be examined to determine if the observed prevalence of the cryptorchid trait is typical of the population. If this trait and the high abnormal sperm count are occurring in the population at the observed rate, the implications to the panther population may be great. In the cheetah, the high percentage of abnormal sperm is related to a high degree of monomorphism in the genetic makeup of that species (O'Brien et al. 1983). This apparent inbreed-

ing in the cheetah is associated with increased neonatal mortality and an increased susceptibility to diseases (O'Brien et al. 1985).

Given the very small effective breeding population of the Florida panther, every opportunity should be made to retain as much genetic material as possible. One way to augment this is to bank (freeze) gametes and embryos for future artificial breeding research. This year a major step was made toward establishing a Florida panther sperm bank. We were able to freeze semen from two of the free-ranging males, #12 and #16.

Unfortunately, it seems that many of the males do not survive until their re-collaring date and valuable genetic and reproductive material is lost with each dead panther. The mean survival time post radio-collaring is 21.3 months and our current re-capture interval is 24 months. Of the last 10 males instrumented, six have died prior to their re-collaring date and before any semen could be archived. Of the remaining four males, only one (#12) has survived to his date for semen preservation. The other wild male's (#16) sperm that is in the freezer is there because the Everglades National Park chose to re-capture him on a shorter interval (13 months) for the purpose of semen collection.

In vitro Fertilization Research

On May 31, 1988, a new phase in the Florida Game and Freshwater Fish Commission's ongoing effort to save the Florida panther was initiated. An international team of researchers from the National Zoological Park, Metro Toronto Zoo, College of Veterinary Medicine at Gainesville, and the Florida Game Commission joined forces and talents to apply the specialized techniques

of in vitro fertilization (IVF) to the cougar. It is hoped that the technology can soon be used to augment the Florida panther captive breeding program. The successful laparoscopic collection of oocytes (eggs) from female cougars and the subsequent fertilization and production of embryos in a "test-tube" represents the first time that the technique of IVF has been accomplished in a large felid.

Previous collaborative studies with Drs. David Wildt and JoGayle Howard, feline reproductive specialists at the National Zoological Park, have revealed that semen from male Florida panthers is characterized by an extremely high proportion of abnormal spermatozoa, especially sperm with head abnormalities. This has raised many questions about the fertility and ultimate breeding potential of male panthers, particularly when artificial breeding techniques are employed. Is the panther semen viable enough to withstand freezing so that valuable genetic material can be archived and utilized in future breeding programs? Will the high percentage of abnormal sperm forms limit their ability to fertilize oocytes? Will the viability of fertilized embryos be affected by the sperm quality? In order to address these questions, Florida panther spermatozoa must be evaluated within the context of their interaction(s) with oocytes. This inherently must involve the female of the species, and IVF technology offers an excellent opportunity to research these issues.

Recent advances in feline reproductive technology and IVF at Dr. Wildts' laboratory prompted us to examine the cougar as a potential reproductive model for the Florida panther. The ultimate goal of this work would be to augment

the captive breeding effort by producing panther kittens artificially, either by artificial insemination or by IVF.

Eight female cougars, including one aged Florida panther, were primed with reproductive hormones, PMSG (pregnant mare serum) and HCG (human chorionic gonadotropin), to stimulate follicular development and oocyte maturation. Oocytes were then collected by aspiration utilizing a fiberoptic lens (laparoscope) introduced through a small skin incision in the abdomen to visualize the ovaries. Seven of the eight females responded to the hormones yielding 141 eggs (A.M. Miller et al. unpublished data). The mature oocytes (75) were inseminated with semen collected from three males by electro-ejaculation, including the captive Florida panther male, "Big Guy". The fertilization rate for all the mature oocytes was 48.5%, and ten cleaved embryos (actively dividing) were produced. The embryos, derived from oocytes of five different females and fertilized by three different males, were surgically returned to two of the original donor females in the hope that these recipient females would act as surrogate mothers for the "test-tube" embryos.

Our first attempt at IVF did not result in any kittens, however, the work should still be considered successful. A major goal of this initial experiment was to address some basic cougar reproductive physiology questions and to assess the feasibility of using the cougar as a model for the Florida panther. Also, we hoped to assess the fertilization capability and function of male Florida panther spermatozoa compared to other male cougars.

One of the most important things we learned was that the cougars response to gonadotropin stimulation was similar to the domestic cat and oocytes fertil-

ized in vitro developed into viable embryos. Further, we were able demonstrate that males with very poor semen quality and behavioral breeding problems, such as our captive Florida panther male "Big Guy", are still capable of fertilizing oocytes in an in vitro environment.

The successful laparoscopic collection of oocytes (eggs) from female cougars and the subsequent fertilization and production of embryos in a "test-tube", represents the first time that the technique of IVF has been successfully accomplished in a large felid. This study in conjunction with new information generated in the domestic cat will allow us to move ahead quickly in our future development of IVF in the Florida panther.

Population Genetics Study

The remnant population of Florida panthers existing in the remote cypress swamps of south Florida are vulnerable to catastrophes such as disease or hurricanes that could drive the subspecies to extinction. But even if they survive at their current population level, they are apt to become compromised due to a loss of genetic diversity and heterozygosity. In order to retain at least 99% of the initial genetic diversity over 100 generations, it has been estimated for a finite population of large carnivores that there must be at least 300 founder animals (Thomas Fosse, pers. comm.). Therefore, with even the most optimal breeding strategy for the 30-50 living Florida panthers the potential for loss of genetic diversity over a relatively short time is great.

There are numerous morphologic indicators that suggest that the Florida panther has already experienced a fair degree of inbreeding and concomitant genetic loss. These include the peculiar "kinked-tail" and cowlick traits so

prevalent in the Big Cypress Swamp population (Belden and Wilkins, manuscript in preparation); the extremely high abnormal sperm count with the predominance of primary defects (Roelke et al. 1986); the recessive, genetically controlled cryptorchid trait displayed in 4 of 12 males; and the finding of a congenital heart defect in one male (this may be a genetic trait).

Before informed management decisions can be made with regard to maintenance of existing heterozygosity or perhaps the introduction of new genetic material from another cougar population a data base must be established. We need to determine the current genetic status of F. c. coryi and compare it to other free-ranging, presumably heterogenic populations.

This study was initiated in the fall of 1986 and thus far blood samples from 82 different individual cougars and panthers have been subjected to the rigors of isozyme electrophoretic techniques. Most of the laboratory work is completed for 41 of 50 different loci. Those that are incomplete are either unresolved suspect polymorphic loci or ones where the established feline protocol would not work for the puma and now must be adapted and rerun.

The species, Felis concolor, appears to have abundant biochemical genetic variation compared to the other great cats. A minimum of 11 polymorphic loci, or 26.8%, have been detected to date. This is high for the cat family and is rivaling the domestic cat for diversity (Table 42). If the unfinished complement of 50 loci (Dr. O'Briens' standard profile at NCI) are all monomorphic, the cougar would still have 22% of their loci polymorphic. By comparison, the published values for lions (Panthera leo) are 12% (Newman et al. 1985) to 14%-15.2% (O'Brien et al. 1987); cheetah (Acinonyx jubatus), 0.0%; tiger (Panthera

tigris), 10%; leopard (Panthera pardus), 8%; and ocelot (Leopardus pardalis), 20.8% (Newman et al. 1985).

If each wild subspecies of cougar is examined separately the percent polymorphism is considerably lower than for the species as a whole. Of those populations represented by six or more individuals, the Florida panther exhibits the fewest polymorphic loci with 7.5% followed by Texas with 10% and Arizona with 17%. The captive zoo population has the highest percentage of polymorphic loci of all the groups at 22.5% (hybrid subspecies soup!).

Table 43 lists the relative gene frequencies for each polymorphic allele for each population. Much work is yet to be completed on this project, all these results are preliminary, and the actual allelic frequencies and polymorphic loci may change with further analysis.

FLORIDA PANTHER LONGEVITY AND MORTALITY

Radio-Collaring of Panthers

The radio-instrumenting of wild Florida panthers started in 1981. Since that time considerable attention has been given to the safety and relative merits of the radio-collaring project in the popular press. It is hoped that the following data will help address many of the questions regarding panther mortality and alleged problems associated with collaring.

A total of 27 individual panthers have been captured and collared in the past seven years; 13 of these are still alive today (Table 44). These panthers have been captured and immobilized a total of 54 times, one of which resulted in death (1.8% loss per capture). Every measure of caution is taken with each immobilization, and, as a result, our safety record is the highest in

the country. The argument that many of the panthers die associated with the capture event can be refuted by examining how long they survive following their most recent anesthesia. Regardless of the cause death, they have lived an average of 13 months post collaring.

The question of whether or not the collar, in some subtle way, is responsible for mortality can also be examined. Twenty-six of the panthers (#23 excluded) have accumulated 552 months of collar life and 49 captures, an average of 21.2 months per panther from the initial capture and 1.88 captures per cat. If we split this into two samples, those that have died and those that have not, we see that they are virtually identical. The dead panthers (including two seriously injured by cars) lived an average of 21.3 months and experienced 1.86 captures each, and those still living have averaged 21.2 months with 1.9 captures. Without an equal number of panthers "invisibly" marked that could be "magically" monitored and followed through out life, we will never be able to completely rule out any subtle effect the collar may have, but we have no evidence to suggest that it does.

The notion that collars interfere with the normal breeding behavior of panthers and prevent the females from conceiving can also be refuted. The concern is based on the premise that the male must bite the back of the females' neck for ovulation to occur. The collar band is only two inches wide, so there should be ample exposed skin if this bite is truly necessary.

To wit, eight documented pregnancies and seven litters have been conceived by five females wearing collars at the time of their conception (one female aborted at 45 days). A ninth pregnancy and birth was suspected from telemetry

data but could not be confirmed (R.C. Belden, pers. comm.). Seven of the eight documented pregnancies were sired by five different males all wearing collars at the time. Further, the radio-instrumented female, #11, conceived two weeks following her initial collaring and was impregnated by a male who only one week before had also undergone immobilization and collaring (#12). One of the three kittens from this litter, #19, was captured and radio-collared at 9 months of age. At 18 months she was re-captured to change her collar. She conceived her first litter within the following few weeks and is now raising 4 kittens (D. Maehr, pers. comm.). This success of a second generation of radio-collared panthers strongly suggests that collaring does not interfere with breeding.

Panther Mortality

Since 1972 a total of 29 panthers have died and another three survived serious injuries only because they received medical attention. The fate of one additional uncollared panther after being struck by a vehicle could not be determined. The causes of mortality and injury for all 33 panthers, radio-collared ($n = 16$) and uncollared ($n = 17$), are listed in Tables 44 and 45, respectively, and the yearly death toll is given in Table 46.

Panther deaths/injuries can be divided into five main categories and are listed in Table 47: road killed/injured (51.5%), illegally killed (15.2%), intraspecific aggression with or without associated septicemia (12.1%), unknown (12.1%), and other (9%). By far the most important causes of panther mortality responsible for 69.7% of the documented deaths are those caused by human beings. These are road kills and injuries, illegal shootings, and capture related mortality (Fig. 1).

A comparison of the causes of death between the uncollared (U-CP) and radio-collared (R-CP) panthers reveals a strikingly different pattern. Human related deaths are responsible for virtually all of the U-CP deaths (94.1%) compared to only 43.8% of the R-CPs (Fig. 2 and 3). Since the causes of death between the two groups are so different, with the majority of the R-CP deaths not related to human activity, it should not be inferred that the collar is responsible. Rather, the collar gives us the ability to detect the cat's location in situations where their carcasses would otherwise go completely undetected. Obviously panthers that die on the highway or even those taken illegally are much easier to document and retrieve than those succumbing to the rigors of life in the swamp.

The phrase "documented mortality" needs to be stressed. These are the deaths for which we have tangible evidence and the picture we have today may not necessarily represent the true situation for the population. For just as the collars have given us an understanding as to the impact of road kills on the population that we could not glean by examining the uncollared cats alone (i.e 37.5% for R-CP verses 64.7% for U-CP), so might the inclusion of juvenile panthers in our sample change our perspectives further.

In most mammal species examined, both in captivity and in the wild, major mortality occurs in the first six months of life and most of that before one month of age. We know very little about this sector of the panther population for we have captured only four animals less than one year of age, and all of these were at least six months old at the time. Without documenting (visualizing and/or handling) the number of kittens born to a given female and

comparing this to the number surviving to at least six months of age, we have no way of knowing what the true mortality picture is. Several disease agents have been identified that can effect the survival of young panthers (parvovirus, calicivirus, and hookworms), but without specific knowledge of the mortality sustained by this age group we can only speculate as to their significance.

The yearly panther mortality since 1972 is displayed in Table 47. Eighty-five percent ($n = 28$) of the 33 panthers have died or been injured in the past eight years compared to the 15% ($n = 5$) that died in the previous eight-year period. Whether this represents a real rise in panther mortality or is due to an increase in biological and public awareness coupled with an intensified carcass retrieval network is not clear. One other less likely possibility is that the population is truly expanding, and there are more panthers to be killed. However, since the human element is responsible for the majority of the deaths, and there have been one or more road hit panthers every year since 1979 (except 1981/82), the impact of the recent rise in human population and concomitant vehicular traffic in southern Florida should not be minimized (see Roelke et al. 1985).

Our capture efforts have intensified yearly, and for the past two years we have been focusing our attention on land we feel is inhabited by the core breeding panther population. We have been encouraged by the increased number of cats collared and followed at any one time: 1984 - 3, 1985 - 6, 1986 - 6, 1987 - 15, and 1988 - 17. This may indicate an expanding or at least self-sustaining panther population. This "impression" should be tempered,

however, by the following. The proportion of collared animals among those dying since the initiation of the radio telemetry project suggests that most of the adults have now been collared. Since July of 1985, 10 of the 12 (83%) dead panthers were wearing collars compared to only 6 of 16 (38%) between July 1980 and June 1985.

We need to be careful, for our skill and perseverance at capturing new panthers on new lands could be "masking" an actual decline in the overall population. We must be cognizant of the fact that panther numbers have dropped in certain areas in the past few years. Specifically, we believe that the Fakahatchee Strand State Preserve proper no longer has a single, full-time resident panther compared to the five to six adult cats plus 3 kittens that were there in 1981-83 (Belden 1986), and the two full-time and two part-time residents in 1984 and 1995 (J.Roboski & M.Roelke, unpubl. data). Today we have only a female and her litter (undetermined number) who utilize the northern portion of the FSSP as part of their range and one additional male who periodically enters the FSSP from the north (D.Maehr, unpubl. data).

CONCLUSIONS

The Florida Panther Biomedical Investigation study is progressing well in many areas. The capture of previously radio-collared and new panthers was successfully accomplished and the total number of field immobilizations continues at a level far above that of previous years. There is a tremendous amount of data being gathered with regard to basic physiology, disease

exposure, hematology and serum chemistries, reproduction, and genetics, most of which is yet to be analyzed.

In light of recent advances in feline reproductive technology, we will soon be able to take advantage of the options artificial breeding techniques can offer to our captive breeding efforts. Therefore, it is imperative that we save an ample supply of sperm from our wild stock before any more males die. Given the recent experience of losing three of six collared males within a two week period coupled with the longevity data mentioned above, I strongly recommend that we consider changing the first re-collaring interval to 12 months on all newly captured males so that semen (and genetic material) can be banked.

The major obstacle to meeting the goals and deadlines as originally outlined for this project is that the magnitude and breadth of the panther biomedical project continues to expand. As originally conceived, we would catch and handle five panthers per year during a two month capture season leaving ample time for related disease and parasite work in Gainesville, the population genetics work at the National Cancer Institute, and the reproductive work. However, the field component of this project has more than doubled in the past two years, both in the number of cats actually handled and in the number of days spent in the field. In addition, there have been several emergency situations involving injured and rescued panthers that have consumed much time. Providing the necessary medical attention to all the animals involved with these unexpected cases has often been at the expense of other planned and required duties.

The release of cougars in northern Florida also required unscheduled veterinary services. The veterinary involvement consisted of an evaluation of the health of each cat followed by a reproductive sterilization prior to their release. In addition, these cats were included in an in vitro fertilization project. The in vitro part of the work was not delineated originally since it was thought that the technology was many years away.

Because of the aforementioned time and manpower limitations there are several projects that are behind schedule. Specifically, Job III- Action 10, the expansion of the small carnivore disease surveillance to encompass all lands inhabited by panthers, has not yet begun, nor does it seem likely to begin in the near future. Also, a great many carnivores (raccoons, bobcats, and otters) collected last season from the core panther areas for necropsy are in the freezer and will probably not be examined until late next spring at the earliest. Job IV- action 11 and 13, the electro-ejaculation and cryopreservation (semen banking) of semen from free-ranging panthers, has been initiated, but, so far, only semen from two wild males has been collected. Action 12, the serial electro-ejaculation of the captive Florida panther male, was not accomplished this past year.

The population genetics study (Job IV- Action 14-17) is one of the most important aspects of this biomedical investigation. However, because of the time limitations discussed above, this project too has suffered from insufficient time to adequately analyze the data already generated and to make the necessary contacts with western cougar biologists to coordinate and obtain an adequate comparative sample size.

To solve these problems, an additional staff person, such as a full-time veterinary technician should be hired. It is my belief that the established goals of this project should not be compromised and that all aspects of this biomedical investigation are relevant and important to the overall goal of preserving the endangered Florida panther. Many of the tasks currently performed by the principal investigator could easily be performed by a full time, permanent assistant. This would obviate the need to continually re-train a new technician every six months as the current temporary employee regulations dictate, and, more importantly, it would free the principle investigator to make progress on other critically important fronts.

LITERATURE CITED

- Anderson, A.E. 1983. A critical review of literature on puma (Felis concolor). Spec. Report no. 54, Colo. Div. Wildl. 91 pp.
- Barker, I.K., R.C. Povey and D.R. Voigt. 1983. Response of mink, skunk, red fox and raccoon to inoculation with mink virus enteritis, feline panleukopenia and canine parvovirus and prevalence of antibody to parvovirus in wild carnivores in Ontario. Can. J. Comp. Med. 47:188-197.
- Barlough, J. E., R. H. Jacobson, D. R. Downing, K. L. Marcella, T. J. Lynch, and F. W. Scott. 1983. Evaluation of a computer-assisted, kinetics-based, enzyme-linked, immunosorbent assay for detection of coronavirus antibodies in cats. J. Clinical Microbiology. 17:202-217.

- Becker, H. N., R. C. Belden, T. Breault, M. J. Burridge, W. B. Frankenger, P. Nicoletti. 1978. Brucellosis in feral swine in Florida. J. Am. Vet. Med. Assoc., 173:(9)1181-1182.
- Becker, N. H., G. Pirtle, R. C. Belden, W. B. Frankenger, B. P. All, H. L. Rubin, and E. P. Gibbs. Preliminary observations on the presence of pseudorabies antibodies in domestic and feral swine in Florida. Manuscript in preparation.
- Belden, Robert C., and Lovett E. Williams, Jr. 1976. Survival status of the Florida panther. Pages 79-98 in P. C. H. Pritchard, ed. Proc. Florida Panther Conference. Florida Audubon Society and Florida Game and Fresh Water Fish Commission. 121pp.
- Belden, R. C. 1978. Florida panther investigation- a progress report. Pages 123-133 in R. R. Odum and L. Landers, eds. Proc. Rare and Endangered Wildlife Symposium. Georgia Department of Natural Resources Technical Bulletin. WL4. Athens, Georgia. 184pp.
- Belden, R. C. 1986. Florida panther recovery plan implementation- a 1983 progress report. Pages 159-172 in S. D. Miller and D. D. Evertt, eds. Cats of the World: Biology, Conservation and Management. Proc. 2nd International Cat Symposium. Caesare Kleberg Wildlife Research Institute. Kingsville, Texas. 501 pp.
- Belden, R. C., W. B. Frankenger, and D. H. Austin. A Simulated Harvest Study of Feral Hogs in Florida. Manuscript in preparation.

- Bittle, J. L. 1981. Feline panleukopenia. Pages 97-101 in J. W. Davis, L. H. Karstad, and D. O. Trainer, eds. Infectious diseases of wild mammals. (2nd ed.) Iowa State University Press, Ames. 421.
- Bouillant, A. and R. P. Hanson. 1965. Epizootiology of Mink Enteritis: III. Carrier State in Mink. Can. J. Comp. Med. Vet. Sci. 29(7):183-189.
- Burridge, M. J., W. J. Bigler, D. J. Forrester, and J. M. Hennemann. 1983. Serologic survey for Toxoplasma gondii in wild animals in Florida. J. Am. Vet. Med. Assoc. 175:964-967.
- Currier, M. J. P., and K. R. Russell. 1982. Hematology and blood chemistry of the mountain lion (Felis concolor). J. Wildl. Dis. 18:99-104.
- Forrester, D. J., J. A. Conti, and R. C. Belden. 1985. Parasites of the Florida panther (Felis concolor coryi). Proc. Helminthol. Soc. Wash. 52:-95-97.
- Hawkey, C. M. 1975. Comparative mammalian hematology: cellular components and blood coagulation of captive wild animals. W. Heinemann Medical Books, London. 310 pp.
- Hines, T. C., R. C. Belden, and M. E. Roelke. 1987. An overview of panther research and recovery program. Pages 140-147 in R. R. Odom, K. A. Riddleberger, and J. C. Ozier, eds. Proc. of the 3rd Symposium on Southeastern Nongame Wildlife. Georgia Department of Natural Resources, Atlanta, Georgia. 253pp.
- Horpath Z. and L. Papp. 1967. Clinical manifestations of Aujeszky's disease in the cat. Acta Vet Hung, 17:49-54.

- Howard, J. G., M. Bush, L. G. Simmons, and D. E. Wildt. 1984. Comparative evaluation of ejaculate characteristics in nondomestic felids with emphasis on sperm morphology. Pages 168-170 in M. Silverman, ed. Proc. Am. Assoc. Zoo Vet. Atlanta, Georgia. 200pp.
- Jacobson, R. H. A KELA test for toxoplasmosis. Manuscript in preparation.
- Mia A. S., D. E. Kahn, M. M. Tierney, and J. E. Post. 1981. A microenzyme linked immunosorbant assay test for detection of FeLV in cats. Comp. for Immunology, Microbiology, and Infectious disease. 4(1):111-117.
- Miller A. M., M. E. Roelke, K. L. Goodrowe, J. G. Goward, and D. E. Wildt. Oocyte recovery, maturation, and fertilization in vitro in the puma (Felis concolor). Manuscript in preparation.
- Nettles, V. F., and G. A. Erickson. 1984. Pseudorabies in wild swine. Proc. United States Animal Health Assoc. 88:505-506.
- Nowack, R. M., and R. T. McBride. 1976. Status Survey of the Florida Panther. Pages 114-115 in P. C. H. Pritchard, ed. Proc. of the Florida Panther Conference. Published by the Florida Audubon Society of Florida Game and Fresh Water Fish Commission. 121pp.
- O'Brien, S. J., M. E. Roelke, L. Marker, A. Newman, C. A. Winkler, D. Meltzer, L. Colby, J. F. Evermann, M. Bush, and D. E. Wildt. 1985. Genetic basis for species vulnerability in the cheetah. Science 227:1, 428-1, 434.
- O'Brien, S. J., D. E. Wildt, D. Goldman, C. R. Merril, and M. Bush. 1983. The cheetah is depauperate in genetic variation. Science 221:459-462.

- O'Brien, S. J., J. S. Martenson, C. Packer, L. Herbst, V. de Vos, P. Joslin, J. Ott-Joslin, D. E. Wildt, and M. Bush. 1987. Biochemical genetic Variation in geographic isolates of African and Asiatic lions. *National Geographic Research* 3(1):114-124.
- Pedersen, N. C. 1986. Pseudorabies. Manuscript in preparation.
- Platt, K. B., D. L. Graham, and R. A. Faaborg. 1983. Pseudorabies: experimental studies in raccoons with different virus strains. *J. Wildl. Dis.* 19:297-301.
- Pirtle, G., M. E. Roelke, and J. R. Brady. 1986. Antibodies against pseudorabies virus in the serum of a Florida black bear cub. *J. Am. Vet. Med. Assoc.* 189(9):1164.
- Pollock, R. V. H. 1984a. The parvoviruses. Part I. Feline panleukopenia virus and mink enteritis virus. *Cont. Ed. Art.* 4, 6:227-241.
- Pollock, R. V. H. 1984b. The parvoviruses. Part II. Canine parvovirus. *Cont. Ed. Art.* 6, 6:653-664.
- Roelke, M. E., E. R. Jacobson, G. V. Kollias, and D. J. Forrester, 1985. Medical management and biomedical findings on the Florida panther (Felis concolor coryi). Annual Performance Report 1984/85. Florida Game and Fresh Water Fish Commission. 113pp.
- Roelke, M. E., E. R. Jacobson, G. V. Kollias, and D. J. Forrester, 1986. Medical management and biomedical findings on the Florida panther (Felis concolor coryi). Annual Performance Report 1985/86. Florida Game and Fresh Water Fish Commission. 65pp.

- Roelke, M. E. 1987. Florida Panther Biomedical Investigation: health and reproduction. Annual performance report 1986/87. Florida Game and Fresh Water Fish Commission: 39 pp.
- Scott F. W., C. K. Cziza, and J. H. Gillespie. 1970. Feline Viruses. V. Serum-neutralization test for feline panleukopenia. The Cornell Veterinarian, LX(2):183-191 pp.
- Tozzini, F., A. Poli, and G. Della Croce. 1982. Experimental infection of European wild swine (Sus scrufa) with pseudorabies virus. J. Wildl. Dis. 18:425-428.
- Trainer, D. O. 1981. Pseudorabies. Pages 102-107 in J. W. Davis, L. H. Karstad, and D. O. Trainer, eds. Infectious diseases of wild mammals, 2ND ed. The Iowa State University Press, Ames, Iowa. 421pp.
- US Department of Agriculture: Standard Agglutination Test Procedures for the Diagnosis of Brucellosis (Manual 65D, p 2-5) and Supplemental Test Procedures for the Diagnosis of Brucellosis (Manual 65E, pp 7-9; 13-15). Ames, Iowa, National Animal Disease Laboratory.
- Wallach, J. D., and W. J. Boever. 1983. Diseases of exotic animals. Medical and surgical management. W.B. Saunders Co., Philadelphia. 1159 pp.
- Wassmer, D. A. 1982. Demography, movements, activity, habitat utilization and marking behavior of a bobcat (Lynx rufus) population in south-central Florida. M.S. Thesis. U. of So. Fla., Tampa.

Wildt, D. E., M. Bush, J. G. Howard, S. J. O'Brien, D. Meltzer, A. Van Dyk, H. Ebedes, and D. J. Brand. 1983. Unique seminal quality in the South African cheetah and a comparative evaluation in the domestic cat. Biol. Reprod. 29:1,019-1,025.

Williams, E. S., E. T. Thorne, M. J. G. Appel, and D. W. Belitsy. 1988. Canine distemper in black-footed ferrets (Mustel nigripes) from Wyoming. J. Wildl. Dis. 24(3):385-398.

Table 1. Florida Panthers Captured, Immobilized, or Examined in the 1987-88 Field Season.

ID #	SEX	CAPTURE DATE	EST AGE AT CAPTURE	EVENT/LOCATION/COMMENT
<u>PRIVATE LANDS- NORTH: BETWEEN LAKE PLACID AND PALMDALE (GLADES & HIGHLANDS CO)</u>				
# 24	M	01-30-88	3-4 yr	Immobilized; Radio-instrumented, captured on Hendry Ranch, east of SR 27, 15 m. N. of Palmdale, Fl. (Carcass remains collected 8/22/88, died of unknown causes 8/13-16/88)
<u>PRIVATE LANDS- SOUTH: NEAR IMMOKALEE, FL. (SW HENDRY CO. & NE COLLIER CO.)</u>				
# 13	M	12-16-87	6-8 yr	Killed; Hit-by-car, SR 29, Sunniland
# 20	M	06-17-87	3-4 yr	Immobilized; "Hit-by-car", removed from wild to Miami Metro Zoo for treatment
"		06-23-87		Immobilized; Debrided wounds, changed bandages, and treated severe dehydration
"		06-28-87		Immobilized; Treated wounds
"		07-02-87		Immobilized; Treated wounds
"		07-06-87		Immobilized; Treated wounds, performed dentistry, evaluated cardiac problem
"		07-10-87		Immobilized; Treated wounds, changed bandages, and performed dentistry
"		07-14-87		Immobilized; Treated wounds, plastic surgery to close skin defect
"		07-20-87		Immobilized; Treated wounds
"		07-27-87		Immobilized; Treated wounds
"		08-04-87		Transported from Miami Metro Zoo to private ranch east of Immokalee for release in to the wild (Carcass retrieved 8/24/88-cause of death pending further investigation, he did have an atrial septal defect in heart)
<u>NORTHERN FAKAHATCHEE STRAND & BEAR ISLAND UNIT OF BCNP & ADJACENT PRIVATE LANDS</u>				
# 11	F	01-07-88	6-7 yr	Immobilized; Changed radio-collar, captured on Prices' land east of Sunniland (mother of #19 F), evidence of two un-collared kittens present with her
# 12	M	01-08-88	6-7 yr	Treed; near Doctors Hammock NE of Bear Island, looking for un-collared female (see below under Fakahatchee Strand State Preserve)

Table 1. (continued)

Capture Summary FY 87/88 p.2

ID #	SEX	CAPTURE DATE	EST AGE AT CAPTURE	EVENT/LOCATION/COMMENT
<u>NORTHERN FAKAHATCHEE STRAND & BEAR ISLAND (continued)</u>				
# 19	F	11-09-87	18 mo	Immobilized; Changed radio-collar, entered from Prices' property, captured on north edge of Bear Island (offspring of #11 F & #12 M)
# 25	M	02-16-88	3-4 yr	Immobilized; Radio-instrumented, captured on Fred Barfield lease, Collier Property, west of SR 29 and south of Pistol pond (Carcass was retrieved 8/26/88, died 8/24-25/88 septicemia from puncture wounds)
# 26	M	03-01-88	4-5 yr	Immobilized; Radio-instrumented, captured north of Noble Ranch lease, uses Seminole land, Hendry Co.
<u>FAKAHATCHEE STRAND STATE PRESERVE</u>				
# 08	F	04-13-87	11-13 yr	Immobilized; Removed from wild (see below)
# 12	M	01-31-88	6-7 yr	Immobilized; Changed radio-collar, collect semen for freezing (Sire of #19 F and un-collared kitten(s) of #09 F & #11 F)
<u>EVERGLADES NATIONAL PARK</u>				
# 14	F	04-09-88 04-11-88	5.5-6.5 yr	Treed; Abort immobilization, tree too high Immobilized; Changed Radio-collar (Mother of #16 M & #21 F)
# 15	F	02-14-88	5-6 yr	S. Bass visualized her with #16 M (Mother of #22 F & #23 F)
"		05- -88		S. Bass reports behavior change indicative of denning & cubbing
"		06-10-88		Found dead: Had been lactating; aggressive encounter with toxemia- bite wounds and hemorrhage on forearm and brisket
# 16	M	02-02-88	28-34 mo (2 1/2 yr)	Immobilized; Changed radio-collar, collect semen for freezing (offspring of #14 F, sibling of #21 F). Captured east of ENP boundary, north of Homestead Airport
"		02-14-88		S. Bass visualized this male with #15 F
"		03-30-88		Treed; looking for un-collared female

Table 1. (continued)

Capture Summary FY 87/88 p.3

ID #	SEX	CAPTURE DATE	EST AGE AT CAPTURE	EVENT/LOCATION/COMMENT
<u>EVERGLADES NATIONAL PARK</u> (continued)				
# 21	F	07-23-88	30-36 mo (2.5-3 yr)	"Hit-by-car". SE Homestead, fractured femur, evacuated to Gainesville, FL. Veterinary School for treatment, see captive section below (offspring of #14 F, sib of #16 M).
# 22	F	03-24-88	18 mo	Immobilized; Changed radio-collar (offspring of #15 F, sib of #23 F)
# 23	F	06-22-87	9-10 mo	Immobilized; Removed from wild due to orphaning from mother (see 1987/87), offspring of #15 F, sib of #22 F. Held in captivity at White Oak Plantation for 11 months (see captive section below)
"		05-14-88	20-21 mo	Released back into Everglades National Park
"		06-22-88	21-22 mo	Immobilized; Removed from the wild, stranded on island in Shark River Slough for 13 days after water "came-up" and she was in very poor physical condition. Evacuated to Gainesville for treatment
# 27	F	04-11-88	2-3 yr	Immobilized; Radio-instrumented, new animal captured just east of ENP east boundary, north of Pine Island, very small female.
<u>CAPTIVITY: WHITE OAK PLANTATION & WILDLIFE RESEARCH LABORATORY AT GAINESVILLE</u>				
Big Guy M		06-02-88	7-8 yr	Immobilized; semen collection and reproductive evaluation, semen used for <u>in vitro</u> fertilization project
"		07-24-88		Immobilized; Collected blood for transfusion for injured Florida panther #21 F
# 08	F	04-13-87	11-13 yr	Immobilized; Removed from Fakahatchee Strand State Preserve, underweight, anemic, non-reproductive in the wild
"		04-27-87		Immobilized; health check
"		05-18-87		Immobilized; health check
"		06-08-87		Immobilized; post quarantine exam
"		08-10-87		Immobilized; vaginal exam
"		09-02-87		Immobilized; Laparotomy to evaluate reproductive system at Veterinary School
"		11-01-87		Transported to White Oak Plantation

Table 1. (continued)

Capture Summary FY 87/88 p.4

ID #	SEX	CAPTURE DATE	EST AGE AT CAPTURE	EVENT/LOCATION/COMMENT
<u>CAPTIVITY: (continued)</u>				
# 08 (cont.)		06-01-88		Immobilized; Laparoscopy to evaluate ovarian response to hormone injections
"		08-20-88		Died suddenly after 4 days of inappetence, kidney, liver, and thyroid disease- final report pending
# 21	F	07-23-88	30-36 mo	"Hit-by-car" SE Homestead, fractured femur, Evacuated to Gainesville, Fl. Veterinary School for treatment (offspring of #14 F, sib of #16 M).
"		07-24-88	(2.5-3 yr)	
"		07-25-88		Immobilized; surgical repair of left femur with circlage wire and indwelling stainless steel plate
"		07-29-88		Moved from VMTH to GFC research lab
"		08-03-88		Immobilized; treat decubital ulcer on L hip
# 23	F	06-22-87	9-10 mo	Immobilized; Removed from wild due to orphaning from mother, offspring of #15 F, sib of #22 F. Held in captivity at White Oak Plantation.
"		02-0?-88	17-18 mo	Immobilized; lame, radiographs revealed healing fracture on radius
"		05-12-88	20-21 mo	Immobilized; crate for return to the wild
"		05-14-88	"	Released back into Everglades National Park
"		06-22-88	21-22 mo	Immobilized; Removed from the wild, stranded on island in Shark River Slough for 13 days after water "came-up" and in very poor physical condition. Evacuated to Gainesville for treatment.
<u>OTHER FELIS CONCOLOR SP.</u>				
UF24042	M	12-19-87	old Ad.	Skeleton found by hunter on island in Crane Swamp Frampton Wildlife Management Area, 6 m. S. of Edgewater, Volusia County. Skull morphology matches Florida panther, specimen is with Florida State Museum
G88-16 UF24097	M	03-01-88	10 mo	Killed; Hit-by-car near Capps, Fl. 40 m. south of Tallahassee, captive (unknown origin) release owned by Ted Turner, sister still at large, both released Jan. 1988

Table 2. Status of all living Florida Panthers on August 1, 1988

ID #	SEX	ORIGINAL CAPTURE	CURRENT EST AGE	COMMENT/SCHEDULED RE-COLLARING
<u>PRIVATE LANDS- NORTH: BETWEEN SEBRING AND PALMDALE (GLADES & HIGHLANDS CO.)</u>				
# 24	M	01-30-88	3-4 yr	Radio-instrumented; change collar 1988/89 (Carcass remains collected 8/22/88, died of unknown causes 8/13-16/88)
<u>PRIVATE LANDS- SOUTH: NEAR IMMOKALEE, FL. (SW HENDRY CO. & NE COLLIER CO.)</u>				
# 17	M	01-20-87	9.5-10.5 yr	Radio-instrumented; change collar 1988/89
# 18	F	01-22-87	9.5-10.5 yr	Radio-instrumented; change collar 1988/89 No documented reproduction since capture
# 20	M	03-10-87	4.5-5.5 yr	Radio-instrumented; change collar 1988/89 D. Maehr reports this male sired litter with #11 F, born mid-May 1988 (Carcass retrieved 8/24/88-cause of death pending further investigation, he did have an atrial septal defect in heart)
<u>NORTHERN FAKAHATCHEE STRAND, BEAR ISLAND UNIT OF BCNP, & ADJACENT PRIVATE LANDS</u>				
# 11	F	01-21-86	6.5-8.5 yr	Radio-instrumented; change collar 1989/90 D. Maehr reports new litter sired by #20M born mid-May, 1988. #19 F is offspring from her last litter born May 1986, two others are still un-collared, now sub- adults (male & female)
# 12	M	01-28-86	6.5-7.5 yr	Radio-instrumented; change collar 1989/90 Sire of #19 F plus two other un-collared sub-adults siblings born to #11 F, also sire of #09 F un-collared juvenile
# 19	F	02-09-87	27 mos	Radio-instrumented; change collar 1989/90 Offspring of #11 F & #12 M
# 25	M	02-16-88	3.5-4.5 yr	Radio-instrumented; change collar 1989/90 (Carcass was retrieved 8/26/88, died 8/24-25/88 septicemia from puncture wounds)
# 26	M	03-01-88	4.5-5.5 yr	Radio-instrumented; change collar 1989/90

Table 2. (continued)

Aug. 1, 1988: Status p.2

ID #	SEX	ORIGINAL CAPTURE	CURRENT EST AGE	COMMENT/SCHEDULED RE-COLLARING
<u>FAKAHATCHEE STRAND STATE PRESERVE AND GOLDEN GATES ESTATES TO WEST ("BLOCKS")</u>				
# 09	F	01-26-85	6.5-8.5 yr	Radio-instrumented; change collar 1988/89 D. Maehr reports association of one kitten/juvenile born aprx. June-July 1987 attempt capture in fall of 1988
<u>EVERGLADES NATIONAL PARK AND "EASTERN EVERGLADES"</u>				
# 14	F	12-06-86	5.5-6.5 yr	Radio-instrumented; change collar 1989/90 S. Bass reports no evidence of mating or birthing since last litter dispersed in March of 1987, no adult male present (mother of #16 M & #21 F)
# 16	M	01-12-87	34-40 mo	Radio-instrumented; change collar 1989/90 S. Bass reports this male sired litter with # 15 F (she & litter died 5 weeks post partum). Offspring of #14 F, sib of #21 F
# 21	F	03-16-87	30-36 mo	Removed from wild on 7-23-88; Fractured femur from "Hit-by-car" (see captive section below). Offspring of #14 F, sib of #16 M
# 22	F	03-18-87	23-24 mo	Radio-instrumented; change collar 1989/90 Offspring of #15 F, sib of #23 F
# 23	F	03-18-87	23-24 mo	Removed from wild 6-22-88 (see captive) Offspring of #15 F, sib of #22 F
# 27	F	04-11-88	2-3 yr	Radio-instrumented; change collar 1989/90
<u>CAPTIVITY: WHITE OAK PLANTATION & WILDLIFE RESEARCH LABORATORY AT GAINESVILLE</u>				
Big Guy M		11-02-84	7-8 yr	Permanent captive resident at White Oak Plantation ; no natural breeding behav- ior; used for <u>in vitro</u> breeding experi- ment = fertile; good health.

Table 2. (continued)

Aug. 1, 1988: Status p.3

ID #	SEX	ORIGINAL CAPTURE	CURRENT EST AGE	COMMENT/SCHEDULED RE-COLLARING
<u>CAPTIVITY (continued)</u>				
# 08	F	03-25-84	12.5-14.5 yr	Permanent captive resident at White Oak Plantation; no evidence of reproductive behavior; no response from experimental stimulation with reproductive hormones on 6-30-88, probably indicates that she is past her reproductive life; good health. Died suddenly 8/20/88 after 4 days of inappetence, kidney, liver, and thyroid disease- final report pending
# 21	F	03-16-87	30-36 mo	Removed from wild on 7-23-88; Fractured femur from "Hit-by-car". Surgical repair utilized circlage wire and an indwelling stainless steel plate. Currently residing and receiving treatment at GFC lab in Gainesville. Her future (return to the wild or captivity) will be based on outcome of this medical problem.
# 23	F	03-28-87	23-24 mo	Removed from wild 6-22-88 because of very poor physical condition after being stranded for 13 days on an island in Shark River Slough in Everglades National Park (ENP). Park service plans to return her to the Everglades National Park January 1989 when the water recedes. Currently residing at GFC research lab, will be moving to White Oak Plantation in early fall.

Table 3. Cougars^A held and handled as part of Florida panther recovery Project

ID #	SEX	DATE	EST AGE	EVENT/COMMENT
Texas #01 (Molly)	F	05-31-88		Resides at White Oak Plantation, wild caught in west Texas, May 1986. Immobilized; collected oocytes for <u>in vitro</u> fertilization project
Texas #02 (Annie)	F	05-31-88		Resides at White Oak Plantation, wild caught in west Texas, May 1986. Immobilized; collected oocytes for <u>in vitro</u> fertilization project (IVF)
"		06-02-88		Immobilized; Transferred 6 embryos into her uterus as part of IVF project
Texas #03 (Taarna)	F	06-01-88		Resides at White Oak Plantation, wild caught in south Texas, May 1986. Immobilized; collected oocytes for <u>in vitro</u> fertilization project
"		06-03-88		Immobilized; Transferred 4 embryos into her uterus as part of IVF project
Texas #13 (PG female)	F	05-27-88		Wild caught in west Texas May 1988. Transported to Florida for release into north Florida.
"		06-01-88		Immobilized; performed oviductal ligation (sterilize) and collected oocytes for <u>in vitro</u> fertilization project
"		07-20-88		Found dead in Suwannee River, cause of death undetermined at this time.
Texas #14 (kitten)	F	05-27-88		Wild caught in west Texas May 1988. Transported to Florida for release into north Florida.
"		06-01-88		Immobilized; performed oviductal ligation (sterilize) and collected oocytes for <u>in vitro</u> fertilization project
Texas #15 (Non-PG female)	F	05-27-88		Wild caught in west Texas May 1988. Transported to Florida for release into north Florida.
"		06-01-88		Immobilized; performed oviductal ligation (sterilize) and collected oocytes for <u>in vitro</u> fertilization project

Table 3. (continued)

Summary Cougars FY 87/88 p.2

ID #	SEX	DATE	EST AGE	EVENT/COMMENT
Texas #16	M	05-27-88		Wild caught in west Texas May 1988. Transported to Florida for release into north Florida.
"		05-31-88		Immobilized; Collect semen for <u>in vitro</u> fertilization project
"		06-02-88		Immobilized; vasectomy performed
"		06-07-88		Transported to Osceola Nat. Forrest
"		06-15-88		Released to wild in northern Florida
Texas #17	M	05-27-88		Wild caught in Big Bend National Park, captured 5-26-88 and transported to Florida for inclusion in captive breeding program.
Texas #18	M	05-27-88		Wild caught in west Texas May 1988. Transported to Florida for release into north Florida.
"		05-31-88		Immobilized; Collect semen for <u>in vitro</u> fertilization project
"		06-02-88		Immobilized; vasectomy performed
"		06-07-88		Transported to Osceola Nat. Forrest
"		06-15-88		Released to wild in northern Florida
"Tom"	M	02-24-88	3-4 yr	Confiscated "pet" cougar from Miami, held as a potential breeder in captive breeding program
"		05-31-88		Immobilized; Collect semen for <u>in vitro</u> fertilization project
"		07-24-88		Immobilized; Collected blood for transfusion for injured Florida panther #21 F

All cougars with the exception of "Tom", belong to the F. c. stanleyana subspecies

Table 4. Body Weights, Physical Condition, Reproductive Status and Select Hematology Values for Adult Panthers Grouped by Capture Location.

ID#	SEX	LOCATION ^b	DATE	WEIGHT	CONDITION*	PCV/HGB**	REPRO [@]
24	M	GLADES CO.	03-01-88	126	I	41.7/14.5	?/2/?
20	M	ALICO	03-10-87	148	I	48.7/17.2	?/1/?
"		SCOFIELD	06-17-87 ^A	134	II	43.9/14.8	+/1/?
"		PRICE/BI	08-24/88 ^B	105	III	-----	+/1/Y
11	F	PRICE	01-07-88	91	II	37.4/12.0	3
12	M	BI/FCC/FSSP	01-31-88	124	II	34.8/12.0	+/1/Y
13	M	BI/PRICE	12-16-87 ^{AB}		--	-----	+/2/S
19	F	PRICE	11-09-87	70	II	34.2/11.2	0
25	M	FCC/FSSP	02-16-88	121	I	39.7/13.6	?/2/?
26	M	NOBLE	03-01-88	125	I	45.5/15.1	?/1/?
14	F	ENP	12-07-86	71	II	35.4/13.7	2
"		ENP	04-11-88	85	II	36.6/12.7	0
15	F	ENP	12-13-86	72	II	36.2/12.9	2
"		ENP	04-07-87	--	II	33.8/11.0	2
"		ENP	06-10-88 ^C	75	--	-----	lactating
16	M	ENP	02-02-88	86	III	33.9/12.1	+/2/Y
21	F	ENP	07-23-88 ^A	62	II	26.0 ^D /--	0
22	F	ENP	03-24-88	60	II	30.1/ 9.8	0
23	F	ENP	06-22-88	48 ^E	III	36.5/11.5 ^E	0
27	F	ENP	04-11-88	50	II	32.0/10.9	0

^bALICO, Inc. - NE of Immokalee; BI/BCNP - Bear Island Unit of Big Cypress National Preserve; Collier Enterprise, Inc., Noble, Price, & Scofield - SE of Immokalee; ENP - Everglades National Park; FCC - Fakahatchee Conservation Club; FSSP - Fakahatchee Strand State Preserve.

*Physical Condition Index: I=Excellent, II=Moderate, III=Poor

**PCV - Packed cell volume. Normals for wild cougars 44.9-48.8, Currier 1982.

**HGB - Hemoglobin, oxygen carrying component in red blood cells

[@]REPRO - Reproductive status; Females- number of cubs documented within past 12 months; Males- results of semen evaluation (+ = fertile, - = sterile, ? = unknown) / number of testicles /documented reproduction (Y = known sire, S = suspect sire, ? = unknown).

^AHit-by Car; ^BFresh carcass; ^CBloated carcass; ^DPossibly diluted with IV fluids; ^E5% dehydrated.

Table 5. Body Weights of Sub-adult Female Florida Panthers at Varying Ages.

Location	ID#	Date	Age	Body Weight lbs.
Northern Fakahatchee Strand, Bear Isl. & Prices'	#19 F	02-09-87	9 mo	49
	"	11-09-87	18 mo	70
	G80-4 F	12-23-79	18-30 mo	68
Everglades National Park	#21 F	03-16-87	14-18 mo	56
	"	07-23-88	30-34 mo	62
	#22 F	03-18-87	6-8 mo	33
	"	04-07-87	7-9 mo	36
	"	06-15-87	9-11 mo	43
	"	03-24-88	16-18 mo	60
	#27 F	04-11-88	24-36 mo	50

LEGEND
HEMATOLOGY TABLES

N/D = Not Determined

MAJOR POPULATIONS: I- Southwestern Florida, Big Cypress Swamp & Fakahatchee Strand and surrounding ecosystem including privately owned land; II- Southeastern Florida, Everglades National Park; III Central Florida; IV- not part of a discrete documented population of panthers.

LOCALITY OF RANGE: BI - Bear Island Unit of Big Cypress National Preserve; CORBETT - Corbett Management Area; ENP - Everglades National Park; FEC- Fish Eating Creek; FS- Fakahatchee Strand both north and south of SR 84; MO - Southwestern Monument Unit, Big Cypress National Preserve; N. Florida- 10 months old captive cougar released near Capps, Fl. south of Tallahassee 2 months before death on highway by car; N.FS - Northern Fakahatchee Strand; PR - Private ranches east of Immokalee; RP - Raccoon Point, Eastern Big Cypress National Preserve; S.FS - Southern Fakahatchee Strand (Fakahatchee Strand State Preserve).

OTHER: Cap - captivity; GFC - Florida Game and Fresh Water Fish Commission, Wildlife Research Laboratory, Gainesville, Fl.; MMZ - Miami Metro Zoo, Miami, Fl.; WOP - White Oak Plantation, Yulee, Fl.

o SAMPLE: Blood samples drawn at the "running time" indicated.
Time zero (0:00) starts when cat receives initial anesthetic agent

o EVENT:

Initial: initial blood sample, drawn as soon as cat is stable, IV catheter im-planting, generally less than 100 cc of IV fluids given.

PRE-E: blood drawn immediately prior to starting electro-ejaculation protocol (males). Skin biopsy surgical procedure performed on lateral thigh, 6 x 6mm plugs removed and wounds sutured. Also, cat has received 5-700 cc of lactated ringers.

PE or Post ejac: Post Ejaculation, number in front indicates time (minutes) following series III of ejaculation protocol. By end the panther has usually received 1 liter lactated ringers IV and 2 liters SQ.

Post Cap: sample drawn at end of capture procedure

+ Laboratory: CONL = Consulab, Miami; DSI = Diagnostic Services Inc., Naples; IALS = Inter-American Laboratory Service, Miami; JASH = James Archer Smith Hospital Laboratory, Homestead; VMTH = Veterinary Medical Teaching Hospital, Gainesville.

@ Anesthetic used: D = Diazepam (Valium^R); H = Halothane; K = Ketamine hydrochloride; T = Telazol; V = Versed; X = Xylazine hydrochloride (Rompun^R);

*Packed cell volume is a calculated value, spun values will be footnoted

**RBC morphology: A = anisocytosis; B = burr cells; C = crenation; E = echinocytosis; H = hypochromasia; H_J = Howell-Jolly body; M = microcytosis; Ma = Macrocytosis; Mf = microfilaria; N = normal; N_r = NRBC/nucleated red blood cells; Pl = polychromasia; Po = poikilocytosis; R = Rouleaux formation

TABLE 6. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 11 Female

Date	01-21-86	01-07-88	01-07-88
Age	4-5 yr	6-7 yr	6-7 yr
Location#	BI/BCNP	PR/PRICE	PR/PRICE
Sample ^a	A	A = 0:23	B = 0:49
Event ^{bb}	Initial	Initial	Post cap
Laboratory ⁺	DSI	VMTH	VMTH
Anesthetic Agent [@]			
CONSTITUENT			
Erythrocyte 10 ⁶ /mm ³	5.42	8.02	7.57
Leucocytes 10 ³ /mm ³	11.1	16.4	15.4
Hemoglobin g/100ml	10.4	12.0	10.2
Packed cell volume %*	25.6	37.4 ^a	34.1 ^b
Mean cell volume μ^3	47.2	46.6	45.1
Mean cell hemoglobin μ g	19.2	32.1	29.9
Mean cell Hb conc. %	40.7	15.0	13.5
RDW	11.4	20.2	19.7
Reticulocytes % (P/A)	1.1	1.8/1.3	N/D
RBC morphology**	N	PoE	N
Platelets 10 ³ /mm ³	155	ADQ	ADQ
Plasma protein g/dl	N/D	7.8	7.6
Fibrinogen mg/dl	N/D	100	100
Icterus index units	N/D	SL	SL
DIFFERENTIAL (Leukocyte count)			
Bards %	4	0	0
Neutrophils %	41	78	79
Lymphocytes %	52	16	14
Monocytes %	0	2	1
Eosinophils %	3	4	6
Basophils %	0	0	0

^aSpun PCV = 35.9^bSpun PCV = 34.1

TABLE 7. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 12 M

Date	01-28-86			01-31-88		
Age	4-5 yr			6-7 yr		
Location#	BI/BCNP			FSSP		
Sample ^b	A = 0:29	B = 2:14	C = 3:11	A = 0:30	B = 1:31	C = 2:02
Event ^{bb}	Initial	Post ejac	90m PE	Initial	Post ejac	30m PE
Laboratory ⁺	DSI	DSI	DSI	DSI	DSI	DSI
Anesthetic Agent ^d	K	KX	KX	KT	KT	KT
CONSTITUENT						
Erythrocyte 10 ⁶ /mm ³	8.26	6.02	6.02	7.71	8.56	8.13
Leucocytes 10 ³ /mm ³	12.0	21.3	18.2	11.1	12.4	18.7
Hemoglobin g/100ml	14.3	11.4	11.6	12.0	13.1	12.7
Packed cell volume %	41.0	28.8	28.6	34.8	38.7	36.7
Mean cell volume u ³	49.6	47.9	47.4	45.1	45.2	45.2
Mean cell hemoglobin uug	17.3	18.9	19.2	15.6	15.3	15.6
Mean cell Hb conc. %	34.9	39.5	40.5	34.5	33.9	34.6
RDW	13.6	11.2	11.7	20.7	21.1	33.1
Reticulocytes % (P/A)	1.7	ND	ND	0.6%	N/D	N/D
RBC morphology**	N	N	N	APoMa	APoMa	APoMa
Platelets 10 ³ /mm ³	810	479	114	533	528	530
Plasma protein g/dl	ND	ND	ND	N/D	N/D	N/D
Fibrinogen mg/dl	ND	ND	ND	N/D	N/D	N/D
Icterus index units	ND	ND	ND	N/D	N/D	N/D
DIFFERENTIAL (Leukocyte count)						
Bands %	2	2	5	2	1	4
Neutrophils %	64	90	75	77	80	87
Lymphocytes %	24	6	16	20	18	8
Monocytes %	8	2	4	0	0	0
Eosinophils %	2	0	1	0	0	0
Basophils %	0	0	0	1	1	1

TABLE 8. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: #14 Female ENP

Date	12-06-86	12-06-86	04-11-88	04-11-88	04-11-88A	04-11-88A
Age	4-5 yr	4-5 yr	5.5-6.5 yr	5.5-6.5 yr	5.5-6.5 yr	5.5-6.5 yr
Location#	ENP	ENP	ENP	ENP	ENP	ENP
Sample ^{bb}	A = 0:22	B = 2:35	A = 0:24	B = 1:00	A = 0:24	B = 1:00
Event ^{bb}	Initial	Post cap	Initial	Post cap	Initial	Post cap
Laboratory ⁺	CONL	CONL	JASH	JASH	VMTH	VMTH
Anesthetic [@]	K	K	K	K	K	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	6.98	6.44	7.92	7.59	7.57	7.26
Leucocytes $10^3/\text{mm}^3$	14.3	12.1	10.7	10.7	12.0	11.1
Hemoglobin g/100ml	13.7	12.8	13.3	12.8	12.7	12.1
Packed cell volume %	35.4	32.1	41.4	40.1	36.6 ^B	34.7 ^C
Mean cell volume μ^3	50.7	49.8	52.3	52.8	48.3	47.8
Mean cell hemoglobin μg	19.7	19.9	16.8	16.9	16.8	16.7
Mean cell Hb conc. %	38.9	39.9	32.1	31.9	34.7	34.9
RDW	N/D	N/D	N/D	N/D	16.6	16.4
Reticulocytes % (P/A)	3.9	N	0.3	N/D	1.4/0.2	N/D
RBC morphology ^{**}	AM	AM	N	N	N	N
Platelets $10^3/\text{mm}^3$	HIGH	HIGH	N/D	N/D	N/D	N/D
Plasma protein g/dl	N/D	N/D	N/D	N/D	8.0	7.7
Fibrinogen mg/dl	N/D	N/D	N/D	N/D	100	200
Icterus index units	N/D	N/D	N/D	N/D	<5	<5

DIFFERENTIAL

(Leukocyte count)

Bands %	0	0	0	0	0	0
Neutrophils %	91	95	73	73	73	69
Lymphocytes %	6	4	15	14	24	20
Monocytes %	3	1	4	6	2	5
Eosinophils %	0	0	8	7	1	4
Basophils %	0	0	0	0	0	2

Table 8. (continued)

#14 F p.2

Date	04-11-88 ^A	04-11-88 ^A
Age	5.5-6.5 yr	5.5-6.5 yr
Location [#]	ENP	ENP
Sample ^b	A = 0:24	B = 1:00
Event ^b	Initial	Post cap
Laboratory ⁺	DSI	DSI
Anesthetic ^c	K	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	7.76	7.36
Leucocytes $10^3/\text{mm}^3$	10.9	12.9
Hemoglobin g/100ml	13.3	12.9
Packed cell volume %*	37.9	35.8
Mean cell volume μ^3	48.8	48.7
Mean cell hemoglobin μg	17.1	17.5
Mean cell Hb conc. %	35.1	36.0
RDW	18.6	18.6
Reticulocytes % (P/A)	0.2	N/D
RBC morphology**	AMPo	AMPo
Platelets $10^3/\text{mm}^3$	111 ^E	73 ^E
Plasma protein g/dl	N/D	N/D
Fibrinogen mg/dl	N/D	N/D
Icterus index units	N/D	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	0	0
Neutrophils %	65	54
Lymphocytes %	31	9
Monocytes %	3	35
Eosinophils %	1	2
Basophils %	0	0

^ASamples 24 hours old when processed^BSpun PCV = 36.6^CSpun PCV = 34.7^DModerately clumped^EPlatelet estimate = Low

TABLE 9. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: #16 Male

Date	01-12-87	01-12-87	01-12-87	02-02-88	02-02-88
Age	16-22 mo	16-22 mo	16-22 mo	28-34 mo	28-34 mo
Location#	ENP	ENP	ENP	E EV/ENP	E EV/ENP
Sample ^b	A = 0:33	B = 1:18	C = 1:43	A = 0:35	B = 1:03
Event ^{bb}	Initial		Post Ejac	Initial	Post Ejac
Laboratory ⁺	CONL	CONL	CONL	JASH	JASH
Anesthetic Agent [@]	K	K	K	K	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	8.16	6.73	8.76	7.7	8.65
Leucocytes $10^3/\text{mm}^3$	14.5	11.9	18.9	18.7	18.0
Hemoglobin g/100ml	13.1	11.8	13.8	12.1	13.6
Packed cell volume %*	38.0	33.2	40.8	33.9	38.8
Mean cell volume μ^3	46.6	49.3	46.6	44.0	44.9
Mean cell hemoglobin μg	16.1	17.6	15.8	15.7	15.7
Mean cell Hb conc. %	34.5	35.7	33.8	35.7	35.0
RDW	N/D	N/D	N/D	N/D	N/D
Reticulocytes % (P/A)	3.0	N/D	N/D	0.2	N/D
RBC morphology**	M P1	M	M P1	N	N
Platelets $10^3/\text{mm}^3$	HIGH	HIGH	HIGH	N/D	N/D
Plasma protein g/dl	N/D	N/D	N/D	N/D	N/D
Fibrinogen mg/dl	N/D	N/D	N/D	N/D	N/D
Icterus index units	N/D	N/D	N/D	N/D	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	0	0	0	0	1
Neutrophils %	76	64	75	75	74
Lymphocytes %	17	27	22	22	19
Monocytes %	7	5	3	0	6
Eosinophils %	0	4	1	3	0
Basophils %	0	0	0	0	0

Table 9. (continued)

#16 M p.2

Date	02-02-88	02-02-88
Age	28-34 mo	28-34 mo
Location#	E EV/ENP	E EV/ENP
Sample ^a	A = 0:35	B = 1:03
Event ^{bb}	Initial	Post Ejac
Laboratory†	VMTH	VMTH
Anesthetic ^c	K	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	7.89	9.03
Leucocytes $10^3/\text{mm}^3$	14.7	15.0
Hemoglobin g/100ml	12.0	13.6
Packed cell volume %	36.3a	40.7b
Mean cell volume μ^3	46.0	45.1
Mean cell hemoglobin uug	15.2	15.1
Mean cell Hb conc. %	33.1	33.4
RDW	16.6	16.7
Reticulocytes % (P/A)	2.0/<0.2	4.0/0.2
RBC morphology**	N	N
Platelets $10^3/\text{mm}^3$	N	N
Plasma protein g/dl	7.6	8.4
Fibrinogen mg/dl	200	200
Icterus index units	<5	5

DIFFERENTIAL

(Leukocyte count)

Bands %	0	0
Neutrophils %	75	81
Lymphocytes %	22	17
Monocytes %	2	2
Eosinophils %	1	0
Basophils %	0	0

^aSpun PCV = 35.0^bSpun PCV = 37.8

TABLE 10. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 19 Female

Date	02-09-87	02-09-87	11-09-87 ^A	11-09-87 ^A	11-09-87
Age	9 mo.	9 mo.	18 mo	18 mo	18 mo
Location#	BI/BCNP	BI/BCNP	PR/PRICE	PR/PRICE	PR/PRICE
Sample ^B	A = 0:12	B = 1:06	A = 0:20	B = 1:12	A = 0:20
Event ^{BB}	Initial	Post cap	Initial	Post cap	Initial
Laboratory ⁺	DSI	DSI	DSI	DSI	VMTH
Anesthetic Agent [@]	K	K	K	K	K
CONSTITUENT					
Erythrocyte 10 ⁶ /mm ³	6.11	5.65	7.31	6.59	7.81
Leucocytes 10 ³ /mm ³	13.0	15.8	16.9	17.3	13.0
Hemoglobin g/100ml	12.5	11.3	11.2	10.5	10.9
Packed cell volume %	27.1	25.3	34.2	29.9	34.9 ^B
Mean cell volume u ³	44.4	44.7	46.8	45.3	44.7
Mean cell hemoglobin uug	20.4	20.0	15.3	15.9	14.0
Mean cell Hb conc. %	46.0	44.8	32.7	35.2	31.2
RDW	11.2	11.7	22.0	21.8	19.7
Reticulocytes % (P/A)	0.8	N/D	2.3	N/D	N/D
RBC morphology ^{**}	Po	M Po	APoMPI	APoMPI	2NrPoPLE ^C
Platelets 10 ³ /mm ³	244	195	269	11 ^D	NE
Plasma protein g/dl	N/D	N/D	N/D	N/D	8.8
Fibrinogen mg/dl	N/D	N/D	N/D	N/D	300
Icterus index units	N/D	N/D	N/D	N/D	<5
DIFFERENTIAL (Leukocyte count)					
Bands %	5	4	1	8	0
Neutrophils %	60	67	54	63	56
Lymphocytes %	28	28	38 +2 ^F	27	32
Monocytes %	2	0	2	1	6
Eosinophils %	5	1	3	1	4
Basophils %	0	0	0	0	2

^APerformed on coulter S⁺^BSpun PCV = 33.5^CRare Howell Jolly Bodies^DPlatelet estimate low^E2⁺ clumped^FAtypical lymphocytes

TABLE 11. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: #22 Female

Date	03-18-87	03-18-87	04-07-87	04-09-87	04-09-87	06-15-87
Age	6-7 mo	6-7 mo	7-8 mo	7-8 mo	7-8 mo	9-10 mo
Location#	ENP	ENP	ENPX1	ENPX2	ENPX2	ENPX3
Sample ^b	A = 0:10	A = 0:10	A = 0:24	A	A	A = 0:13
Event ^{bb}	Initial	Initial	Initial	Initial	Initial	Initial
Laboratory ⁺	CONL	VMTH	JASH	JASH	VMTH	VMTH
Anesthetic Agent [@]	K	K	K	KD	KD	K
CONSTITUENT						
Erythrocyte 10 ⁶ /mm ³	8.04	9.74	7.2	6.47	6.62	6.6
Leucocytes 10 ³ /mm ³	8.6	8.2	7.9	9.3	8.6	7.4
Hemoglobin g/100ml	15.1	15.7	11.8	11.0	11.3	10.0 ^f
Packed cell volume %*	43.3	47.2 ^a	34.4	31.4	32.2 ^d	22.45 ^{f,g}
Mean cell volume u ³	53.8	49.0	47.8	48.5	49.0	34.5 ^f
Mean cell hemoglobin uug	18.81	N/D	16.4	17.0	N/D	N/D
Mean cell Hb conc. %	35.0	33.0	34.3	35.1	35.0	44.5 ^f
RDW	N/D	N/D	23.3	22.1	N/D	N/D
Reticulocytes % (P/A)	2.5	3.0/1.6	1.1	5.9	N/D	5.0/2.3 ^f
RBC morphology**	M P1 Po	Nr E P1C	P1	H P1 Po	P1 Po	N +2C
Platelets 10 ³ /mm ³	HIGH	ADQ ^b	435k	360 ^l	ADQ ^e	N
Plasma protein g/dl	N/D	8.6	N/D	N/D	7.8	N/D
Fibrinogen mg/dl	N/D	200	N/D	N/D	100	N/D
Icterus index units	N/D	5	N/D	N/D	HEM 2+	N/D
DIFFERENTIAL						
(Leukocyte count)						
Bands %	6	0	5	2	0	0
Neutrophils %	41	64	48	57	61	61
Lymphocytes %	49	25	28	36	29	36
Monocytes %	1	7	11	4	6	2
Eosinophils %	3	4	8	1	4	1
Basophils %	0	0	0	0	0	0

Table 11. (continued).

#22 F p.2

Age	9-10 mo	9-10 mo	9-10 mo	9-10-mo	9-10-mo	9-10 mo
Date	06-15-87	06-15-87	06-15-87	06-15-87	06-15-87	06-16-87
Location#	ENPX3	ENPX3	ENPX3	ENPX3	ENPX3	ENPX4
Sample ^b	A = 0:13	B = 0:42	B = 0:42	C = 1:17	C = 1:17	A = 0:14
Event ^{bb}	Initial					Initial
Laboratory ^a	JASH	JASH	VMTH	JASH	VMTH	JASH
Anesthetic Agent ^a	K	KD	KD	KD	KD	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	5.7	4.87	5.45	5.51	5.6 ^f	5.11
Leucocytes $10^3/\text{mm}^3$	6.7	7.3	7.4	7.0	7.3	7.7
Hemoglobin g/100ml	9.8	8.7	8.4	9.4	9.3 ^f	8.7
Packed cell volume %*	30.0	25.5	25.8 ^h	28.6	41.3	25.6
Mean cell volume μ^3	52.6	52.4	47.3	51.9	37.5 ^f	50.1
Mean cell hemoglobin μg	17.2	17.9	15.4	17.1	22.5 ^f	17.0
Mean cell Hb conc. %	32.7	34.1	32.6	32.9	N/D	34.0
RDW	N/D	N/D	20.8	N/D	N/D	N/D
Reticulocytes % (P/A)	3.4	N/D	N/D	N/D	N/D	0.8
RBC morphology**	P1 H _j	P1	+1C A P1	P1 H _j	N P1	P1
Platelets $10^3/\text{mm}^3$	N/D	N/D	N	N/D	N	N/D
Plasma protein g/dl	N/D	N/D	6.8	N/D	f	N/D
Fibrinogen mg/dl	N/D	N/D	100	N/D	f	N/D
Icterus index units	N/D	N/D	5	N/D	f	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	0	0	0	1	0	0
Neutrophils %	53	60	58	60	65	67
Lymphocytes %	43	36	35	37	33	25
Monocytes %	2	2	2	1	0	3
Eosinophils %	2	2	5	1	2	5
Basophils %	0	0	0	0	0	0

Table 11. (continued).

#22 F p.3

Age	9-10 mo	18 mo	18 mo	18 mo	18 mo	18 mo
Date	06-16-87	03-24-88	03-24-88	03-24-88	03-24-88	03-24-88
Location ^a	ENP ^{X4}	ENP	ENP	ENP	ENP	ENP
Sample ^b	A = 0:14	A = 0:19	B = 0:55	A = 0:19	A = 0:19	B = 0:55
Event ^{bb}	Initial	Initial	Post cap	Initial	Initial	Post cap
Laboratory ⁺	VMTH	JASH	JASH	DSI	VMTH	VMTH
Anesthetic Agent [@]	K	KD	KD	KD	KD	KD

CONSTITUENT

Erythrocyte 10 ⁶ /mm ³	5.4	6.27 ^N	6.68 ^N	6.43	5.80	7.08
Leucocytes 10 ³ /mm ³	7.7	15.2	11.4	15.0	14.2	11.0
Hemoglobin g/100ml	8.1	10.8	11.4	10.7	9.8	12.3
Packed cell volume % ^{**}	26.1 ⁱ	34.2	36.5	34.1	30.1 ^R	32.0
Mean cell volume u ³	48.4	54.5	54.6	53.1	51.9	44.0
Mean cell hemoglobin uug	15.0	17.2	17.1	16.6	16.9	N/D
Mean cell Hb conc. %	31.0	31.6	31.2	31.3	32.6	38.4
RDW	21.6	N/D	N/D	25.6	22.4	N/D
Reticulocytes % (P/A)	6.3/0.6	1.8	N/D	3.5	5.2/1.4	N/D
RBC morphology ^{**}	Hj R	Nr ^O P1	Nr ^P P1	APoM	N	N C
Platelets 10 ³ /mm ³	Nj	N	N	359	N	N
Plasma protein g/dl	7.3	N/D	N/D	N/D	7.3	-
Fibrinogen mg/dl	300	N/D	N/D	N/D	300	-
Icterus index units	5	N/D	N/D	N/D	HEMST	HEMUT

DIFFERENTIAL

(Leukocyte count)

Bands %	0	1	0	4	0	2
Neutrophils %	59	87 ^Q	78 ^Q	62	81	83
Lymphocytes %	34	9	13	34	14	14
Monocytes %	5	1	7	0	2	0
Eosinophils %	2	2	2	0	1	0
Basophils %	0	0	0	0	1	1
Other					IV	

^aSpun PCV=44.0%; ^b1+ clumped; ^c2+E, 2+P1 2NRBC/100 WBC; ^dSpun PCV=32.5%; ^e2+ clumped; ^fsample grossly hemolyzed; ^gSpun PCV=5.5%; ^hSpun PCV=25.0; ⁱSpun PCV=25.5%; ^j1 clumped; ^kmean platelet volume (MPV) 14.9; ^l(MPV) 16.0; ^NHowell Jolly Bodies present in some RBC's; ^O5 Nucleated RBC/100 WBC; ^P4 Nucleated RBC/100 WBC; ^QDöhle bodies present in some neutrophils; ^RSpun PCV = 31.3; ^SModerate hemolysis; ^TSample 24hrs old, shipped via Federal Express; ^UMarked hemolysis; ^VPycnotic

^{X1}Removed from wild, held for 40 hrs with mother #15F and sib #23F, trying to reunite family, #23 was orphaned; ^{X2}Returned to wild, successfully reunited family; ^{X3}Remove from wild, held in captivity overnight, attempting to rejoin family, sib #23 was orphaned; ^{X4}Returned to wild, she stayed with mother, but #23F did not rejoin; ^{X5}Routine re-capture to change radio-collar.

TABLE 12. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: #23 Female

Date	03-18-87	03-18-87	03-28-87 ^c	04-09-87	04-09-87	06-01-87 ^g
Age	6-7 mo	6-7 mo	6-7 mo	7-8 mo	7-8 mo	8-9 mo
Location#	ENP	ENP	ENPX1	ENPX2	ENPX2	ENPX3
Sample ^b	A	A	A	A	A	A = 0:25
Event ^{bb}	Initial	Initial	Initial	Initial	Initial	Initial
Laboratory ⁺	CONL	VMTH	JASH	JASH	VMTH	VMTH
Anesthetic Agent [@]	K	K	K	K	K	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	6.86	8.53	8.5	5.85	6.21	5.19
Leucocytes $10^3/\text{mm}^3$	11.3	11.2	10.8	14.8	14.3 ^d	5.7
Hemoglobin g/100ml	12.6	13.4	13.4	9.6	10.2	8
Packed cell volume %	36.2	41.0 ^a	41.8	28.4	29.8 ^e	24.6 ^h
Mean cell volume μ^3	52.8	48	49.2	48.6	48	47.4
Mean cell hemoglobin uug	18.4	N/D	15.8	16.4	N/D	15.4
Mean cell Hb conc. %	34.9	33	32	33.8	34	32.5
RDW	N/D	N/D	22	23.8	N/D	19
Reticulocytes % (P/A)	1.1	2.0/.4	0.4	6.7	7.66/3.3	.4/.6
RBC morphology ^{**}	N	C Po Hj	N	N	N	2+C Hj
Platelets $10^3/\text{mm}^3$	N/D	ADQ ^b	374	596	ADQ ^f	ADQ
Plasma protein g/dl	6.9	8.2	6.1	7.8	8.6	6.6
Fibrinogen mg/dl	N/D	300	N/D	N/D	300	100
Icterus index units	N/D	<5	N/D	N/D	HEM1+	HEM1+

DIFFERENTIAL

(Leukocyte count)

Bands %	4	0	0	0	0	0
Neutrophils %	39	75	35	73	72	63
Lymphocytes %	56	22	60	26	22	32
Monocytes %	0	3	4	1	5	5
Eosinophils %	1	0	1	0	1	0
Basophils %	0	0	0	0	0	0

TABLE 12. (continued).

#23 F p.2

Date	06-01-87	06-01-87	06-01-87	06-16-87	06-16-87	06-22-87
Age	8-9 mo	8-9 mo	8-9 mo	8-9 mo	8-9 mo	9-10 mo
Location#	ENPX3	ENPX3	ENPX3	ENPX4	ENPX4	ENPX5
Sample ^b	A = 0:25	B = 4:11	B = 4:11	A	A	A
Event ^b	Initial	Post cap	Post cap	Initial	Initial	Initial
Laboratory ⁺	JASH	VMTH	JASH	JASH	VMTH	JASH
Anesthetic Agent [@]	K	K	K	K	K	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	4.94	6.57	6.29	6.9	6.98 ⁿ	8.83
Leucocytes $10^3/\text{mm}^3$	5.8	8.3	7.9	9.1	9.4	10.7
Hemoglobin g/100ml	7.9	10.2	10.1	13.0	12.7 ⁿ	15.0
Packed cell volume %*	23.2	30.8 ⁱ	29.4	38	34.5	45.2
Mean cell volume μ^3	47.0	46.9	46.8	51.9	49.4 ⁿ	51.2
Mean cell hemoglobin μg	16.0	15.5	16.1	18.8	18.2 ⁿ	17.0
Mean cell Hb conc. %	34.0	33.1	34.3	36.3	36.8 ⁿ	33.2
RDW	21.3	18.7	21.1	N/D	21.4	N/D
Reticulocytes % (P/A)	N/D	N/D	N/D	1.5	5.0/1.3	1.6
RBC morphology**	N	C Po	N	N	N2+C	N ^r k
Platelets $10^3/\text{mm}^3$	510	ADQJ	306	N/D	N	N/D
Plasma protein g/dl	N/D	7.3	N/D	7.7	9.7	8.0
Fibrinogen mg/dl	N/D	100	N/D	N/D	200	N/D
Icterus index units	N/D	HEM 1+	N/D	N/D	n	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	1	0	0	0	0	0
Neutrophils %	63	60	70	60	54	72
Lymphocytes %	36	35	29	37	43	26
Monocytes %	0	3	1	1	2	2
Eosinophils %	0	2	0	2	0	0
Basophils %	0	0	0	0	1	0

TABLE 12. (continued).

#23 F p.3

Date	06-22-87	08-03-87	02-07-88	05-12-88	05-12-88	05-12-88
Age	9-10 mo	11-12 mo	17-18 mo	20-21 mo	20-21 mo	20-21 mo
Location#	ENPX5	ENPX6	ENPX7	ENPX8	ENPX8	ENPX8
Sample ^b	A	A	A	A = 0:24	B = 1:06	A = 0:24
Event ^{bb}	Initial	Initial	Initial	Initial	Post cap	Initial
Laboratory ⁺	JASH	JASH	VMTH	VMTH	VMTH	JASH
Anesthetic Agent ^a	K	K				

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	9.2	8.34	7.10	7.89	6.74
Leucocytes $10^3/\text{mm}^3$	11.2	12.4	8.5	9.1	8.2
Hemoglobin g/100ml	14.5	14.1	11.5	12.9	11.8
Packed cell volume %*	45.31	41.8	33.8 ⁰	37.8 ^P	35.2
Mean cell volume μ^3	49.2	50.1	47.6	47.9	52.2
Mean cell hemoglobin μg	15.8	16.9	16.2	16.3	17.5
Mean cell Hb conc. %	32.0	33.7	34.0	34.1	33.5
RDW	19.5	N/D	16.0	15.7	N/D
Reticulocytes % (P/A)	2.8/1.8	3.5	1.2/0.8	N/D	N/D
RBC morphology**	1+C Hjm	Po M	2+C	2+C	N
Platelets $10^3/\text{mm}^3$	N	N/D	ADQ+Q	ADQ+Q	N/D
Plasma protein g/dl	9.0	N/D	7.3	7.4	N/D
Fibrinogen mg/dl	200	N/D	<100	200	N/D
Icterus index units	HEM 2+	N/D	<5	<5	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	0	3	0	0	0
Neutrophils %	54	76	50	70	61
Lymphocytes %	45	20	39	25	34
Monocytes %	1	1	6	4	5
Eosinophils %	0	0	2	0	3
Basophils %	0	0	3	1	0

TABLE 12. (continued)

#23 F p.4

Date	05-12-88	06-22-88	06-22-88
Age	20-21 mo	21-22 mo	21-22 mo
Location ^a	ENP ^{X8}	ENP ^{X9}	ENP ^{X9}
Sample ^b	B = 1:06	A = 0:08	B = 1:06
Event ^c	Post cap	Initial	Post cap
Laboratory ⁺	JASH	VMTH	VMTH
Anesthetic ^d		K	

CONSTITUENT

Erythrocyte 10 ⁶ /mm ³	7.58	6.96	5.30
Leucocytes 10 ³ /mm ³	8.6	7.3	10.2
Hemoglobin g/100ml	13.0	11.5	8.7
Packed cell volume % ^{**}	39.0	36.5 ^R	26.8 ^S
Mean cell volume u ³	51.5	52.4	50.5
Mean cell hemoglobin uug	17.2	16.5	16.4
Mean cell Hb conc. %	33.3	31.5	32.5
RDW	N/D	17.4	16.2
Reticulocytes % (P/A)	N/D	N/D	N/D
RBC morphology ^{**}	N	A 3+C P1 Hj	P1 Hj
Platelets 10 ³ /mm ³	N/D	T	N
Plasma protein g/dl	N/D	7.5	7.0
Fibrinogen mg/dl	N/D	400	400
Icterus index units	N/D	<5	<5

DIFFERENTIAL

Bands %	0	0	0
Neutrophils %	62	65	78
Lymphocytes %	30	24	11
Monocytes %	5	7	9
Eosinophils %	0	3	2
Basophils %	0	1	0

^aSpun PCV=36.8%; ^b1+ clumped; ^c9-10% dehydrated, extremely cachexic; ^d13.85 corrected for NRBC;

^eSpun PCV=28.5%; ^fmoderate increase; ^g5-6% dehydrated, anorectic for 6 days; ^hSpun PCV=23.5%;

ⁱSpun PCV=30.8%; ^jmoderately clumped; ^k1 NRBC/100 WBC; ^lSpun PCV=44.0%; ^mocc keratocyte;

ⁿsample grossly hemolyzed; ^oSpun PCV = 32.5; ^pSpun PCV = 36.8; ^qmod-marked clumped; ^rSpun PCV = 34; ^sSpun PCV = 25; ^tPlatelets clumped with a small number of large platelets.

^{X1}Removed from wild, orphaned from mother for 10 days, 9-10% dehydrated, cachexic; ^{X2}Returned to wild, reunited with family after 12 days in captivity, good physical condition; ^{X3}Removed from wild, separated from mother for 6 days, anorectic, 5-6% dehydrated; ^{X4}Returned to wild, attempt to reunite with family, 16 days in captivity; ^{X5}Removed from wild, failed attempt to reunite with family, 6 days anorectic, slight dehydration; ^{X6}Post quarantine, moving to White Oak Plantation; ^{X7}Radiograph injured leg; ^{X8}Return to Everglades National Park, released to the wild on 05-14-88; ^{X9}Removed from wild, stranded on island in Shark River Slough for 13 days, very thin, poor physical condition, 5% dehydrated.

TABLE 13. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 24 Male

Date	01-30-88		
Age	3-4 yr		
Location#	PR/HENDRY		
Sample ^b	A = 0:23	B = 1:34	C = 2:20
Event ^{bb}	Initial		
Laboratory ⁺	DSI	DSI	DSI
Anesthetic Agent [@]	K		
CONSTITUENT			
Erythrocyte 10 ⁶ /mm ³	9.14	7.89	8.37
Leucocytes 10 ³ /mm ³	12.6	12.8	13.4
Hemoglobin g/100ml	14.5	13.1	14.2
Packed cell volume %*	41.7	35.3	37.6
Mean cell volume u ³	45.6	44.8	44.9
Mean cell hemoglobin uug	15.9	16.6	17.0
Mean cell Hb conc. %	34.8	37.1	37.8
RDW	24.7	34.1	32.8
Reticulocytes % (P/A)	N/D	N/D	N/D
RBC morphology**	A Po M	AM	M PI
Platelets 10 ³ /mm ³	511	564	528
Plasma protein g/dl	N/D	N/D	N/D
Fibrinogen mg/dl	N/D	N/D	N/D
Icterus index units	N/D	N/D	N/D
DIFFERENTIAL			
(Leukocyte count)			
Bands %	0	0	0
Neutrophils %	64	77	78
Lymphocytes %	32	1	1
Monocytes %	3	20	20
Eosinophils %	1	2	1
Basophils %	0	0	0

TABLE 14. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 25 Male

Date	02-16-88			02-16-88		
Age	3-4yr			3-4 yr		
Location#	PR/BARFIELD			PR/BARFIELD		
Sample ^b	A = 0:20	B = 1:20	C = 2:20	A = 0:20	B = 1:20	C = 2:20
Event ^{bb}	Initial	Post ejac	60m PE	Initial	Post ejac	60m PE
Laboratory ⁺	VMTH	VMTH	VMTH	DSI	DSI	DSI
Anesthetic Agent [@]	K			K		
CONSTITUENT						
Erythrocyte 10 ⁶ /mm ³	8.59	9.0	9.31	8.78	9.22	8.97
Leucocytes 10 ³ /mm ³	10.9	19.3	19.4	12.5	17.1	20.5
Hemoglobin g/100ml	13.6	14.5	14.2	14.7	15.3	15.0
Packed cell volume % ^a	39.7 ^a	41.6 ^b	42.7 ^c	40.6	42.6	41.5
Mean cell volume u ³	46.2	46.2	45.9	46.2	46.2	46.2
Mean cell hemoglobin uug	15.8	16.1	15.3	16.7	16.6	16.7
Mean cell Hb conc. %	34.3	34.9	33.2	36.2	35.9	36.1
RDW	18.0	17.9	18.0	N/D	33.7	32.0
Reticulocytes % (P/A)	2.2/0.2	N/D	N/D	N/D	N/D	N/D
RBC morphology ^{**}	A HiPoCMf	N P1	CPo R	A PoM ^{nr} f	A PoMP1	A PoM
Platelets 10 ³ /mm ³	ADQ ^d	ADQ ^{+e}	N/D	2569	2639	2599
Plasma protein g/dl	8.2	8.8	8.7	N/D	N/D	N/D
Fibrinogen mg/dl	200	300	200	N/D	N/D	N/D
Icterus index units	<5	<5	<5	N/D	N/D	N/D
DIFFERENTIAL						
(Leukocyte count)						
Bands %	0	0	0	2	4	1
Neutrophils %	69	77	81	62	74	77
Lymphocytes %	9	13	9	35	18	19
Monocytes %	11	6	5	1	4	3
Eosinophils %	10	4	4	0	0	0
Basophils %	1	<1	1	0	0	0

^aSpun PCV = 38.8%^bSpun PCV = 60.2(?!)^cSpun PCV = 41.0^d1+ clumped^eModerately clumped^f1 NRBC/100 WBC^gPlatelet estimate = Normal

TABLE 15. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 26 Male

Date	03-01-88			03-01-88 (continued->)		
Age	4-5 yr			4-5 yr		
Location#	PR/HENDRY Co			PR/HENDRY Co		
Sample ^b	A = 0:35	B = 1:13	C = 2:15	A = 0:30	B = 1:18	C = 2:18
Event ^b	Initial	Post ejac	60m PE	Initial	Post ejac	60m PE
Laboratory ⁺	VMTH	VMTH	VMTH	DSI	DSI	DSI
Anesthetic Agent ^o	K			K		
CONSTITUENT						
Erythrocyte 10 ⁶ /mm ³	9.85	10.38	9.23	9.43	9.25	8.80
Leucocytes 10 ³ /mm ³	15.0	18.6	19.2	15.5	18.8	19.7
Hemoglobin g/100ml	15.1	15.2	14.2	15.6	15.7	14.6
Packed cell volume %*	45.5 ^a	46.4 ^b	41.8 ^c	42.9	42.1	40.3
Mean cell volume u ³	46.2	45.5	45.3	45.5	45.5	45.8
Mean cell hemoglobin uug	15.3	14.6	15.4	16.5	17.0	16.6
Mean cell Hb conc. %	33.2	32.8	34.0	36.4	37.3	36.2
RDW	19.3	18.5	19.2	30.6	33.7	32.6
Reticulocytes % (P/A)	2.8/0.2	N/D	N/D	64	N/D	N/D
RBC morphology**	N C3+	N C3+	N C2+ Mf	N	N	N
Platelets 10 ³ /mm ³	Nd	>ADQ ^d	>ADQ ^d	388 ^e	443 ^e	423 ^e
Plasma protein g/dl	8.0	8.2	7.8	N/D	N/D	N/D
Fibrinogen mg/dl	200	200	300	N/D	N/D	N/D
Icterus index units	<5	<5	SL Hem <5	N/D	N/D	N/D
DIFFERENTIAL						
(Leukocyte count)						
Bands %	0	0	0	1	1	8
Neutrophils %	90	91	91	79	92	84
Lymphocytes %	6	5	6	16	6	7
Monocytes %	3	2	<1	3	0	0
Eosinophils %	1	2	2	1	1	1
Basophils %	0	0	1	0	0	0

Table 15. (continued)

#26 M p.2

Date	01-30-88
Age	4-5 yr
Location#	PR/HENDRYCo
Sample ^a	D = 3:22
Event ^b	120M PE
Laboratory ^c	DSI
Anesthetic ^d	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	8.56
Leucocytes $10^3/\text{mm}^3$	25.6
Hemoglobin g/100ml	14.8
Packed cell volume %	36.4
Mean cell volume μ^3	42.5
Mean cell hemoglobin μg	17.2
Mean cell Hb conc. %	40.6
RDW	33.8
Reticulocytes % (P/A)	N/D
RBC morphology**	N
Platelets $10^3/\text{mm}^3$	372e
Plasma protein g/dl	N/D
Fibrinogen mg/dl	N/D
Icterus index units	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	3
Neutrophils %	90
Lymphocytes %	6
Monocytes %	1
Eosinophils %	0
Basophils %	0

^aSpun Pcv = 47.8^bSpun PCV = 47.0^cSpun PCV = 44.8^dplatelets moderately clumped^eplatelet estimate normal

TABLE 16. CELLULAR CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 27 Female

Date	04-11-88		04-11-88a		04-11-88a	
Age	2-3 yr		2-3 yr		2-3 yr	
Location#	E EV/ENP		E EV/ENP		E EV/ENP	
Sample ^b	A = 0:15	B = 1:00	A = 0:15	B = 1:00	A = 0:15	B = 1:00
Event ^b	Initial	Post cap	Initial	Post cap	Initial	Post cap
Laboratory ⁺	JASH	JASH	VMTH	VMTH	CONL	CONL
Anesthetic Agent ^a	K		K		K	
CONSTITUENT						
Erythrocyte $10^6/\text{mm}^3$	7.04	6.60	6.77	6.27	6.8	6.41
Leucocytes $10^3/\text{mm}^3$	8.3	8.9	7.6	8.0	8.4	8.9
Hemoglobin g/100ml	11.4	10.6	10.9	10.1	11.3	10.8
Packed cell volume %	36.5	34.1	32.0 ^b	29.4 ^c	32.6	30.6
Mean cell volume μ^3	51.8	51.7	47.3	46.9	48.0	47.8
Mean cell hemoglobin μg	16.2	16.1	16.1	16.1	16.6	16.8
Mean cell Hb conc. %	31.2	31.1	34.0	34.3	34.6	35.2
RDW	N/D	N/D	15.7	15.6	17.9	18.2
Reticulocytes % (P/A)	3.8/0.6	N/D	N/D	N/D	0.4	N/D
RBC morphology**	N	N	N Mf	N	A Po M	A Po M
Platelets $10^3/\text{mm}^3$	N/D	N/D	Nd	Ne	378 ^f	447 ^f
Plasma protein g/dl	N/D	N/D	8.5	8.2	N/D	N/D
Fibrinogen mg/dl	N/D	N/D	100	200	N/D	N/D
Icterus index units	N/D	N/D	<5	<5	N/D	N/D
DIFFERENTIAL						
(Leukocyte count)						
Bands %	1	2	1	0	0	0
Neutrophils %	61	61	63	64	70	55
Lymphocytes %	21	20	28	28	25	3
Monocytes %	12	11	1	1	2	41
Eosinophils %	4	5	6	5	3	1
Basophils %	1	1	1	2	0	0

^aSample was 24 hours old when analyzed by this lab^bSpun PCV = 32.9^cSpun PCV = 30.2^dplatelets slightly clumped^eplatelets moderately clumped^fPlatelet estimate = normal

TABLE 17. CELLULAR CONSTITUENTS OF BLOOD FROM WILD ARIZONA MOUNTAIN LIONS

ID & Sex	AZ #08 F	AZ #14 F
Date	12-12-86	12-27-86
Age	1.5 yr	1.5 yr
Location#		
Laboratory ^a	LRPCL ^a	LRPCL ^a
Anesthetic Agent [@]	Dead	Dead
CONSTITUENT		
Erythrocyte 10 ⁶ /mm ³	7.65	7.16
Leucocytes 10 ³ /mm ³	6.7	2.9
Hemoglobin g/100ml	12.1	11.5
Packed cell volume %*	40	36
Mean cell volume u ³	52	51
Mean cell hemoglobin uug	16	16
Mean cell Hb conc. %	31	32
RDW	N/D	N/D
Reticulocytes % (P/A)	N/D	N/D
RBC morphology**	Nb	N
Platelets 10 ³ /mm ³	DEC	ADO
Plasma protein g/dl	N/D	N/D
Fibrinogen mg/dl	N/D	N/D
Icterus index units	N/D	N/D
DIFFERENTIAL (Leukocyte count)		
Bands %	0	0
Neutrophils %	66	38
Lymphocytes %	33	60
Monocytes %	0	0
Eosinophils %	1	2
Basophils %	0	0

^aLAB: Lewis R. Pyle Clinical lab., Payson, Arizona^bNegative for Hemobartonella felis

TABLE 18. CELLULAR CONSTITUENTS OF BLOOD FROM WILD COLORADO MT. LIONS*
(*Felis concolor hippolestes*) 1987 & 1988

ID # & Sex	#05 M		#07 F	#20 M	#21 F	#22 M
Age	9-10 yr	10-11 yr	8 yr	3.5-4 yr	3.5 yr	6 yr
Date	05-09-87	04-20-88	04-25-87	04-25-88	05-12-87	04-23-88
Location#		Cushman		Cushman		Fisher
Sample ^b	A	A = 0:25	A	A = 0:30	A = 0:38	A = 0:43
Event ^b	Initial	Initial	Initial	Initial	Initial	Initial
Laboratory+	MONT	MONT	MONT	MONT	MONT	MONT
Anesthetic Agent ^c	K	K	KX	K	KX	K

CONSTITUENT

Erythrocyte $10^6/\text{mm}^3$	8.84	6.74	8.64	11.25	7.82	8.28
Leucocytes $10^3/\text{mm}^3$	13.7	17.0	5.8	11.7	8.1	7.9
Hemoglobin g/100ml	14.7	11.5	15.0	16.2	13.7	15.9
Packed cell volume %*	45.4	34.0	47.5	48.0	40.8	45.5
Mean cell volume μ^3	50	50.4	53	42.6	50	54.9
Mean cell hemoglobin μg	16.5	17.0	17.1	14.4	17.13	19.2
Mean cell Hb conc. %	32.1	33.8	31.2	33.7	33.1	34.9
Reticulocytes % (P/A)	N/D	0.4	N/D	0.1	N/D	0
RBC morphology**	N	N	2+ M	1+ Po	N	N
Platelets $10^3/\text{mm}^3$	N/D	200	N	60	N	N
Plasma protein g/dl	N/D	N/D	N/D	N/D	N/D	N/D

DIFFERENTIAL

(Leukocyte count)

Bands %	7	0	0	0	1	1
Neutrophils %	82	78	80	73	68	80
Lymphocytes %	6	22	20	25	28	17
Monocytes %	3	0	0	0	1	2
Eosinophils %	2	0	0	2	2	0
Basophils %	2	0	0	0	2	0

Table 18. (continued)

Colorado Mt. Lions p.2

ID # & Sex	#40 M	#47 M	#52 M	#55 M
Age	4-5 yr	25 mos	3.5 yr	4-5 yr
Date	04-22-88	04-27-88	04-19-88	04-26-88
Location [#]	McKenzie	L.Dolores	W.Horsefly	Criswell
Sample ^o	A = 0:30	A = 0:43	A = 0:25	A = 0:35
Event ^{oo}	Initial	Initial	Initial	Initial
Laboratory ⁺	MONT	MONT	MONT	MONT
Anesthetic Agent ^o	K	K	K	K
CONSTITUENT				
Erythrocyte $10^6/\text{mm}^3$	11.88	12.54	9.7	10.0
Leucocytes $10^3/\text{mm}^3$	14.0	11.6	8.8	11.5
Hemoglobin g/100ml	17.2	18.9	17.7	15.1
Packed cell volume %	48.0	54.0	49.0	44.0
Mean cell volume μ^3	40.4	43.0	51.0	44.0
Mean cell hemoglobin μg	14.5	15.1	18.2	15.1
Mean cell Hb conc. %	35.8	35.0	36.1	34.3
Reticulocytes % (P/A)	0.1	0.2	0.9	0
RBC morphology**	N	1+ Po	1+ Po	1+ Po
Platelets $10^3/\text{mm}^3$	340	80	280	140
Plasma protein g/dl	N/D	N/D	N/D	N/D
DIFFERENTIAL (Leukocyte count)				
Bands %	0	0	0	0
Neutrophils %	74	81	78	77
Lymphocytes %	24	19	22	21
Monocytes %	0	0	0	0
Eosinophils %	2	0	0	2
Basophils %	0	0	0	0

*Mt. Lions were captured on Uncompahgre plateau, in southwestern Colorado (Elevation 7-9000 ft.). They are part of the Mt. Lion population dynamics study being conducted by Allen Anderson, Colorado Division of Wildlife

[#]Location - capture site/river drainage

⁺Montrose Hospital Laboratory, Montrose, Colorado.

*PCV is a calculated value

TABLE 19: CELLULAR CONSTITUENTS OF BLOOD FROM WILD OREGON COUGARS

ID & Sex	OR #30 ^A	OR #03 ^B	OR #08 ^B	OR #09 ^B	OR #10 ^B
Date	05-12-87	03-13-86	01-19-87	02-24-87	03-21-87
Age					
Location	East OR	West OR	West OR	West OR	West OR
Event ^{qq}	Initial	Initial	Initial	Initial	Initial
Laboratory ⁺	GRH	MMH	MMH	MMH	MMH
Anesthetic Agent ^q		KX	KX	KX	KX
CONSTITUENT					
Erythrocyte 10 ⁶ /mm ³	7.96	9.42	8.22	8.63	7.03
Leucocytes 10 ³ /mm ³	5.7	10.3	10.7	5.5	15.5
Hemoglobin g/100ml	13.4	16.3	13.6	15.3	11.6
Packed cell volume % ^c	37.1 ^c	41.1	39.7	41.2	32.2
Mean cell volume μ^3	47.0	46.8	48.3	47.7	45.7
Mean cell hemoglobin μ g	N/D	17.3	16.5	17.7	16.4
Mean cell Hb conc. %	N/D	36.9	34.2	37.1	35.9
RDW	N/D	39.2	19.2	34.8	33.9
Reticulocytes % (P/A)	N/D	N/D	N/D	N/D	N/D
RBC morphology ^{**}	N	N/D	N/D	N/D	N/D
Platelets 10 ³ /mm ³	N	N/D	127 ^d	8	228
Plasma protein g/dl	N/D	N/D	N/D	N/D	N/D
Fibrinogen mg/dl	N/D	N/D	N/D	N/D	N/D
Icterus index units	N/D	N/D	N/D	N/D	N/D
DIFFERENTIAL (Leukocyte count)					
Bands %	12	N/D	N/D	N/D	N/D
Neutrophils %	62	N/D	N/D	N/D	N/D
Lymphocytes %	19	N/D	N/D	N/D	N/D
Monocytes %	4	N/D	N/D	N/D	N/D
Eosinophils %	3	N/D	N/D	N/D	N/D
Basophils %	0	N/D	N/D	N/D	N/D

⁺Labs: GRH - Grand Ronde Hospital, LaGrande, Ore.; MMH - Mercy Medical Hospital, Roseburg, Ore.

^AEastern Oregon cougar - held in captivity

^BWestern Oregon cougar - near Roseburg, Ore.

^CSpun PCV = 37%

^dMean platelet volume = 15.2

LEGEND
SEROLOGY TABLES

N/D = Not Determined

MAJOR POPULATIONS: I- Southwestern Florida, Big Cypress Swamp & Fakahatchee Strand and surrounding ecosystem including privately owned land; II- Southeastern Florida, Everglades National Park; III Central Florida; IV- not part of a discrete documented population of panthers.

LOCALITY OF RANGE: BI - Bear Island Unit of Big Cypress National Preserve; CORBETT - Corbett Management Area; ENP - Everglades National Park; FEC- Fish Eating Creek; FS- Fakahatchee Strand both north and south of SR 84; MO - Southwestern Monument Unit, Big Cypress National Preserve; N. Florida- 10 months old captive cougar released near Capps, Fl. south of Tallahassee 2 months before death on highway by car; N.FS - Northern Fakahatchee Strand; PR - Private ranches east of Immokalee; RP - Raccoon Point, Eastern Big Cypress National Preserve; S.FS - Southern Fakahatchee Strand (Fakahatchee Strand State Preserve).

OTHER: Cap - captivity; GFC - Florida Game and Fresh Water Fish Commission, Wildlife Research Laboratory, Gainesville, Fl.; MMZ - Miami Metro Zoo, Miami, Fl.; WOP - White Oak Plantation, Yulee, Fl.

b SAMPLE: Blood samples drawn at the "running time" indicated.
Time zero (0:00) starts when cat receives initial anesthetic agent

b EVENT:

Initial: initial blood sample, drawn as soon as cat is stable, IV catheter implanted, generally less than 100 cc of IV fluids given.

PRE-E: blood drawn immediately prior to starting electro-ejaculation protocol (males). Skin biopsy surgical procedure preformed on lateral thigh, 6 x 6mm plugs removed and wounds sutured. Also, cat has received 5-700 cc of lactated ringers.

PE or Post ejac: Post Ejaculation, number in front indicates time (minutes) following series III of ejaculation protocol. By end the panther has usually received 1 liter lactated ringers IV and 2 liters SQ.

Post Cap: sample drawn at end of capture procedure

+ Laboratory: CONL = Consulab, Miami; DSI = Diagnostic Services Inc., Naples; IALS = Inter-American Laboratory Service, Miami; JASH = James Archer Smith Hospital Laboratory, Homestead; VMTH = Veterinary Medical Teaching Hospital, Gainesville.

@ Anesthetic used: D = Diazepam (Valium^R); H = Halothane; K = Ketamine hydrochloride; T = Telazol; V = Versed; X = Xylazine hydrochloride (Rompun^R);

Table 20. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 10 Male

Date	01-15-86	05-02-86
Age	5-7 mo	9-11 mo
Location#	FSSP/BLK	FSSP
Sample ^b	A	A
Event ^{bb}	Initial	Initial
Laboratory+	DSI	DSI
Anesthetic ^c	K	K

Total Protein	6.0	7.4
Globulin	2.7	3.3
Albumin	3.3	4.1
A/G Ratio	1.2	1.2
LDH	328	258
CPK	686	409
SGPT	88	50
SGOT	59	30
Alk. Phos.	183	91
Na	154	N/D
K	4.5	N/D
Cl	116	N/D
Ca	9.3	10.3
Phos.	7.3	6.1
Glucose	150	126
Cholesterol	147	145
Bilirubin	001	0.1
Creatinine	1.0	1.6
BUN	58	26
BUN/Crea. Ratio	58	16.3
GGT	2.0	4.0
Serum Iron	108	68
Anion Gap	N/D	N/D
CO ₂ Total	17.3	N/D
Triglycerides	38	22
Uric Acid	1.0	0.4

Table 21. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 11 Female^A

Date	01-21-86	01-07-88	01-07-88
Age	4-4 yr	6-7 yr	6-7 yr
Location#	BI/BCNP	PR/PRICE	PR/PRICE
Sample ^o	A	A = 0:23	B = 0:49
Event ^{oo}	Initial	Initial	Post cap
Laboratory+	DSI	CONL	CONL
Anesthetic ^o	KX		
Total Protein	7.3	7.0	7.5
Globulin	4.1	3.6	3.8
Albumin	3.2	3.4	3.7
A/G Ratio	0.8	0.9	1.0
LDH	157	151	232
CPK	636	909	1110
SGPT	71	10	14
SGOT	65	64	91
Alk. Phos.	11	15	19
Na	155	150	156
K	4.0	4.2	4.8
Cl	120	113	117
Ca	9.4	9.8	10.3
Phos.	5.8	6.5	5.5
Glucose	106	292	245
Cholesterol	126	142	160
Bilirubin	0.1	0.2	0.1
Creatinine	1.4	1.7	1.6
BUN	59	51	54
BUN/Crea. Ratio	42	30	34
GGT	2	N/D	N/D
Serum Iron	58	27	32
Anion Gap	N/D	0	0
CO ₂ Total	18.8	9	10
Triglycerides	48	111	95
Uric Acid	0.5	0.6	0.7
Ionized Calcium	N/D	4.3	4.4
Ferritin	42	N/D	N/D

A "The Bear Island Female"

Table 22. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 12 Male^A

Date	01-29-86	01-31-88	01-31-88	01-31-88	01-31-88
Age	4-5 yr	6-7 yr	6-7 yr	6-7 yr	6-7 yr
Location#	BI/BCNP	FSSP	FSSP	FSSP	FSSP
Sample ^{bb}	A = 0:40	A = 0:30	A = 0:30	B = 1:15	C = 2:20
Event ^{bb}	Initial	Initial	Initial	Post ejac	60m PE
Laboratory+	DSI	DSI	CONL	CONL	CONL
Anesthetic ^c	K	KT	KT	KT	KT
Total Protein	8.7	8.0	8.0	8.1	7.7
Globulin	4.8	4.4	4.5	3.9	3.7
Albumin	3.9	3.6	3.5	4.2	4.0
A/G Ratio	0.8	0.8	0.8	1.1	1.1
LDH	369	126	196	246	287
CPK	655	254	229	N/D	1640
SGPT	101	54	20	29	28
SGOT	153	45	42	62	76
Alk. Phos.	12	6	6	30	25
Na	153	154	154	157	154
K	4.6	4.6	4.5	4.5	4.0
Cl	116	122	119	118	117
Ca	10.3	9.5	10.0	11.1	10.5
Phos.	5.0	5.0	5.3	5.8	4.3
Glucose	222	198	179	139	137
Cholesterol	158	127	128	199	185
Bilirubin	0.1	0	0.2	0.2	0.2
Creatinine	2.5	2.3	2.2	1.7	1.7
BUN	19	13	17	48	46
BUN/Crea. Ratio	8	5.7	8.0	28	27
GGT	2	1	N/D	N/D	N/D
Serum Iron	71	39	46	79	92
Anion Gap	N/D	N/D	21	23	19
CO ₂ Total	15	16	14	16	18
Triglycerides	11	16	6	23	14
Uric Acid	1.0	0.4	0.5	0.3	0.4
Ionized Calcium	N/D	N/D	4.1	4.5	4.4

A "The Bear Island Male"

Table 23. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 13 Male^A

Date	02-27-86	02-27-86
Age	4-6 yr	4-6 yr
Location#	BI/BCNP	BI/BCNP
Sample ^o	A = 0:	B = 1:
Event ^{oo}	Initial	Post ejac
Laboratory+	DSI	DSI
Anesthetic ^o	K	
Total Protein	7.4	7.7
Globulin	3.8	3.9
Albumin	3.6	3.8
A/G Ratio	0.9	1.0
LDH	334	326
CPK	364	2610
SGPT	51	67
SGOT	41	87
Alk. Phos.	14	12
Na	152	153
K	4.3	4.4
Cl	116	117
Ca	9.2	9.3
Phos.	5.6	3.3
Glucose	411	319
Cholesterol	174	183
Bilirubin	0.1	0.1
Creatinine	2.6	2.5
BUN	24	24
BUN/Crea. Ratio	9	10
GGT	1	1
Serum Iron	93	116
Anion Gap	ND	ND
CO ₂ Total	10.6	16.2
Triglycerides	1	1
Uric Acid	1.1	1.2

A"Big Al"

Table 24. Serum Constituents of Blood in Wild Florida Panther: # 14 Female

Date	12-06-86	04-12-88	
Age	4-5 yrs	5.5-6.5 yr	
Location#	ENP	ENP	
Sample ⁰	A = 0:22	A = 0:	B = 1:
Event ⁰⁰	Initial	Initial	Post cap
Laboratory+	CONL	JASH	JASH
Anesthetic [@]	K	K	
Total Protein	8.1	7.5	7.4
Globulin	4.2	3.8	3.8
Albumin	3.9	3.7	3.6
A/G Ratio	0.9	1.0	0.9
LDH	141	94	134
CPK	N/D	585	880
SGPT	62	49	49
SGOT	83	54	59
Alk. Phos.	9	5	7
Na	155	157	158
K	4.2	4.1	3.5
Cl	120	115	115
Ca	9.9	9.5	9.2
Phos.	3.5	3.2	2.4
Glucose	95	104	124
Cholesterol	131	177	172
Bilirubin	0.1	0.1	0.1
Creatinine	2.8	2.0	2.1
BUN	41	39	38
BUN/Crea. Ratio	14.6	19.5	18.1
GGT	N/D	N/D	N/D
Serum Iron	124	87	104
Anion Gap	16	N/D	N/D
CO ₂ Total	19	22	23
Triglycerides	4	23	18
Uric Acid	0.7	N/D	0.1
SGOT/SGPT Ratio	N/D	1.1	1.2

Table 25. Serum Constituents of Blood in Wild Florida Panther: # 16 Male^A

Date	01-12-87	02-02-88	02-02-88	02-02-88	02-02-88	02-02-88
Age	18-26 mo	28-34 mo	28-34 mo	28-34 mo	28-34 mo	28-34 mo
Location#	ENP	E EV/ENP	E EV/ENP	E EV/ENP	E EV/ENP	E EV/ENP
Sample ⁰	A = 0:33	A = 0:40	B = 1:35	A = 0:40	B = 1:35	C = 2:10
Event ⁰⁰	Initial	Initial	Post ejac	Initial	Post ejac	30M PE
Laboratory+	CONL	JASH	JASH	CONL	CONL	CONL
Anesthetic ⁰	K	K	K	K	K	K
Total Protein	7.1	6.9	7.8	7.2	8.1	8.1
Globulin	3.4	3.6	4.0	3.8	4.2	4.2
Albumin	3.7	3.3	3.8	3.4	3.9	3.9
A/G Ratio	1.1	0.9	0.9	0.9	0.9	0.9
LDH	162	160	284	170	330	310
CPK	N/D	1158	2568	981	N/D	2540
SGPT	81	48	56	24	33	21
SGOT	100	53	75	49	66	79
Alk. Phos.	43	22	20	27	25	25
Na	153	162	157	157	158	155
K	4.3	4.4	3.9	4.0	4.4	4.5
Cl	122	116	116	120	118	117
Ca	9.9	9.8	10.2	10.0	10.6	10.5
Phos.	5.9	4.2	5.1	4.9	5.7	6.0
Glucose	283	106	147	95	123	143
Cholesterol	144	128	146	137	153	152
Bilirubin	0.1	0.1	0.2	0.1	0.2	0.2
Creatinine	1.4	1.7	1.8	1.8	2.0	2.0
BUN	69	63	58	60	57	56
BUN/Crea. Ratio	49.3	37.1	32.6	33	29	28
GGT	N/D	N/D	N/D	N/D	N/D	N/D
Serum Iron	108	75	83	65	66	61
Anion Gap	11	ND	ND	17	22	19
CO ₂ Total	20	22	20	20	18	19
Triglycerides	52	ND	ND	25	15	15
Uric Acid	2.0	0.1	0.3	0.6	0.7	0.9
Ionized Calcium	N/D	N/D	N/D	4.4	4.3	4.3

^A"Everglades Male"

Table 26. Serum Constituents of Blood in Wild Florida Panthers: # 19 Female^A

Date	02-09-87	11-09-87
Age	9 mo	18 mo
Location#	BI	PR/PRICE
Sample ^b	A = 0:12	A = 0:20
Event ^{bb}	Initial	Initial
Laboratory+	DSI	DSI
Anesthetic ^c	K	K

Total Protein	6.6	7.8
Globulin	3.0	3.7
Albumin	3.6	4.1
A/G Ratio	1.2	1.1
LDH	167	332
CPK	271	485
SGPT	58	141
SGOT	55	90
Alk. Phos.	137	14
Na	152	N/D
K	4.3	N/D
Cl	112	N/D
Ca	10.2	9.8
Phos.	6.9	5.8
Glucose	177	146
Cholesterol	156	122
Bilirubin	0.1	0
Creatinine	1.1	1.9
BUN	46	56
BUN/Crea. Ratio	41.8	29.5
GGT	1	1.0
Serum Iron	146	128
Anion Gap	N/D	N/D
CO ₂ Total	17	N/D
Triglycerides	178	95
Uric Acid	0.5	1.4

^A"The Price Kitten"

Table 27. Serum Constituents of Blood in Wild Florida Panthers: #22 Female

Date	03-18-87	04-07-87	06-15-87	06-16-87	03-24-88	03-24-88
Age	6-7 mo	7-8 mo	9-10 mo	9-10 mo	18 mo	18 mo
Location#	ENP	ENPX1	ENPX3	ENPX4	ENPX5	ENPX5
Sample ⁰	A = 0:10	A = 0:37	A = 0:13	A = 0:14	A = 0:19	B = 0:55
Event ^{bb}	Initial	Initial	Initial	Initial	Initial	Post cap
Laboratory+	CONL	CONL	JASH	JASH	JASH	JASH
Anesthetic@	K	K	K	K	K	
Total Protein	7.4	6.7	6.4	6.6	6.7	7.4
Globulin	2.9	2.7	2.9	3.1	3.6	3.8
Albumin	4.5	4.0	3.5	3.5	3.1	3.6
A/G Ratio	1.6	1.5	1.2	1.1	0.9	0.9
LDH	133	144	111	130	272	449
CPK	N/D	N/D	230	2472	892	1411
SGPT	27	66	39	56	87	103
SGOT	42	53	35	78	55	76
Alk. Phos.	158	120	54	52	17	15
Na	152	151	145	150	153	156
K	4.2	4.9	4.6	4.0	4.5	4.3
Cl	117	119	114	114	116	118
Ca	11.6	10.9	10.0	10.0	9.9	10.2
Phos.	5.2	6.3	6.0	6.0	4.3	3.8
Glucose	185	247	140	105	132	100
Cholesterol	207	129	163	147	121	132
Bilirubin	0.1	0.0	0.1	0.2	0.1	0.1
Creatinine	1.4	1.4	1.0	1.2	1.5	1.6
BUN	14	28	60	23	41	41
BUN/Crea. Ratio	10.0	20.0	60	19.2	27.3	25.6
GGT	N/D	N/D	N/D	N/D	N/D	N/D
Serum Iron	67	115	64	38	82	N/D
Anion Gap	8.0	18.0	N/D	N/D	N/D	N/D
CO ₂ Total	27	14	14	12	18	16
Triglycerides	18	18	N/D	N/D	13	N/D
Uric Acid	5.1	0.6	0.2	0.1	0.0	0.5
SGOT/SGPT Ratio	N/D	N/D	N/D	N/D	0.6	0.7

Table 27. (continued)

#22 F p.2

Date	03-24-88
Age	18 ^{mo}
Location#	ENPX5
Sample ^b	A = 0:19
Event ^{bb}	Initial
Laboratory+	DSI
Anesthetic ^c	K

Total Protein	6.7
Globulin	3.1
Albumin	3.6
A/G Ratio	1.2
LDH	238
CPK	858
SGPT	95
SGOT	52
Alk. Phos.	18
Na	150
K	4.5
Cl	120
Ca	9.1
Phos.	4.2
Glucose	134
Cholesterol	120
Bilirubin	0.1
Creatinine	1.5
BUN	39
BUN/Crea. Ratio	26
GGT	1
Serum Iron	61
Anion Gap	N/D
CO ₂ Total	17
Triglycerides	29
Uric Acid	0.6
SGOT/SGPT Ratio	N/D

¹Removed from wild, held for 40 hrs with mother #15F and sib #23F, trying to reunite family, #23 was orphaned; ^{X2}Returned to wild 4-09-87, successfully reunited family; ^{X3}Remove from wild, held in captivity overnight, attempting to rejoin family, sib #23 was orphaned; ^{X4}Returned to wild, she stayed with mother, but #23F did not rejoin; ^{X5}Routine re-capture to change radio-collar.

Table 28. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: #23 Female*

Date	03-18-87	03-28-87	04-09-87	06-01-87	06-16-87	06-22-87
Age	6-7 mo	6-7 mo ^a	7-8 mo ^b	8-9 mo ^c	8-9 mo ^d	9-10 mo ^e
Location#	ENP	ENPX1	ENPX2	ENPX3	ENPX4	ENPX5
Sample ^b	A	A	A	A = 0:25	A	A
Event ^{bb}						
Laboratory+	CONL	JASH	JASH	JASH	JASH	JASH
Anesthetic@	K	K	K	K	K	K
Total Protein	6.9	6.1	7.8	6.0	7.7	8.0
Globulin	2.7	2.4	3.5	2.5	2.2	3.8
Albumin	4.2	3.7	4.3	3.5	5.5	4.2
A/G Ratio	1.6	1.5	1.2	1.4	2.5	1.1
LDH	650	158	163	51	206	185
CPK	N/D	629	2334	260	338	357
SGPT	64	28	77	29	120	77
SGOT	72	25	106	24	100	50
Alk. Phos.	227	94	27	63	40	106
Na	152	161	158	150	147	147
K	4.8	4.5	5.1	4.4	4.1	5.0
Cl	117	114	113	115	109	110
Ca	11.0	11.0	10.6	9.9	11.2	11.2
Phos.	7.2	9.5	7.5	5.6	6.4	8.4
Glucose	374	277	99	135	127	242
Cholesterol	238	142	148	122	207	164
Bilirubin	0.1	0.1	0.0	0.2	0.2	0.0
Creatinine	1.7	1.9	0.9	1.6	0.9	2.3
BUN	24	34	77	33	55	25
BUN/Crea. Ratio	14.1	17.9	85.6	20.6	61.1	10.9
GGT	N/D	N/D	N/D	N/D	N/D	N/D
Serum Iron	76	95	N/D	55	52	95
Anion Gap	22.0	N/D	N/D	N/D	N/D	N/D
CO ₂ Total	13	7	18	17	18	7
Triglycerides	16	N/D	N/D	N/D	N/D	N/D
Uric Acid	1.2	0.2	0.4	0.0	0.0	0.3
Ionized Calcium	N/D	N/D	N/D	N/D	N/D	N/D

Table 28. (continued).

23 F

Date	08-03-87	02-07-88	05-12-88	06-22-88	06-22-88
Age	11-12 mo ^f	17-18 mo ^f	20-21 mo ^f	21-22 mo ^g	21-22 mo ^g
Location#	ENPX6	ENPX7	ENPX8	ENPX9	ENPX9
Sample ^b	A			A = 0:18	B = 1:28
Laboratory+	JASH			CONL	CONL
Anesthetic ^c	K		K	K	K
Total Protein	8.1			7.5	6.7
Globulin	3.7			3.3	3.0
Albumin	4.4			4.2	3.7
A/G Ratio	1.2			1.3	1.2
LDH	112			298	425
CPK	573			226	889
SGPT	64			71	66
SGOT	59			57	70
Alk. Phos.	43			31	24
Na	161			162	150
K	3.7			4.9	4.8
Cl	115			122	118
Ca	10.9			11.2	9.9
Phos.	5.7			5.5	4.0
Glucose	109			178	183
Cholesterol	163			102	89
Bilirubin	0.2			0.2	0.2
Creatinine	1.5			2.0	1.8
BUN	45			24	21
BUN/Crea. Ratio	30.0			12	12
GGT	N/D			N/D	N/D
Serum Iron	N/D			59	57
Anion Gap	N/D			0	17.0
CO ₂ Total	20			12	15
Triglycerides	N/D			21	10
Uric Acid	-0.1			0.6	0.2
Ionized Calcium	N/D	N/D	N/D	4.8	4.5

* "Annie"; ^a9-10% dehydrated, cachectic; ^bhealthy; ^canorectic, 5-6% dehydrated; ^dhealthy; ^e6 days anorectic; ^fin captivity, healthy; ^g95% dehydrated, cachectic.

^{X1}Removed from wild, orphaned from mother for 10 days, 9-10% dehydrated, cachectic; ^{X2}Returned to wild, reunited with family after 12 days in captivity, good physical condition; ^{X3}Removed from wild, separated from mother for 6 days, anorectic, 5-6% dehydrated; ^{X4}Returned to wild, attempt to reunite with family, 16 days in captivity; ^{X5}Removed from wild, failed attempt to reunite with family, 6 days anorectic, slight dehydration; ^{X6}Quarantine, moving to White Oak Plantation; ^{X7}Radiograph injured leg; ^{X8}Return to Everglades National Park, released to the wild on 05-14-88; ^{X9}Removed from wild, stranded on island in Shark River Slough for 13 days, thin, poor physical condition, 5% dehydrated.

Table 29. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 24 Male^A

Date	01-30-88	01-30-88	01-30-88	01-30-88	01-30-88
Age	3-4 yr	3-4 yr	3-4 yr	3-4 yr	3-4 yr
Location#	PR/HIGHCo	PR/HIGHCo	PR/HIGHCo	PR/HIGHCo	PR/HIGHCo
Sample ^o	A = 0:23	A = 0:27	B = 1:03	C = 2:02	D = 3:02
Event ^{oo}	Initial	Initial	Post ejac	60m PE	120m PE
Laboratory+	DSI	CONL	CONL	CONL	CONL
Anesthetic ^o	K	K	K	K	K
Total Protein	7.4	7.2	6.9	6.5	7.5
Globulin	3.7	3.5	3.9	3.6	4.0
Albumin	3.7	3.7	3.0	2.9	3.5
A/G Ratio	1.0	1.1	0.8	0.8	0.9
LDH	378	384	298	220	233
CPK	371	340	N/D	N/D	2380
SGPT	69	21	10	10	11
SGOT	50	43	41	58	91
Alk. Phos.	24	29	4	4	5
Na	151	153	126	125	154
K	4.3	4.3	4.2	4.0	4.3
Cl	117	115	102	97	114
Ca	9.9	10.3	8.6	8.1	9.6
Phos.	6.4	6.7	5.5	4.9	4.6
Glucose	209	200	123	110	131
Cholesterol	185	183	115	106	124
Bilirubin	0.1	0.2	0.1	0.1	0.2
Creatinine	1.6	1.6	2.0	1.8	2.1
BUN	50	50	15	16	23
BUN/Crea. Ratio	31.3	31.0	8.0	9.0	11.0
GGT	0	N/D	N/D	N/D	N/D
Serum Iron	86	54	40	35	55
Anion Gap		20	15	15	0
CO ₂ Total	21	18	9	13	14
Triglycerides	56	36	7	5	6
Uric Acid	0.6	0.4	0.4	0.4	0.0
Ionized Calcium	N/D	4.5	3.8	3.7	4.1

A "The Lake Placid male"

Table 30. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 25 Male^A

Date	02-16-88	02-16-88	02-16-88
Age	3-4 yr	3-4 yr	3-4 yr
Location#	PR/BARFIELD	PR/BARFIELD	PR/BARFIELD
Sample ^b	A = 0:20	B = 1:20	C = 2:20
Event ^{bb}	Initial	Post ejac	60m PE
Laboratory+	DSI	DSI	DSI
Anesthetic ^c	K	K	K
Total Protein	8.4	9.2	8.9
Globulin	4.5	5.0	4.9
Albumin	3.9	4.2	4.0
A/G Ratio	0.9	0.8	0.8
LDH	93	203	357
CPK	645	1635	3620
SGPT	86	101	101
SGOT	104	144	154
Alk. Phos.	7	7	7
Na	153	159	154
K	4.3	4.3	3.7
Cl	118	116	115
Ca	9.3	10.2	9.6
Phos.	3.6	3.0	2.7
Glucose	134	165	191
Cholesterol	120	132	128
Bilirubin	0.1	0.2	0.2
Creatinine	2.4	2.4	2.4
BUN	22	22	21
BUN/Crea. Ratio	9.2	9.2	9.1
GGT	1	0	1
Serum Iron	82	103	120
Anion Gap	N/D	N/D	N/D
CO ₂ Total	14	14	14
Triglycerides	14	20	24
Uric Acid	0.4	0.5	0.6

A "Rogue"

Table 31. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 26 Male

Date	03-01-88	03-01-88	03-01-88	03-01-88
Age	4-5 yr	4-5 yr	4-5 yr	4-5 yr
Location#	PR/HENDCo	PR/HENDCo	PR/HENDCo	PR/HENDCo
Sample ^a	A = 0:30	B = 1:18	C = 2:18	D = 3:22
Event ^{bb}	Initial	Post ejac	60m PE	120m PE
Laboratory+	DSI	DSI	DSI	DSI
Anesthetic ^c	K			
Total Protein	7.4	7.8	7.5	7.7
Globulin	3.7	3.8	3.7	3.8
Albumin	3.7	4.0	3.8	3.9
A/G Ratio	1.0	1.1	1.0	1.0
LDH	264	375	768	N/D ^a
CPK	8.5	2120	5650	12610
SGPT	62	74	75	81
SGOT	76	117	152	211
Alk. Phos.	9	11	8	7
Na	154	155	145	147
K	4.2	5.1	4.4	4.1
Cl	115	117	109	109
Ca	9.7	10.0	9.0	9.2
Phos.	3.4	3.8	3.5	3.0
Glucose	158	141	132	132
Cholesterol	131	139	130	136
Bilirubin	0.2	0.2	0.2	0.3
Creatinine	3.2	3.3	2.8	2.7
BUN	24	24	23	21
BUN/Crea. Ratio	7.5	7.3	8.2	7.8
GGT	1	0	1	1
Serum Iron	69	65	137	145
Anion Gap	N/D	N/D	N/D	N/D
CO ₂ Total	15	16	17	16
Triglycerides	23	19	17	18
Uric Acid	0.4	0.5	0.8	0.4
Testosterone ng/dL	N/D	N/D	13.5	N/D

^aLab diluted sample because value was too high, but did not report any results

Table 32. SERUM CONSTITUENTS OF BLOOD FROM WILD FLORIDA PANTHER: # 27 Female^A

Date	04-11-88	04-11-88	04-11-88	04-11-88
Age	2-3 yr	2-3 yr	2-3 yr	2-3 yr
Location#	E EV/ENP	E EV/ENP	E EV/ENP	E EV/ENP
Sample ^o	A = 0:15	B = 1:00	A = 0:15	B = 1:00
Event ^{oo}	Initial	Post cap	Initial	Post cap
Laboratory+	JASH	JASH	DSI	DSI
Anesthetic [@]				

Total Protein	8.0	8.0	8.1	8.1
Globulin	4.8	4.7	4.7	4.8
Albumin	3.2	3.3	3.4	3.3
A/G Ratio	0.7	0.7	0.7	0.7
LDH	262	100	260	80
CPK	256	655	248	649
SGPT	43	43	43	42
SGOT	37	43	34	38
Alk. Phos.	5	3	5	4
Na	154	153	148	148
K	4.7	4.7	4.5	4.5
Cl	120	120	120	120
Ca	9.0	9.1	9.1	9.0
Phos.	5.2	4.4	5.3	4.5
Glucose	124	138	123	132
Cholesterol	120	116	115	116
Bilirubin	0.1	0.1	0.0	0.0
Creatinine	1.4	1.5	1.5	1.6
BUN	32	30	29	28
BUN/Crea. Ratio	22.9	20.0	19.3	17.5
GGT	N/D	N/D	2	2
Serum Iron	87	104	56	69
Anion Gap	N/D	N/D	N/D	N/D
CO ₂ Total	18	19	16	17
Triglycerides	26	17	26	16
Uric Acid	N/D	N/D	0.1	0.1
SGOT/SGPT Ratio	0.9	1.0	N/D	N/D

A "Rockette"

Table 33. Serum Constituents of Blood in Wild Colorado Mountain Lions* (Felis concolor hippolestes) 1987 & 1988

ID# & Sex	#05 M	#07 F	#20 M	#21 F
Date	05-09-87	04-20-88	04-25-87	04-25-88
Sample ^b	A	A = 0:25	A	A = 0:30
Age	9-10 yr	10-11 yr	8 yr	3.5-4 yr
Location**	Wild	Cushman	Wild	Cushman
Drug(s)@	K	K	KX	K
Laboratory+	MONT	CONL	MONT	CONL
				MONT
Total Protein	9.4	9.4	7.7	7.9
Globulin	N/D	7.2	N/D	3.9
Albumin	--A	2.8	0.7A	4.0
A/G Ratio	N/D	0.4	N/D	1.0
LDH	150	116	452	114
CPK	N/D	245	N/D	425
SGPT	N/D	17	N/D	80
AST/SGOT	41	57	97	129
Alk. Phos.	7	5	N/D	8
Na	158	153	156	151
K	4.2	4.1	4.1	4.2
Cl	134	121	126	123
Ca	8.8	9.5	9.2	10.6
Phos.	1.9	5.2	3.1	6.6
Glucose	138	128	113	115
Cholesterol	154	139	242	187
T. Bilirubin	0.3	0.1	0.6	0.1
Creatinine	2.3	1.5	1.4	1.4
BUN	27	67	63	68
BUN/Crea. Ratio	11.94	45	N/D	49
GGT	N/D	N/D	N/D	N/D
Serum Iron	N/D	42	N/D	79
Anion Gap	N/D	13	N/D	11.0
CO ₂ Total	14	19	14	17
Triglycerides	26	18	88	29
Uric Acid	0.2	0.4	0.5	0.8
Ionized calcium	N/D	3.4	N/D	4.4

Table 33. (continued)

Colorado Mt. Lions p.2

ID# & Sex	#22 M	#40 M	#47 M	#52 M	#55 MB
Date	04-23-88	04-22-88	04-27-88	04-19-88	04-26-88
Sample ^b	A = 0:45	A = 0:30	A = 0:48	A = 0:30	A = 0:38
Age	6 yr	4-5 yr	25 mos	3.5 yr	4-5 yr
Location*	Fisher	McKenzie	L.Dolores	W.Horsefly	Criswell
Drug(s)@	K	K	K	K	K
Laboratory+	CONL	CONL	CONL	CONL	CONL
Total Protein	7.5	7.2	8.3	7.7	3.1
Globulin	3.9	3.4	3.7	3.6	1.7
Albumin	3.6	3.8	4.6	4.1	1.4
A/G Ratio	1.1	1.1	1.2	1.1	0.8
LDH	331	138	398	244	104
CPK	2270	632	4570	1189	418
SGPT	56	48	54	169	42
AST/SGOT	75	52	127	327	79
Alk. Phos.	10	14	16	13	6
Na	154	154	168	153	52
K	3.4	4.1	4.3	4.0	2.0
Cl	124	121	117	122	58
Ca	9.7	10.0	11.1	10.5	3.9
Phos.	5.0	5.1	6.4	4.8	2.0
Glucose	342	248	81	125	57
Cholesterol	221	184	135	241	58
T. Bilirubin	0.1	0.2	0.2	0.2	0.1
Creatinine	1.4	1.8	2.2	1.5	0.5
BUN	66	72	73	73	28
BUN/Crea. Ratio	47	40	33	49	56
GGT	N/D	N/D	N/D	N/D	N/D
Serum Iron	103	152	83	112	35
Anion Gap	14	17	0 ?	15	0 ?
CO ₂ Total	16	16	21	16	11
Triglycerides	17	46	29	25	11
Uric Acid	0.5	0.5	0.5	1.0	0.2
Ionized calcium	4.1	4.4	4.5	4.4	2.5

*Lions were captured on Uncompangre Plateau, in SW Colorado. They are part of the mountain lion population dynamics study being conducted by Allen Anderson, Colorado Division of Wildlife. **Location - capture site/river drainage.

^AAlbumin assay used by this lab only detects human albumin.

^BHighly suspect of all results for this animal, many values are not compatible with life (viz. k = 2.0), everything appears diluted by 2-3x (?)

Table 34. SERUM CONSTITUENTS OF BLOOD FROM WILD OREGON COUGARS^A

ID & Sex	OR #06 ^B	OR #08 ^B	OR #09	OR #10
Date	05-06-86	01-19-87	02-24-87	03-21-87
Sample ^B	A	A	A	A
Event ^B	LiveCap	LiveCap	LiveCap	LiveCap
Laboratory ⁺	MMH	MMH	ML	MMH
Anesthetic [@]	KX	KX	KX	KX
Total Protein	8.6	7.3	7.6	6.9
Globulin	3.7	3.6	3.5	5.9
Albumin	4.9	3.7	4.1	1.0
A/G Ratio	1.3	1.0	1.2	0.2
LDH	1290	781	>600	760
CPK	6990	14450	N/D	1680
SGPT	N/D	N/D	N/D	N/D
SGOT	510	245	>500	95
Alk. Phos.	9	5	58	42
Na	159	160	158	162
K	4.0	4.3	3.8	6.6
Cl	114	110	122	124
Ca	11.9	9.8	10.1	10.2
Phos.	5.6	6.7	5.6	6.0
Glucose	218	228	199	92
Cholesterol	178	239	154	143
Bilirubin	0.4	0.2	0.2	0.3
Creatinine	0.7	2.3	2.7	2.5
BUN	93	43	36	36
BUN/Crea. Ratio	132.9	18.7	13	14.4
GGT	2	1	11	-7 (?)
Serum Iron	N/D	N/D	N/D	N/D
Anion Gap	N/D	N/D	N/D	N/D
CO ₂ Total	17.0	16.6	13	17.2
Triglycerides	48	36	3	34
Uric Acid	1.0	1.4	<1.0	2.1

^AWild caught cougars from Douglas County, near Roseburg, Oregon. Radio-instrumented and sampled by Bob Gagliuso, masters student, Oregon State University.

^BHemolysed blood sample

⁺ML = Medlal, Inc., Portland, Oregon; MMH = Mercy Medical Hospital, Roseburg, Oregon.

Table 35. Serologic Tests and Antigens used to Determine Antibody Titers Against Eight Pathogenic Agents in 32 Free-ranging Florida Panthers.

Agent (antigen)	No. of Samples	Test	Positive Threshold	Reference
VIRUSES				
Feline calicivirus (FP 255)	40	plaque reduction	> 1:4	CFHL-Scott ^A
Feline infectious peritonitis (corona virus- TGE)	50	KELAB ^B	≥ 1:9	Barlough et al., 1983
Feline leukemia virus	50	ELISAC ^C		Mia et al., 1981
Feline panleukopenia virus (FPL-LV)	40	serum neutralization	≥ 1:50	Scott et al., 1970
Feline rhinotracheitis virus (FVR-Goldstein)	40	plaque reduction	≥ 1:2	CFHL-Scott ^A
Pseudorabies	26	Latex agglutination ^D	> 1:4	Pirtle, 1988
BACTERIA				
<u>Brucella</u> spp. (<u>Brucella abortus</u>)	26	plate agglutination	≥ 1:25	USDA
PROTOZOA				
<u>Toxoplasma gondii</u>	50	KELA	≥ 1:48	Jacobson et al., 1988

^ACFHL: Feline Health Laboratory, Cornell University, Dr. Fred Scott

^BKELA: kinetics enzyme-linked immunosorbant assay; results are considered to be "IFA-equivalent" titers.

^CELISA: enzyme-linked immunosorbant assay; kits utilized were VIRACHEK-FelVR by Symbiotics and LEUK-ASSAY F*IR by Pitman-Moore.

^DLatex kit from Viral Antigens, INC., Memphis, Tenn.

^EDr. P. Nicolletis' brucellosis lab, UF, College of Veterinary Medicine

Table 36. Summary of serologic tests for antibodies to selected pathogens in 32 individual wild Florida panthers, 1978-88.

Agent	Prevalence			Reciprocal titer	
	No. exam.	No. pos.	%	Minimum	Maximum
VIRUSES					
Feline calicivirus	32	18 ^A	56	<2	>256
Feline infectious peritonitis (coronavirus)	32	0	0	<9	
Feline leukemia virus	32	0	0	0	
Feline panleukopenia virus (parvovirus)	32	25 ^B	78	<5	>10,000
Feline rhinotracheitis virus (herpesvirus)	32	0	0	<2- <8 ^D	
Pseudorabies virus	25	0	0	0	
PROTOZOA					
<u>Toxoplasma gondii</u>	32 ^C	2	6	<48	308
BACTERIA					
<u>Brucella</u> spp.	25	0	0	<25	

^ATwo animals sero-converted after 12 and 22 months, negative to positive, and each was included once in the tally as a positive animal. Also, postmortem hemolysis could interfere with detecting a low positive titer in three animals, actual results: two with <1:8 and one with <1:20.

^BOne animal sero-converted after 12 months, negative to positive, and was included once in the tally as a positive animal.

^CData on five of these serum samples were presented in two earlier papers (four in Forrester et al., 1985 and one in Burrige et al., 1979). All of these samples tested negative by KELA in this current study, however one was reported by Forrester to be positive by indirect hemagglutination test (1:256).

^DHemolyzed sera from necropsied animals resulted in higher negative thresholds than non-hemolyzed sera.

Table 37. Seroprevalence of Selected Disease Agents in Free-living Florida Panthers, 1978-88.

ID#	SEX	LOCATION ^B	DATE	AGE CLASS ^C	TESTS ^A							
					FPL	FCV	TOX	FVR	FELV	FIP	BRUC	PRV
# 01	M	I-S.FS	12-16-83 ^D	6	>5,000	12	-	<4	-	-	ND	-
# 02	M	I-S.FS	01-29-83	6	>4,000	<2	-	<4	-	-	-	ND
		I-S.FS	12-06-84 ^{DE}	6	100	<4	-	<5	-	-	ND	ND
# 03	F	I-S.FS	01-17-83 ^D	6	2,250	<4	-F1	<4	-	-	ND	ND
# 04	M	I-FS	01-29-83	6	<5	<2	-	<4	-	-	-	ND
		I-N.FS	01-22-84	6	>5,000	2	-	<4	-	-	-	ND
		I-N.FS	04-18-85 ^{DG}	6	50	<20	-	<10	-	-	ND	ND
# 07	M	I-RP	03-27-83	5	1,000	<2	49	<4	-	-	-	ND
		I-S.FS	01-26-85	6	1,000	>256	188	<5	-	-	ND	-
		I-S.FS	10-28-85 ^{DH}	6	500 ^V	80 ^V	-	<10 ^V	-	-	ND	-
# 08	F	I-S.FS	03-25-84	5	>5,000	48	-	<4	-	-	-	ND
		I-S.FS	02-21-85	6	10,000	16	-	<5	-	-	ND	-
		I-S.FS	01-13-86	6	>10,000 ^V	64 ^V	39	<2 ^V	-	-	ND	ND
		I-S.FS	04-13-87	6	5,000 ^V	96 ^V	9	12 ^V	-	-	ND	ND
		CAP/GFC	06-09-87	6	1,000 ^V	>256 ^V	-	96 ^V	-	-	ND	ND
# 09	F	I-S.FS	01-26-85	4	10,000	10	308	<5	-	-	-	-
		I-S.FS	01-08-87	5	1,000 ^V	24 ^V	79	6 ^V	-	-	ND	ND
		CAP/MMZ	02-05-87	5	10,000 ^V	192 ^V	150	96 ^V	-	-	ND	ND
# 10	M	I-S.FS	01-15-86	1	100	4	-	<2	-	-	-	-
		I-S.FS	05-02-86	2	100 ^V	3 ^V	-	<2 ^V	-	-	ND	ND
# 11	F	I-BI	01-21-86	5	500	2	-	<2	-	-	ND	ND
		I-PR	01-07-88	5	500 ^V	24 ^V	15	6 ^V	-	-	-	-
# 12	M	I-BI/FS	01-28-86	5	500	<2	-	<2	-	-	ND	ND
		I-BI/FS	01-31-88	5	100 ^V	6 ^V	26	<2 ^V	-	-	-	-
# 13	M	I-BI/PR	02-27-86	5	>10,000	8	-	<2	-	-	-	-
# 14	F	II-ENP	12-07-86	5	50	>256	9 & 27	<2	-	-	-	-
		II-ENP	04-11-88	5	500 ^V	80 ^V	7	3 ^V	-	-	ND	ND
# 15	F	II-ENP	12-13-86	5	100	<2	6	<2	-	-	-	-
		II-ENP	04-07-87	5	100 ^V	>256 ^V	-	2 ^V	-	-	ND	ND
# 16	F	II-ENP	01-12-87	2	<10	48	6	<2	-	-	-	-
		II-ENP	02-02-88	4	<10	240	12	<2	-	-	ND	ND

Table 37. (continued)

Seroprevalence p.2

ID# / SEX	LOCATION ^B	DATE	AGE CLASS ^C	TESTS ^A								
				FPL	FCV	TOX	FVR	FELV	FIP	BRUC	PRV	
# 17	M	I-PR	01-20-87	6	500	32	24	2	-	-	-	-
# 18	F	I-PR	01-22-87	6	500	16	9	<2	-	-	-	-
# 19	F	I-BI	02-09-87	2	10,000	8	17	<2	-	-	-	-
# 20	M	I-PR	03-10-87 06- -87	4	100	6	15 37	<2	-	-	-	- ND ND
# 21	F	II-ENP	03-16-87	2	<10	2	15	<2	-	-	-	ND
# 22	F	II-ENP	03-18-87	2	<10	<2	4	<2	-	-	ND	ND
		II-ENP	04-09-87	2					-	-	-	-
		II-ENP	03-24-88	3	<10	32	5	<2	-	-	ND	ND
# 23	F	II-ENP	03-18-87	2	<10	<2	3	<2	-	-	ND	ND
		II-ENP	04-09-87						-	-	-	-
		II-ENP	06-01-87	2	<10	2	3	<2	-	-	ND	ND
# 24	M	III-FEC	01-30-88	4	<10	48	23	<2	-	-	-	-
# 25	M	I-N.FS	02-16-88	4	500	3	8	<2	-	-	-	-
# 26	M	I-PR	03-10-88	5	500	16	8	<2	-	-	-	-
# 27	M	II-ENP	04-11-88	4	100	16	10	<2	-	-	-	-
Big Guy	M	I-MO	11-02-84	4	<20	40	-	5	-	-	-	-
G78-65	M	I-RP	03-17-78 ^D	3	5,000	<8	-F2	<4	-	-	-	-
G80-15	M	I-N.FS/BI	02-11-80 ^D	4	500	48	-F2	<8	-	-	ND	ND
G81-19	F	I-S.FS	04-19-81 ^D	4	<5	<8	-F2	<8	-	-	ND	ND
G83-22	M	III-FEC	03-17-83 ^D	4	2,250	64	-	<8	-	-	ND	-
G84-20	F	IV-CORBET	11-01-84 ^D	4	1,000	<4	-	<5	-	-	ND	ND
G84-26	F	I-FS	11-12-84 ^D	6	1,000	<4	-	<5	-	-	ND	ND
G88-TED	M	N.FLORIDA	03-10-88 ^D	2	<50	<3	-	<3	-	-	-	ND

LEGEND: SEROPREVALENCE TABLE

A SEROLOGICAL TESTS:

BRUC - brucellosis, plate agglutination test screens serum for antibodies against bacteria *Brucella* spp.; FCV - feline calicivirus, SN antibody > 1:4 considered positive; FELV - feline leukemia virus, ELISA test detects presence of virus; FIP - feline infectious peritonitis - ELISA test determines antibody to coronaviruses; FPL - feline panleukopenia virus, serum neutralizing antibody titer, test detects and cross reacts with all parvoviruses. Titers > 1:50 are considered positive; FVR - feline viral rhinotracheitis, SN antibody titer > 1:2 considered positive; TOX - toxoplasmosis, caused by protozoan *Toxoplasma gondii*. KELA titer > 1:48 considered positive; PRV - pseudorabies virus, latex agglutination > 1:4 considered positive.

B LOCATION OF PANTHER-

MAJOR POPULATIONS: I- Southwestern Florida, Big Cypress Swamp & Fakahatchee Strand and surrounding ecosystem including privately owned land; II- Southeastern Florida, Everglades National Park; III Central Florida; IV- not part of a discrete documented population of panthers.

LOCALITY OF RANGE: BI - Bear Island Unit of Big Cypress National Preserve; CORBETT - Corbett Management Area; ENP - Everglades National Park; FEC - Fish EATING Creek; FS- Fakahatchee Strand both north and south of SR 84; MO - Southwestern Monument Unit, Big Cypress National Preserve; N. Florida- 10 months old captive cougar released near Capps, FL. south of Tallahassee 2 months before death on highway by car; N.FS - Northern Fakahatchee Strand; PR - Private ranches east of Immokalee; RP - Raccoon Point, Eastern Big Cypress National Preserve; S.FS - Southern Fakahatchee Strand (Fakahatchee Strand State Preserve).

OTHER: Cap - captivity; GFC - Florida Game and Fresh Water Fish Commission, Wildlife Research Laboratory, Gainesville, FL.; MMZ - Miami Metro Zoo, Miami, FL.; WOP - White Oak Plantation, Yulee, FL.

CAGE CLASS: 1 - kitten (0-6 months); 2 - juvenile (7-18 months); 3 - subadult (19-24 months); 4 - young adult (2-4 years); 5 - mature adult (5-8 years); 6 - older adult (> 8 years).

D Blood collected postmortem

E Every autolysed carcass (3-4 days P.M.).

F Reported by Forrester, 1985, sera tested at CDC <1:256 considered negative: 1:1:256, 2:1:32, also G80-4 < 1:32

G Minimal blood collected from eviscerated carcass.

H Carcass was 12+ hours postmortem when collected.

V Certain test results on this date may be influenced by vaccinations received on the previous immobilization date. Panthers were vaccinated with killed virus vaccine (Fort Dodge-FEL-O-VAX^R) for FPL, FCV, and FVR.

Table 38. Relationship of Prevalence of Feline Panleukopenia Virus^A and Feline Calicivirus^B Antibodies to Location, Age, and Sex of Florida Panther

Disease Agent	Factor	N	χ^2	P value	SignificantC
Feline Panleukopenia Virus	Location ^D	29	$\chi^2_1 = 7.472$	.006	Yes
	Age ^E	32	$\chi^2_3 = 9.719$	.027	Yes
	Sex	32	$\chi^2_1 = 2.169$	.141	No
Feline Calicivirus	Location ^D	29	$\chi^2_1 = 1.766$	.184	No
	Age ^E	32	$\chi^2_3 = 0.44$	.93	No
	Sex	32	$\chi^2_1 = 3.388$	.066	No

NOTE: All data for analysis was taken from the "master" individual F1. panther seroprevalence table

AP prevalence data for panleukopenia titers scored as < 1:50 = negative
> 1:50 = positive

[illegible]

Cp value of .05 or less is accepted as significant

D Location of panther- prevalence compared between MAJOR POPULATIONS:
I- Southwestern Florida, Big Cypress Swamp & Fakahatchee Strand and surrounding ecosystem including privately owned land; II- Southeastern Florida, Everglades National Park

^EAge class: 1 - kitten (0-6 months); 2 - juvenile (7-18 months); 3 - subadult (19-24 months); 4 - young adult (2-4 years); 5 - mature adult (5-8 years); 6 - older adult (> 8 years).

Table 39 A. Serum Neutralization Antibody Titers Against Feline Panleukopenia Virus in Free-ranging Florida Panthers Arranged by Major Population^A

1. Titer results

Population or location	No. panthers examined	No. (%) samples positive at reciprocal titers of						
		≤50	50	100	500	1,000	5,000	>5,000
I	22	2 (9)		2 (9)	7 (32)	2 (9)	3 (14)	6 (27)
II	7	4 (57)	1 (14)	2 (29)				
III	2	1 (50)					1 (50)	
IV	1					1 (100)		
Totals	32	7 (22)	1 (3)	4 (13)	7 (22)	3 (9)	4 (13)	6 (19)

2. Above data grouped into three categories: negative, low, and high titers

Population or location	No. panthers examined	No. (%) samples positive at reciprocal titers of						
		Negative (≤50)	Low (50 100 500)			High (1,000 5,000 >5,000)		
I	22	2 (9)		9 (41)			11 (50)	
II	7	4 (57)		3 (43)				
III	2	1 (50)					1 (50)	
IV	1						1 (100)	
Totals	32	7 (22)		12 (38)			13 (41)	

^AMAJOR POPULATIONS: I- Southwestern Florida, Big Cypress Swamp & Fakahatchee Strand and surrounding ecosystem including privately owned land, Collier & Hendry County; II- Southeastern Florida, Everglades National Park, Dade County; III- Glades & Highlands County; IV- Corbett Management Area, Palm Beach County.

Table 39 B. (cont.) Panthers examined by location within the Big Cypress Swamp ecosystem(I)^B p.2

1. Titer results

Popula- tion and location	No. panthers examined	No. (%) samples positive at reciprocal titers of					
		<50	50	100	500	1,000	5,000 >5,000
I-S.FS+N.FS	[11]	[1 (9)]		[1 (9)]	[2 (18)]	[1 (9)]	[2 (18)] [4 (36)]
I-S.FS	7	1 (14)		1 (14)			2 (29) 3 (43)
I-N.FS	4				2 (50)	1 (25)	1 (25)
I-BI	3				2 (66)		1 (33)
I-PR	5			1 (20)	3 (60)		1 (20)
I-RP	2					1 (50)	1 (50)
I-MO	1	1 (100)					
Totals	22	3 (14)		2 (9)	7 (32)	2 (9)	3 (14) 6 (27)

2. Above data grouped into three categories: negative, low, and high titers

Popula- tion and location	No. panthers examined	No. (%) samples positive at reciprocal titers of				
		Negative (≤50)	Low (50 100 500)		High (1,000 5,000 >5,000)	
I-S.FS+N.FS	[11]	[1 (9)]	[3 (27)]		[7 (64)]	
I-S.FS	7	1 (14)	1 (14)		5 (71)	
I-N.FS	4		2 (50)		2 (50)	
I-BI	3		2 (66)		1 (33)	
I-PR	5		4 (80)		1 (20)	
I-RP	2				2 (100)	
I-MO	1	1 (100)				
Totals	22	2 (9)	9 (41)		11 (50)	

^BLOCATION within (I) Big Cypress Swamp, Fakahatchee Strand, and surrounding ecosystem including privately owned land: BI - Bear Island Unit of Big Cypress National Preserve; MO - Southwestern Monument Unit, Big Cypress National Preserve; N.FS - Northern Fakahatchee Strand (north of SR 84); PR - Private ranches east of Immokalee; RP - Raccoon Point, Eastern Big Cypress National Preserve; S.FS - Southern Fakahatchee Strand (Fakahatchee Strand State Preserve, south of SR 84).

Table 40. Serum Neutralization Antibody Titers Against Feline Calicivirus in Free-ranging Florida Panthers.

1. Panthers examined by major population^A

Population or location	No. panthers examined	No. (%) samples positive at reciprocal titers of						
		<4	8	16	32	64	128	256
I	22	10 (45)	4 (18)	2 (9)	3 (14)	2 (9)		1 (5)
II	7	3 (43)		1 (14)	1 (14)		1 (14)	1 (14)
III	2					2 (100)		
IV	1	1 (100)						
Totals	32	14 (44)	4 (13)	3 (9)	4 (13)	4 (13)	1 (3)	2 (6)

2. Panthers examined by location within the Big Cypress Swamp ecosystem^B

Population and location	No. panthers examined	No. (%) samples positive at reciprocal titers of						
		<4	8	16	32	64	128	256
I-S.FS	8	4 (50)	1 (13)	1 (13)		1 (13)		1 (13)
I-N.FS	4	3 (75)				1 (25)		
I-BI	3	2 (66)	1 (33)					
I-PR	5		2 (40)	1 (20)	2 (40)			
I-RP	1	1 (100)						
I-MO	1					1 (100)		
Totals	22	10 (46)	4 (18)	2 (9)	2 (9)	3 (14)		1 (5)

^AMAJOR POPULATIONS: I- Southwestern Florida, Big Cypress Swamp & Fakahatchee Strand and surrounding ecosystem including privately owned land, Collier & Hendry Counties; II-Southeastern Florida, Everglades National Park, Dade County; III- Glades & Highlands Counties; IV- Corbett Management Area, Palm Beach County.

^BLOCATION within (I) Big Cypress Swamp, Fakahatchee Strand, and surrounding ecosystem including privately owned land: BI - Bear Island Unit of Big Cypress National Preserve; MO - Southwestern Monument Unit, Big Cypress National Preserve; N.FS - Northern Fakahatchee Strand (north of SR 84); PR - Private ranches east of Immokalee; RP - Raccoon Point, Eastern Big Cypress National Preserve; S.FS - Southern Fakahatchee Strand (Fakahatchee Strand State Preserve, south of SR 84).

Table 41. Seroprevalence of Selected Disease Agents in Bobcats of South Florida, 1986-88.

Location	ID #	TESTS ^A					
		FPL	FCV	FRV	FELV	FIP	TOXO
Highland County Private Ranches	N88-06 BC	<10	96	<2	-	-	-
	N88-07 BC	50	64	6	-	-	-
	N88-08 BC	50	12	128	-	-	-
	N88-09 BC	50	<2	<2	-	-	69
	N88-11 BC	<10	128	<2	-	-	-
Collier & Hendry County Private Ranches	N87-02 BC	1,000	<2	<2	-	-	-
	N87-07 BC	5,000	8	<2	-	-	-
	N87-08 BC	50	<2	<2	-	-	-
	N88-02 BC	5,000	16	<2	-	-	-
	N88-03 BC	<10	4	<2	-	-	-
	N88-04 BC	5,000	12	3	-	-	63
Bear Island/Northern Fakahatchee Strand	LC87-04 BC	5,000	6	<2	-	-	-
	LC87-06 BC	10	4	<2	-	-	-
	LC87-08 BC	<10	8	<2	-	-	-
	N87-09 BC	10	<2	<2	-	-	-
	N88-10 BC	<10	<2	4	-	-	-
	N88-12 BC	5,000	6	<2	-	-	-
Corkscrew Sanctuary	LC87-07 BC	>10,000	192	<2	-	-	-
Turner River Road	N88-01 BC	<10	4	6	-	-	-
Fakahatchee Strand State Preserve	LC87-05 BC	<10	3	<2	-	-	-
	N87-01 BC	<10	<2	<2	-	-	-
	N87-10 BC	<10	<2	<2	-	-	-
Everglades National Park	LC87-01 BC	<10	24	<2	-	-	-
	LC87-02 BC	<10	8	<2	-	-	-
	LC87-03 BC	<10	64	<2	-	-	-
	N86-17 BC	<10	<2	<2	-	-	-

^ARefer to footnotes for Table 37.

Table 42. Allelic isozyme (allozyme) phenotypes of polymorphic loci in different populations of puma (F. concolor).

Locus ^A	PP	PGD	APRT	CAT	DIA-W	ES1	ADA	GPI
Population ^B								
Florida								
BCNP (13-18) ^C	AB	AB	AB	AA	AA	AA	AA	AA
ENP (6)	AB	AB	AB	AA	AA	AA	AA	AA
California (4)	AB	AB	AA	AA	AA	AB	AA	AA
Oregon								
Western (5)	AB	AA	AA	AA	AA	AB	BB	AA
Eastern (1)	AA	AA	AA	AA	AA	BB	AA	AA
Texas (12)	AB	AA	AA	AA	AA	AB	AB	AA
Arizona (6)	AB	AB	AA	AA	AA	AB	AB	AB
Colorado (3)	AA	AA	AA	AA	AA	AB	AA	AA
Utah (2)	AA	AB	AA	AA	AA	AB	AA	AA
"Piper" (10)	AB	AB	AB	AB	AB	AA	AA	AA
Captive (15)	AB	ABC	AA	AA	AA	AB	AB	AB

Table 42. (continued)

Polymorphic loci p.2

Locus ^A	ACP2	GOT2	ESa	Number loci variable
Population ^B				
Florida				
BCNP (13-18) ^C	AA	AA	AA	3
ENP (6)	AA	AA	AA	3
California (4)	AA	AA	AA	3
Oregon				
Western (5)	AA	AA	AB	3
Eastern (1)	BB	AB	AA	1
Texas (12)	AA	AB	AA	4
Arizona (6)	AB	AB	AA	7
Colorado (3)	AA	AB	AA	2
Utah (2)	AB	BB	AA	3
"Piper" (10)	AA	AA	AA	5
Captive (15)	AB	AB	AA	9

^AGene names are homologous to human loci of the same name and abbreviation

^BSUBSPECIFIC DESIGNATION: Florida (F. c. coryi), BCNP-Big Cypress National Preserve and surrounding ecosystem, ENP-Everglades National Park; Western Oregon (border between F. c. oregonensis and F. c. californica), Eastern Oregon (F. c. missoulensis); California (F. c. californica); Texas (F. c. stanleyana); Arizona (F. c. azteca & browni); Colorado (F. c. hippolestes); Utah (F. c. kaibabensis); "Piper" stock, bred by Everglades Wonder Gardens of Bonita Springs FL., original breeding stock obtained from wild Florida panther (F. c. coryi) in approx. 1940 from Big Cypress swamp; Captive (wild origin could not be determined)

^CNumber of individuals examined for each population in parentheses

Table 43. Gene Frequencies for Eleven Polymorphic Loci in Nine Different Populations^A of Puma (F. concolor).

Locus ^B		Florida		Oregon		California	Texas
		BCNP (13-18) ^C	ENP (6)	Western (5)	Eastern (1)	(4)	(12)
ADA	a =	1.0	1.0	0	1.0	1.0	0.44
	b =			1.0			0.56
CAT	a =	1.0	1.0	1.0	1.0	1.0	1.0
	b =						
ESa	a =	1.0	1.0	0.9	1.0	1.0	1.0
	b =			0.1			
ES1	a =	1.0	1.0	0.5		0.5	0.22
	b =			0.5	1.0	0.5	0.78
GOT2	a =	1.0	1.0	1.0	0.5	1.0	0.35
	b =				0.5		0.65
GPI	a =	1.0	1.0	1.0	1.0	1.0	1.0
	b =						
PGD	a =	0.65	0.08	1.0	1.0	0.5	1.0
	b =	0.35	0.92			0.5	
	c =						
PP	a =	0.86	0.94	0.38	1.0	0.75	0.75
	b =	0.14	0.06	0.62		0.25	0.25
APRT	a =	0.97	0.42	1.0	1.0	1.0	1.0
	b =	0.03	0.58				
ACP ₂	a =	1.0	1.0	1.0		1.0	1.0
	b =				1.0		
DIA-W	a =	1.0	1.0	1.0	1.0		1.0
	b =						

Table 43. (continued)

Gene Frequency Table p.2

		Arizona	Colorado	Utah	"Piper"	Captive
Locus ^B		(6) ^C	(3)	(2)	(10)	(15)
ADA	a =	0.6	1.0	1.0	1.0	0.9
	b =	0.4				0.1
CAT	a =	1.0	1.0	1.0	0.75	1.0
	b =				0.25	
ESa	a =	1.0	1.0	1.0	1.0	1.0
	b =					
ES1	a =	0.58	0.33	0.5	1.0	0.68
	b =	0.42	0.66	0.5		0.32
GOT2	a =	0.75	0.75		1.0	0.77
	b =	0.25	0.25	1.0		0.23
GPI	a =	0.42	1.0	1.0	1.0	0.9
	b =					0.1
PGD	a =	0.75	1.0	0.75	0.3	0.65
	b =	0.25		0.25	0.7	0.31
	c =					0.04
PP	a =	0.75	1.0	1.0	0.06	0.875
	b =	0.25			0.94	0.125
APRT	a =	1.0	1.0	1.0	0.4	0.94
	b =				0.6	0.06
ACP ₂	a =	0.92	1.0	0.5	1.0	0.89
	b =	0.08		0.5		0.11
DIA-W	a =	1.0	1.0	1.0	0.72	1.0
	b =				0.28	

^ASUBSPECIFIC DESIGNATION: Florida (F. c. coryi), BCNP-Big Cypress National Preserve and surrounding ecosystem, ENP-Everglades National Park; Oregon-western (border between F. c. oregonensis and F. c. californica), eastern (F. c. missoulensis); California (F. c. californica); Texas (F. c. stanleyana); Arizona (F. c. azteca & browni); Colorado (F. c. hipplestes); Utah (F. c. kaibabensis); "Piper" stock, bred by Everglades Wonder Gardens of Bonita Springs FL., original breeding stock obtained from wild Florida panther (F. c. coryi) in approx. 1940 from Big Cypress swamp; Captive (wild origin could not be determined).

^BGene names are homologous to human loci of the same name and abbreviation

^CNumber of individuals examined for each population in parentheses

Table 44. Longevity of Collared Panthers - As of Sept. 1, 1988

ID#	Sex	Capture Date		Field ^A Captures	Months Collared		Dead or Injured Panthers		
		Initial	Latest		Total	Recent ^B	Date	Age	Cause/Location ^C
#01	M	02-10-81	-----D	1	34	34	12-14-83	12-14 y	Road-killed SR 84 mm 18, Cco
#02	M	02-20-81	01-29-83	3	44	21	10-27-84	13+ y	Intrasp aggression FSSP, Cco
#03	F	01-23-82	01-17-83	2	12	0	01-17-83	9-10+ y	Capture related ^E FSSP, Cco
#04	M	01-27-82	01-22-84	3	39	15	04-18-85	10+ y	Road-killed SR 84 mm 17, Cco
#05	F	02-23-82	-----	1	21	21	11-18-83	8-9+ y	Unknown- Bnz & Hr ^F Fak Conc C, Cco
#06	M	02-27-82	-----	1	2	2	04-16-82	6-7 y	Unknown- Bnz & Hr RP/BCNP, Cco
#07	M	03-02-82	01-26-85	3	43	9	10-28-85	9-10 y	Road-killed SR 29 2mS SR84
#08	F	03-25-84	04-13-87	3	37 ^G	RFW ^{H1}	08-20-88	12-14+ y	Kidney, liver, & thyroid disease captivity - WOP
#09	F	01-26-85	01-08-87	2	44	20	* Alive *		
#10	M	01-15-86	05-05-86	2	12	8	01-27-87	17-19 mo	Intrasp aggression Fak Conc C, Cco
#11	F	01-21-86	01-07-88	2	32	8	* Alive *		
#12	M	01-28-86	01-31-88	2	32	8	* Alive *		
#13	M	02-27-86	-----	1	22	22	12-16-87	6-8 y	Road-killed SR 29 Suri, Cco
#14	F	12-06-86	04-11-88	2	21	5	* Alive *		
#15	F	12-13-86	06-16-87	3	18	12	06-10-88	5-7 y	Intrasp aggression & infection/ENP
#16	M	01-12-87	02-02-88	2	20	7	* Alive *		
#17	M	01-20-87	-----	1	20	20	* Alive *		
#18	F	01-22-87	-----	1	20	20	* Alive *		
#19	F	02-09-87	11-09-87	2	19	10	* Alive *		

Table 44. (continued)

Longevity p.2

ID#	Sex	Capture Date		Field ^A Captures	Months Collared		Dead or Injured Panthers		
		Initial	Latest		Total	Recent ^B	Date	Age	Cause
#20	M	03-10-87	06-17-87	2	3	RFW ^{H2}	06-17-87	3-4 y	Hit-by-car
"	"	"	"	2	18	15	08-24-88	4-5 y	SR 858 5mE SR 29 Pos. heart related (atrial defect) BI/BCNP, Cco
#21	F	03-16-87	07-23-88	2	18	RFW ^{H3}	* Alive *	2.5-3 y	Hit-by-car Palm Dr., SE Homestead, Dco
#22	F	03-18-87	03-24-88	4	18	6	* Alive *		
#23	F	03-18-87	06-22-88	5	18 ^I	RFW ^{H4}	* Alive *		In captivity
#24	M	01-30-88	-----	1	8	8	08-12/16-88	3-4 y	Unknown- Bnz & Hr Lykes Bros, Gco
#25	M	02-16-88	-----	1	7	7	08-25-88	3-4 y	Intrasp aggression and septicemia Fak Conc C, Cco
#26	M	03-01-88	-----	1	6	6	* Alive *		
#27	F	04-11-88	-----	1	5	5	* Alive *		

^AField captures = total number of times panther was captured and immobilized in the wild (field)

^BRecent = months lived since most recent capture

^CLocation: County-Collier (Cco), Dade (Dco), Glades (Gco); ENP-Everglades Nat. Park; Fak Conc C-Fakahatchee Conservation Club; FSSP-Fakahatchee Strand State Preserve; BI/BCNP & RP/BCNP - Bear Island and Raccoon Point in Big Cypress Nat. Preserve; SunL- Sunniland; WOP- White Oak Plantation

^DRadio collar malfunctioned 6 months after collaring

^EVery old female in poor physical condition, anesthetic possibly entered the blood stream

^FBnz & Hr - skeleton was reduced to bones and hair

^GLived for a total of 53 months, 16 months in captivity

^HRFW = Removed from wild:

¹poor physical condition and no reproduction for 3 years

²hit-by-car, removed for 6 weeks to treat injuries then returned to the wild

³hit-by-car, removed to fix fractured femur, still in captivity

⁴stranded on island surrounded by water in Shark River Slough, ENP

^I#23 was in captivity from 6-22-87 until 5-14-88 (11 months) then returned to the wild

Table 45. Documented Panther Injury & Mortality: Uncollared Panthers

ID#	Sex	Date	Est. Age ^A	Cause of Death/Injury	Location/Comment/Source ^B
UF 9789	M	02-13-72	2-3 yr	Road injured/shot	S. of Moore Haven, Glades Co.1,2,7
"Sunniland"	F	10-0?-72	Adult	Road-killed	S. of Sunniland, Collier Co. No specimen- may not be valid report ²
G78-65	M	03-08-78	2-3 yr	Illegally-killed	Levee 28, Dade Co.3,4,7
G80-4	F	12-23-79	1.5-2.5 yr	Road-killed	SR 29, 200 yds. N. of SR 84, Collier Co.3,4,7
G80-15	M	02-07-80	1.5-2.5 yr	Road-killed	Sunniland, 1 mile N. on SR 29, Collier Co.3,4,7
G81-19	F	04-19-81	2-3 yr	Road-killed	SR29, 9.5 m. So of SR 84, 1.6 m. S. of Road Prison, Collier Co., Pregnant 2-3 mos.- 4 fetuses3,4,7
G83-22	M	03-18-83	2-3 yr	Road-killed	SR 27 near Palmdale, Glades Co.3,4,7
"Canal Pt."	F	05-22-83	Adult	Illegally-killed	L-8 canal near Canal Point, Fl., Martin Co.3,7
G83-75	M	12-01-83	3-6 yr	Illegally-killed	Seminole Indian Reservation, shot by Chief James Billy, Hendry Co.3,7
G84-20	F	10-30-84	2-3 yr	Illegally-killed	Corbett Wildlife Management Area, Palm Beach Co.5,7
G84-25	M	11-02-84	3-5 yr	Road-injured	SR 41, 2 m. E. of Ochoppee, Fl., fractured both femurs, * Alive * in captivity, "Big Guy" ⁵
G84-26	F	11-18-84	8-10 yr	Road-killed	SR 84, mm 16, Collier Co.5,7
G85-BNZ	F	01-10-85	18-24 mo	Road-killed	SR 84, mm 16, Collier Co.5,7
G85-CS	F	03-23-85	2-3 yr	Illegally-killed	Collier Seminole State Park, N. of SR 41, 20 m. E. of Naples, Fl., shot through neck and skinned, long bones removed (butchered) ^{5,7}
"Naples"	F	05-12-85	unknown	Road-injured	SR 951, 2 m. N of SR 41, struck by car, not killed - did not find body, saw tracks ⁶
PCO 59	F	11-14-86	7-9 yr	Road-killed	SR 84, mm 16, Collier Co.7,8

Table 45. (continued)

ID#	Sex	Date	Est. Age ^A	Cause of Death/Injury	Location/Comment/Source ^B
UF 24042	M	12-19-87	8-10 ⁺ yr	Unknown	Skeleton found by hunter in Crane Swamp, Franton Wildlife Management Area, 6 m. S. of Edgewater, Fl., Volusia Co. ^{3,7}
G88-16	M	03-01-88	10 mos.	Road-killed	CAPTIVE born/Released by Ted Turner in Jan. 1988 along with sibling. Killed near Capps, Fl. S. of Tallahassee ^{7,8}

^AEstimated age is based on status of growth plate closure, tooth wear, and "subjective" field impressions.

^BSource of information:

- 1) Belden, Robert C., and Lovett E. Williams, Jr. Survival Status of the Florida Panther. In: Proceedings of the Florida Panther Conference, March 17-18, 1976, Orlando, Florida. Published by the Florida Audubon Society of Florida Game and Fresh Water Fish Commission, p. 86.
- 2) Nowack, Ronald M., and Roy McBride. Status Survey of the Florida Panther. Reprinted from World Wildlife Fund Yearbook, 1973-74. In: Proceedings of the Florida Panther Conference, March 17-18, 1976, Orlando, Florida. Published by the Florida Audubon Society of Florida Game and Fresh Water Fish Commission, p. 118.
- 3) Belden, Robert C. Field capture records, radio-telemetry data, and personal communication for 1981-83. Florida Game and Fresh Water Fish Commission. Gainesville, Fl.
- 4) Forrester, Donald J. Necropsy examination records for 1978-83. Department Infectious Disease, College of Veterinary Medicine, University of Florida, Gainesville, Fl.
- 5) Roelke, Melody E., Elliott R. Jacobson, and George V. Kollias. Veterinary medical records for field seasons 1983/84, 1984/85, and 1985/86. Department of Special Clinical Sciences, College of Veterinary Medicine, University of Florida, Gainesville, Fl.
- 6) Roboski, John and Walt McCown. Field capture records, radio-telemetry data, and personal communication- 1984 & 1985. Florida Game and Fresh Water Fish Commission. Naples, Fl.
- 7) Wilkins, Laurie. Specimens held at Museum collection. Mammal Range Florida State Museum, University of Florida, Gainesville, Fl.
- 8) Roelke, Melody E. Veterinary medical records for field seasons 1986-1988. Florida Game and Fresh Water Fish Commission. Gainesville, Fl.

Table 46. Causes of Documented Panther Mortality/Injury: Radio-collared
Verses Uncollared Panthers, 1972-1988

Category of Death	Collared No. (Percent)		Uncollared No. (Percent)		Total No. (Percent)	
Road killed/Injured	6 ^A	(37.5)	11 ^B	(64.7)	17	(51.5)
Illegally killed	0	0	5	(29.4)	5	(15.2)
Intraspecific Aggression ^C	4	(25.0)	0	0	4	(12.1)
Unknown cause ^D	3	(18.8)	1	(5.9)	4	(12.1)
Other:						
Congenital Heart Defect	1	(6.3)	0	0	1	(3.0)
Kidney Disease ^E	1	(6.3)	0	0	1	(3.0)
Capture mortality	1	(6.3)	0	0	1	(3.0)
TOTAL	16		17		33	

^ATwo panthers were injured by vehicles: #21 F is still in captivity healing from a fractured femur; #20 M recovered from injuries and was released, later died, probably related to congenital atrial septal defect.

^BTwo panthers were hit by cars and survived: G84-25 M ("Big Guy") in captivity, recovered from two fractured femurs; a female ("Naples") survived at least the first day, found tracts, never found body.

^CThis also includes those panthers that died of septicemia &/or toxemia as a result of bite and puncture wounds.

^DSkeletal remains were recovered on these animals, no obvious cause of death.

^EKidney disease was the primary cause of death for panther #08 F, however, her thyroid, liver, and reproductive systems were failing as well.

Table 47. Causes of Florida Panther Mortality or Injury by Year, 1972-1988

Fiscal Year ^A	Road Kill ^B	Illegal Kill	Aggression ^C	Unknown	Other ^D	Total
1972/73	2 (0/2) ^E	0	0	0	0	2 (0/2)
1973-/77	0	0	0	0	0	0
1977/78	0	1 (0/1)	0	0	0	1 (0/1)
1978/79	0	0	0	0	0	0
1979/80	2 (0/2)	0	0	0	0	2 (0/2)
1980/81 ^E	1 (0/1)	0	0	0	0	1 (0/1)
1981/82	0	0	0	1 (1/0)	0	1 (1/0)
1982/83	1 (0/1)	1 (0/1)	0	0	1 (1/0)	3 (1/2)
1983/84	1 (1/0)	1 (0/1)	0	1 (1/0)	0	3 (2/1)
1984/85	5 (1/4 ^B)	2 (0/2)	1 (1/0)	0	0	8 (2/6)
1985/86	1 (1/0)	0	0	0	0	1 (1/0)
1986/87	2 (1 ^B /1)	0	1 (1/0)	0	0	3 (2/1)
1987/88	1 (1/0)	0	1 (1/0)	1 (0/1)	0	3 (2/1)
1988/89 ^G	1 (1 ^B /0)	0	1 (1/0)	1 (1/0)	2 (2 ^F /0)	5 (5/0)
TOTAL	17 (6/11)	5 (0/5)	4 (4/0)	4 (3/1)	3 (3/0)	33 (16/17)

^AFiscal year: July 1- June 30, centered around the winter

^BThis category includes 4 panthers that were injured by vehicles, but did not die

^CAggression- intraspecific, includes deaths due to septicemia &/or toxemia subsequent to fight wounds as well as deaths from combat and cannibalism

^DOther: Capture mortality (1), kidney disease (1), and heart anomaly^F (1)

^ERadio-collared/Uncollared panthers in parenthesis, collaring project started Jan. 1981

^F#20 M was road injured, repaired and released to the wild, he later died of a heart defect (presumptive diagnosis) in FY 88/89, therefore he was scored twice

^GOnly a partial year, includes July 1 - Sept. 1, 1988

ALL PANTHERS

(Human Related = 67 %)

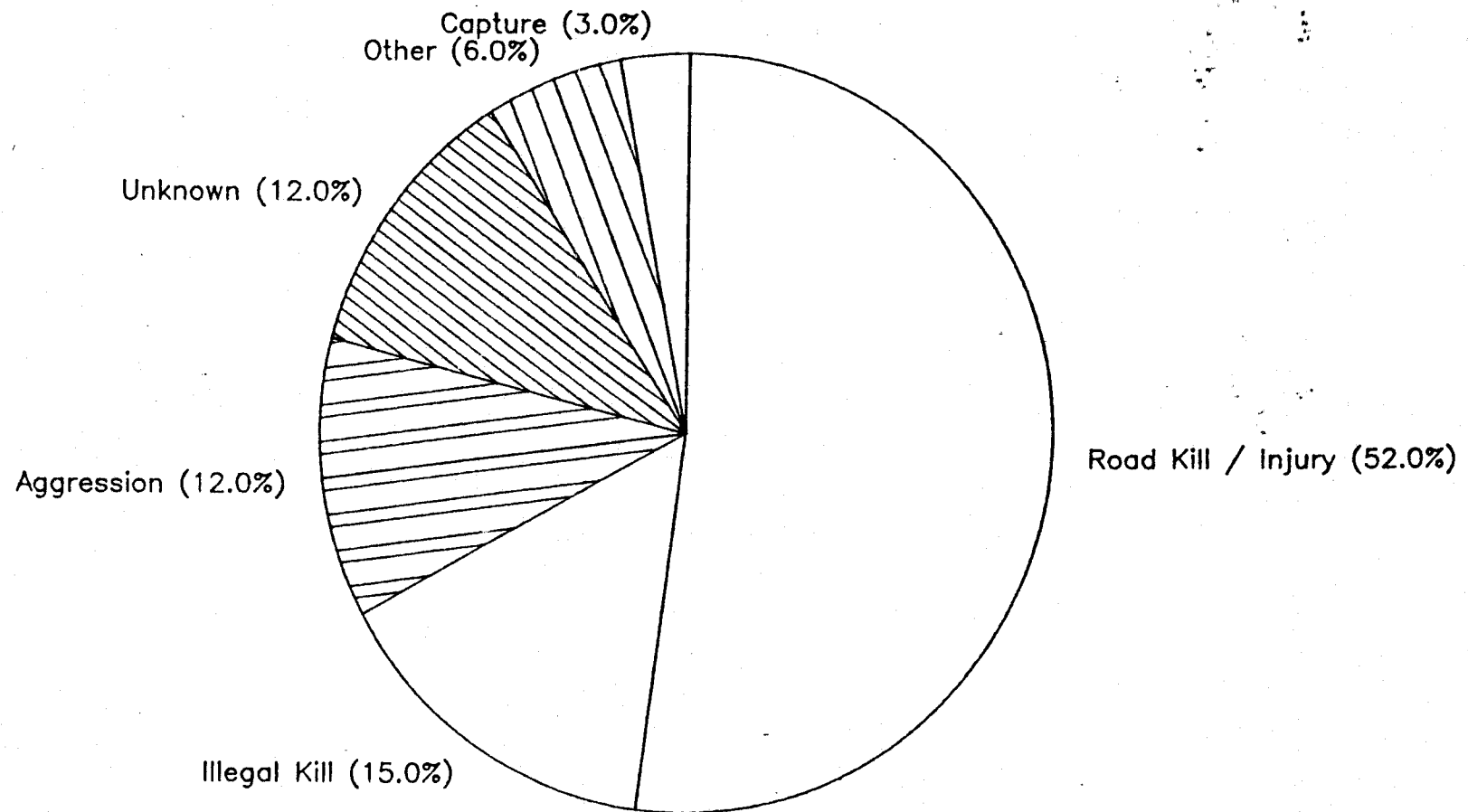


Figure 1. Documented Panther Mortality: All Panthers

RADIO-COLLARED

(Human Related = 44 %)

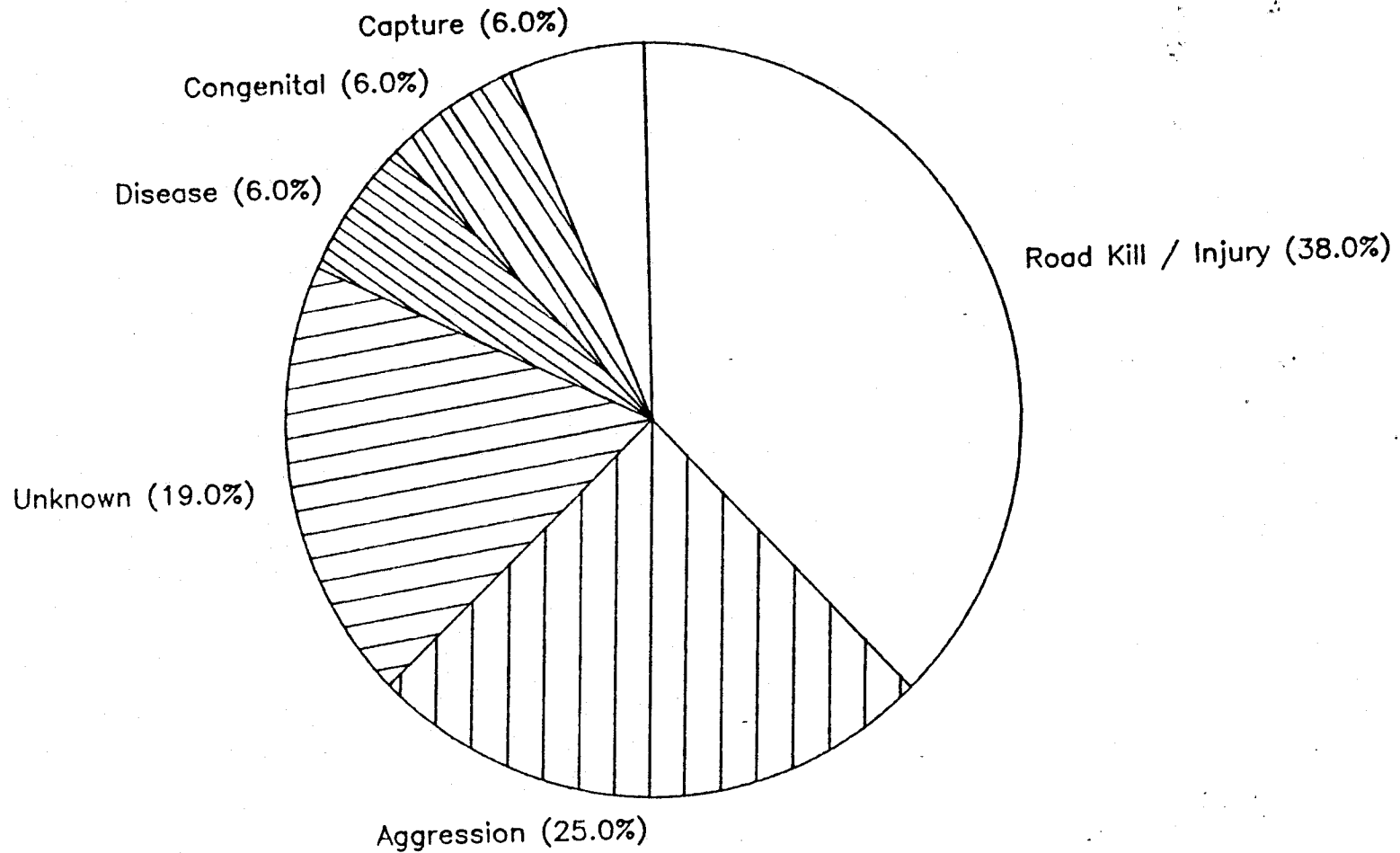


Figure 2. Documented Panther Mortality: Radio-Collared Panthers

UNCOLLARED

(Human Related = 94 %)

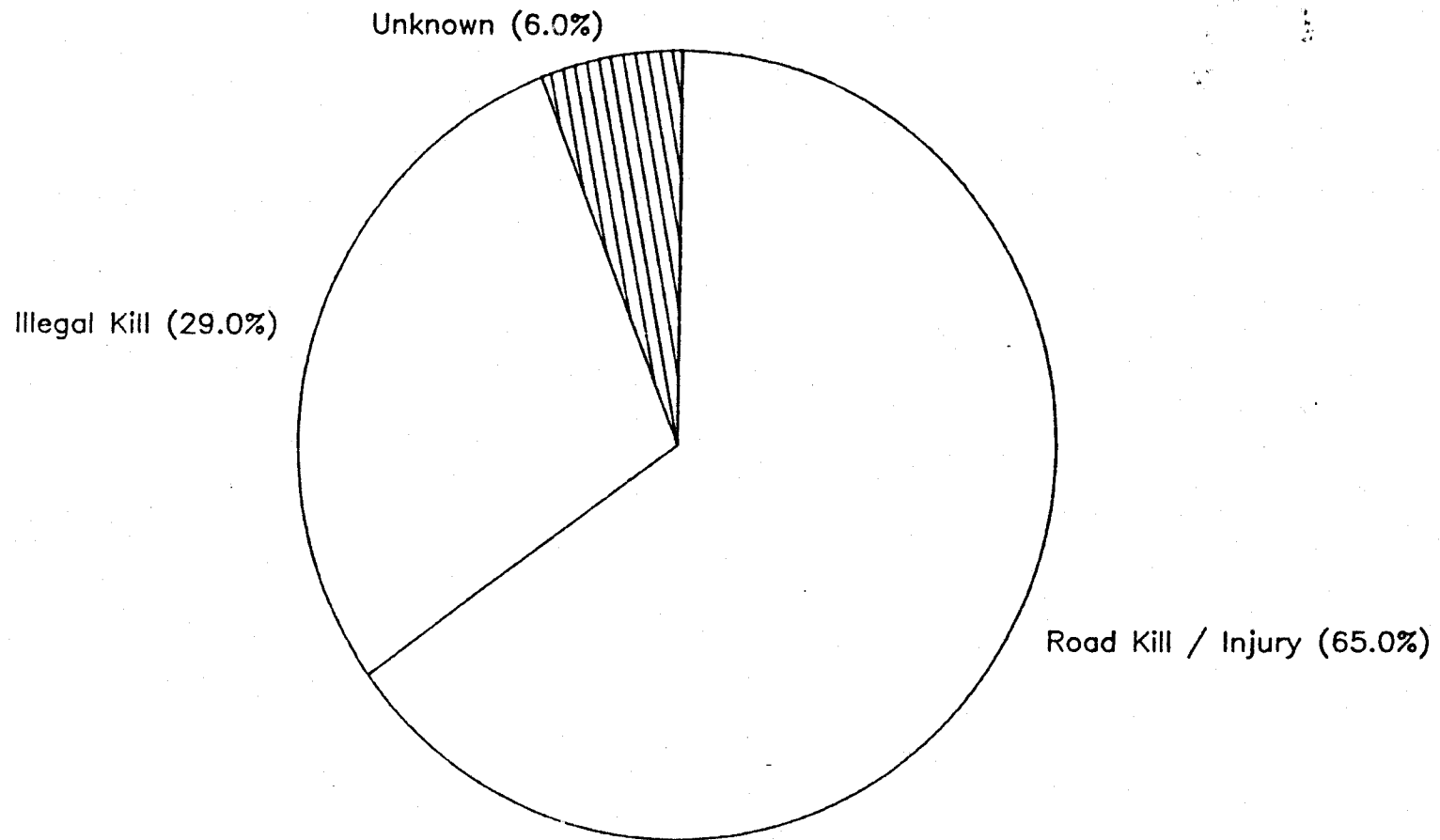


Figure 3. Documented Panther Mortality; Uncollared Panthers