

National Park Service  
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Big Cypress National Preserve  
Ochopee, FL

**BIG CYPRESS NATIONAL PRESERVE**  
FLORIDA PANTHER (*Puma concolor coryi*)  
RESEARCH AND MONITORING  
2004-2005 ANNUAL REPORT

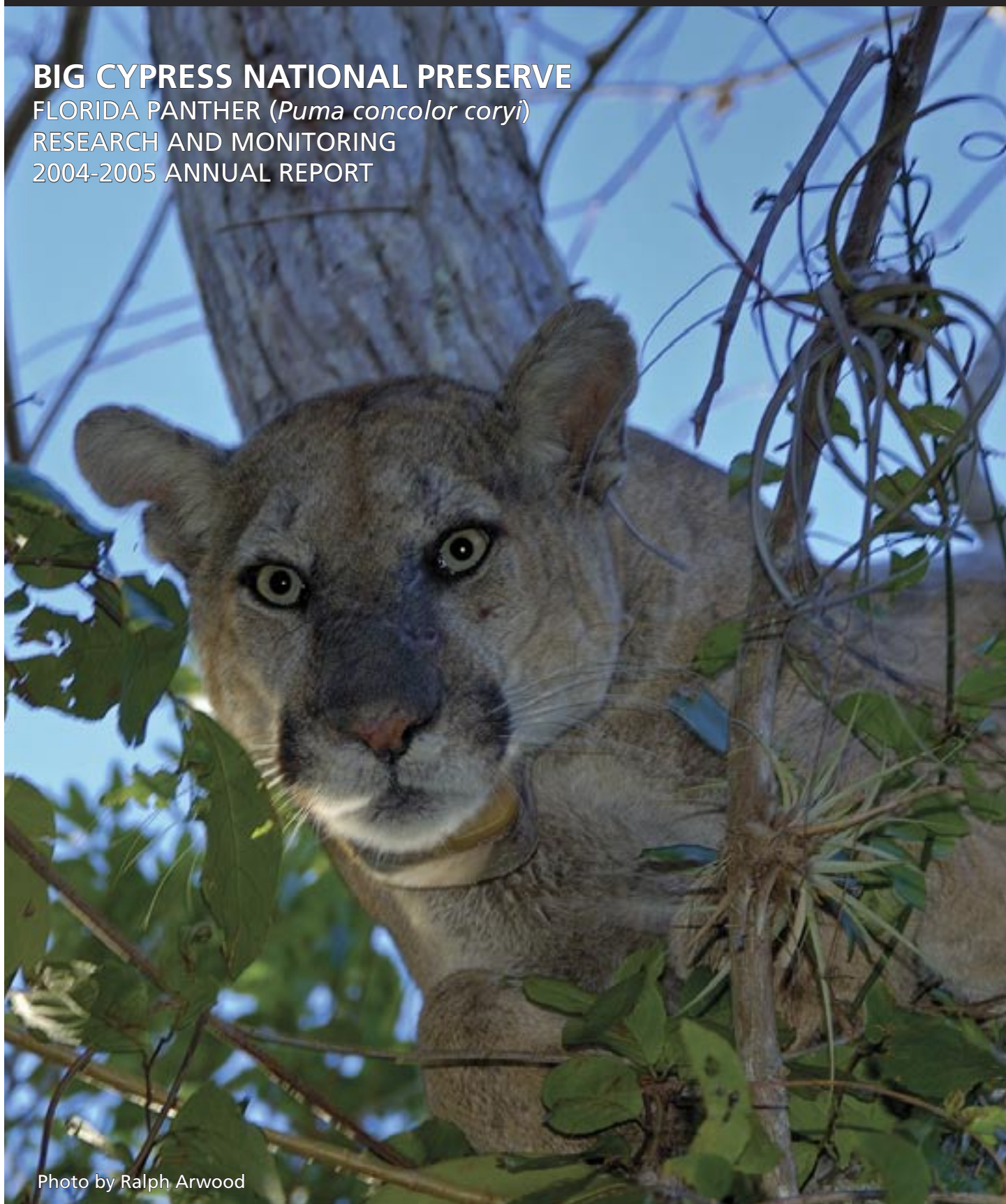


Photo by Ralph Arwood

**FLORIDA PANTHER (*Puma concolor coryi*)**

**RESEARCH AND MONITORING**

**IN BIG CYPRESS NATIONAL PRESERVE**

**2004-2005 ANNUAL REPORT**

submitted to U. S. Fish and Wildlife Service  
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## Abstract

The goals of this project are to provide demographic, biomedical, and genetic information on Florida panthers (*Puma concolor coryi*) in the 217,410-ha study area in Big Cypress National Preserve with which to guide management actions, assess responses to natural events and human-caused impacts, and enhance panther recovery. The reporting period is July 1, 2004 to June 30, 2005. During 33 hunting days, we captured and handled 5 adult panthers, 4 males and 1 female. Two were previously uncollared and 3 had their collars replaced. We verified the presence of a minimum of 1 uncollared adult male and 7 uncollared adult females in the study area. We monitored 13 adult panthers, 3 of which were lost from the sample: 1 female died from intraspecific aggression, 1 female was killed by a collision with a vehicle, and 1 female died from an injury incurred in the wild. Six other mortalities included 4 uncollared males killed by vehicles, 1 male killed by intraspecific aggression, and 1 female who died of unknown causes. Three monitored females denned 4 times, producing 10 kittens, 6 males and 4 females, all of which we marked with transponders and from which we obtained biomedical samples. One den failed with the death of the male kitten at 3 to 4 weeks of age. We determined that the average home range of the 6 resident females was 142 km<sup>2</sup> and that of the 5 resident males was 555 km<sup>2</sup>. We continue to recommend the construction of a wildlife underpass at Turner River on Highway 41, and further recommend that the series of underpasses and fencing along State Road 29 be expanded to remedy the panther losses there.

## **Report Background**

This is the third annual report on National Park Service (NPS) panther work in Big Cypress National Preserve (Big Cypress). It covers capture and monitoring efforts between July 1, 2004 and June 30, 2005 in the study area (SBICY), which consists of all lands (217,410 ha) within the Preserve boundary south of Interstate 75 (I-75). The Florida Fish and Wildlife Conservation Commission (FWC) monitors panthers in the remaining 75,340 ha of Big Cypress north of I-75. The SBICY study area also includes lands used by our monitored panthers that are not in the FWC or EVER study areas. Examples of these areas are the Miccosukee tribal lands south of I-75 and east of the L-28 canal and Everglades National Park (EVER) north and west of Shark Valley Slough. This report also summarizes aspects of panther reproduction in the entire Big Cypress from information obtained from both agencies since 1981.

Information on all the panthers known to inhabit SBICY between 1981 and 2003 can be found in the 2003 Big Cypress Annual Report (Jansen et al 2003). The 2004 Annual Report covered capture and monitoring work in SBICY from July 1, 2003 to June 30, 2004 (Jansen et al 2004).

## **Statement of Purpose**

The overall purpose of this ongoing project is to determine the status of the panther population in Big Cypress, to provide information to management so their decisions will support and enhance panther recovery, and to determine the panthers' behavioral and/or demographic responses to natural events, management actions, and human impacts in south Florida.

## **Project Goals**

**Goal 1.** To provide the necessary information to make sound management decisions, evaluate the effects of restoration projects and management strategies, and meet the recommendations and stipulations of the Environmental Impact Assessments and Biological Opinions related to the management of Big Cypress.

**Goal 2.** To assess the potential of the habitat in Big Cypress to support panthers.

**Goal 3.** To assess the potential of the expanding population of panthers in Big Cypress to link with the subpopulation of panthers in Everglades National Park.

**Goal 4.** To provide the samples necessary to assess of the impacts of the Genetic Restoration Program on the panthers in Big Cypress south of Interstate-75.

**Goal 5.** To monitor the distribution of feline leukemia in the panther population and to proactively vaccinate against this potentially lethal disease.

## **Study Area**

The study area, SBICY, represents 74% (217,409 ha) of Big Cypress, a 295,142-ha unit of the National Park Service (NPS), situated in south Florida in Collier, Monroe, and Dade Counties. The enabling legislation of Big Cypress allows for continued recreational and commercial uses, such as hunting, off-road vehicle operation, and oil extraction. Most of Big Cypress is also designated a state wildlife management area for recreational hunting, and, as such, has been divided into 6 “units” to allow flexibility in management and regulatory decision-making (Figure 1). Big Cypress encompasses almost half of a unique water-dependent ecosystem called Big Cypress Swamp. Unlike the Everglades, it is still a relatively pristine wetland system. Nearly 80% of the rain normally falls during the 6-month wet season of May through October and averages 135 cm per year (Schneider et al. 1996). The vegetative types described by Welch et al (1999) have been consolidated into 7 general categories. Using these, the study area consists of 50% cypress, 16% prairie, 13% marsh, 13% pineland, 4% mixed hardwood swamp, 3% hardwood hammock, and 1% mangroves (Figure 2). Disturbed habitat, including exotic plants and areas of human influence such as roads, is found in 0.4% of SBICY.

Only 285 km of roads exist in SBICY. Two paved roads, I-75 (formerly Alligator Alley) and Highway 41 (Hwy. 41), run east-west through the northern and southern portions respectively from State Road 29 (S R 29) to Conservation Area 3A. Four unpaved county roads, Birdon (841), Wagonwheel (837), Turner River (839), and Loop (94) (now partially under NPS jurisdiction), cover 97 kms. State Road 29 is a paved road that borders Big Cypress on the west. The southern boundary of Big Cypress joins Everglades National Park (EVER) and the eastern boundary is partially separated from Water Conservation Area 3A by a levee (L-28) (Figure 1). The northern boundary adjoins tribal and private lands, some of which have been converted into agricultural production.

A deer and hog hunting season takes place from September through December. The 5-year (2000-2004) average for hunter pressure was 14,536 man-days, with a mean harvest of 214 deer (bucks only) and 58 hogs (FWC 2004 weekly harvest reports). The agencies also monitor population trends through aerial surveys, track counts, and spotlight counts since deer and hogs are the main prey species of the Florida panther.

Off-road vehicles (ORVs) are the only practical way to access the interior of Big Cypress for recreational purposes. The extent of ORV trails has increased since first quantified from 1953 maps (Duever et al. 1986). They mapped 250 km of ORV trails from 1953 maps and over 1,100 km from 1973 maps. Welch et al (1999) delineated over 46,774 km of trails or trail remnants that were visible on aerial photos. Janis and Clark (2002) determined that panthers showed some avoidance of these trails during periods of increased vehicle activity. Aesthetic concerns and the

probable impacts on soils, vegetation, and wildlife have prompted the development of an ORV management plan that restricts ORV travel to designated trails (National Park Service 2000). This designated trail system is still in the development and construction phase.

## **Methods**

### **Study Area Sampling**

We used the 6 designated “game management units” of Big Cypress, i.e., Bear Island, Deep Lake, Turner River, Corn Dance, Loop, and Stairsteps, to partition Big Cypress for descriptive purposes. We called the area added to Big Cypress in 1988 Addlands North and Addlands South (Figure 1). We incorporated the 1-mile strip of acquired land along SR 29 into the existing management units for the purpose of this report. Because the Turner River, Corn Dance, and Stairsteps Units are so large, we further divided SBICY into 12 “blocks”, based on roads and recognizable geographic features, to aid in quantifying our survey and capture efforts (Figure 3). The size of the blocks range from 14,184 ha to 28,698 ha and average 20,747 ha. Although our objective is to randomly sample all areas for the presence of panthers, targeted goals identified annually may take precedent.

### **2005 Capture Season Plans**

In the SBICY 2005 Capture Season Plan presented at the 1 November 2004 Panther Capture Season Planning meeting in Naples, Florida, we identified 2 panthers, FP79 and FP104, whose collar batteries needed replacement. We recommended semen collection from male panther FP104, based on his prior associations with 4 collared females on 11 occasions, none of whom had denned to date. We also planned to tree and evaluate FP127’s collar fit because he was a young male when collared the previous year.

We prioritized survey blocks 3, 4, 7, and 12 for hunting efforts, based on the fact that we had conducted little or no capture effort in those areas the previous 2 years (Figure 4). We planned to target block 4 for several additional purposes. The preparation of a General Management Plan for the Addition lands was initiated in 2001 and is currently in the public review phase. The United States Fish and Wildlife Service (USFWS) Biological Opinion on the I-75 Recreational Access Plan (USFWS 1990) addressed the necessity of monitoring panther response when the Addition lands are opened to recreational use. It is, therefore, important to maintain a sample of monitored panthers inhabiting that area to adequately document any impacts of increased human use. This area has also been identified as a priority in which to establish a buffer zone against FeLV (Cunningham 2004). We also planned to target our hunting efforts in blocks 2 and 9 which are inhabited by 2 females with failed collars, FP88 and FP93, and where no females are currently being monitored.



We had 2 Generation III GPS collars (Telonics, Inc.), slated for placement on adult males and programmed to obtain 5 evening-to-morning locations to complement the existing large dataset of daytime locations and to determine habitat use when panthers are active in night. For other panthers, we had MK9 models (Telonics, Inc.) with VHF capability and programmed to duty-cycle in order to extend their life in the field.

## **Survey and Capture Protocols**

Throughout the year, we routinely received reports of tracks or sightings of panthers. We documented each on a Big Cypress Wildlife Observation Card, attempted to contact the observer if more details were needed, and compared these reports to the current locations of monitored panthers. Many of these observations were compelling, however, in most cases it was difficult to confirm them with evidence such as tracks or photos. We used the protocol, therefore, established by Rancher's Supply (Roy McBride, pers. comm.), in which the presence of a panther must be validated by photographs or sightings made by or confirmed by observers familiar with panthers and experienced in sign, such as tracks or scat.

We conducted our capture work following the protocols outlined in Endangered Species Permit #TE051015-0 from USFWS and the Special Purpose Permit #WX02384 from the FWC. Drug protocols and panther handling modifications are agreed upon annually between Big Cypress and FWC team members as new information becomes available. Biomedical procedures were similar to those outlined in Land et al (2004). For consistency in our capture effort analysis, we defined a hunt day as one having suitable environmental conditions and the availability of all team members to conduct a capture.

## **Population Monitoring**

We located each panther with a functioning collar 3 times a week between 0900-1200 hrs, using telemetry from a fixed-wing aircraft. Our methodology differed to some extent from the EVER and FWC monitoring protocol. We determined the general location of each panther at 150 m above the ground, and then made 1 or more passes at 60 m to further define the location. Flights conducted by other panther monitoring agencies do not descend below 150 m (Darrell Land and Sonny Bass, pers. comm.) We found, however, that low-level passes were necessary in most instances because of the complexity and intermingling of vegetative types.

We recorded the date, time, Universal Transverse Mercator (UTM) coordinates, habitat type, and unique situations, such as 2 panthers in the same location or panther sightings. We mapped the general location by air, then used a Geographic Information System with aerial photos geo-referenced in North American datum 83 to obtain accurate UTM's once back at the office. We shared with FWC, on a flight-by-flight basis, the locations of several males that used both the

FWC and SBICY study areas. The combined dataset on these individuals was incorporated into this report. We also incorporated location data from FWC and EVER to generate a map showing SBICY locations in relation to the entire monitored population.

We determined the home ranges of resident radio-collared panthers located in SBICY between July 1, 2004 and June 30, 2005 by 2 methods:

- 1) as minimum convex polygons (MCP) (Mohr 1947) with a 5% harmonic mean outlier removal for the entire time the individual was monitored via telemetry as an adult, and
- 2) as fixed kernels (Worton 1989), using the least squares cross validation (LSCV) “smoothing parameter” (Seaman and Powell 1996) to show the home range during the reporting period.

We determined the “lifetime”, i.e., monitoring period as an adult, for 3 panthers, FP55, FP120, and FP136, that died during the reporting year. We determined the area of use for FP125, including the time he was with his mother and his dispersal movements prior the loss of his collar and likely death. We generated home range maps using the ArcView 3.2 Spatial Analyst (Environmental Systems Research Institute, Inc.). We incorporated FWC data on dens in Big Cypress north of I-75 in order to provide a comprehensive picture of known denning activity in the entire Preserve.

## **Reproduction**

Inspection of Florida panther dens by FWC began in April 1992 and by Big Cypress in April 1995. When an adult female panther was found in the same location for more than 3 consecutive flights, we conducted a ground check to further identify the site and install a remote monitoring device (Land et al 1998) if denning was suspected. We determined the female’s routine of den attendance by 24-hour remote monitoring, waiting for an opportunity when she is away and we were able to reach the site and locate the kittens in daylight. We processed the kittens following the protocol established by FWC (Cunningham, M. 2002). Appendix III in Lotz et al (2005) lists all panther kittens handled at dens from 1992 to June 2005 and Appendix IV lists all known dens of radio-collared female panthers from June 1985 to June 2005.

## **Mortality**

If a panther’s collar emitted a mortality signal, we notified FWC that we were in the process of confirming whether or not the panther was dead. On rare occasions, a panther may remain motionless for 2 hours, the time it takes to activate the mortality mode on the collar. Following the protocol established by FWC, (Land 1999), an agency law enforcement officer either accompanied or joined us to inspect the site for sign of human involvement in the death. We submitted the carcass to FWC immediately and, within 24 hours, submitted the standardized form “*Panther Mortality Investigations and Carcass Retrieval*” to FWC and USFWS.

If Big Cypress personnel received a report that a panther had been injured or killed on a road in SBICY, we notified FWC and responded to the site to secure it and obtain detailed information. We submitted the carcass to FWC who arranged for the necropsy. Some necropsy results are incorporated into this report. Appendix V in Lotz et al (2005) lists known panther injuries and mortalities from 1972 to June 2005.

## Reporting

We used the reporting period of July 1, 2004 to June 30, 2005 to coincide with FWC reports that coincide with their fiscal year. The compiled telemetry flight dataset was submitted to FWC at the end of the reporting period. We submitted all data obtained on panther dens and mortality as well as biomedical samples from kittens and adults to FWC and designated labs within 24 hours of collection. Biomedical findings on panthers handled in SBICY have been summarized in Lotz et al (2005).

## Definitions

We defined **Home range** as the area where a panther restricts the majority of its movements. We determined home range for those panthers that had more than 5% of their locations in SBICY, had more than 50 locations, and were considered to be adults. Those not meeting these criteria had **areas of use**. We chose 2 years as the average age to classify female panthers as **adults**, based on a sample of 7 known age females in SBICY who had their first litter at an average of 23 months. We also chose 2 years as the average age to classify male panthers as adults, although some may be still dispersing or have not had a breeding opportunity until older, whereas others, i.e. FP79, have successfully bred at 15 months (Warren Johnson, pers. comm.) We defined **Residents** as adults that had more than 50 locations per year (approximately one-third of all flight locations) in SBICY. We described **Dispersers** as those panthers that made large random movements and typically inhabited SBICY for less than 6 months before they either left or settled into a home range. **Immigrants** dispersed from some other locality. **Emigrants** were panthers born in SBICY but dispersed completely outside the study area.

## Results

### Survey and Capture Efforts

We hunted for 33 days, 32 days between January 12 and March 4, 2005 and again on March 29. We captured and handled 5 adult panthers, 4 males and 1 female (Table 1). Five of those days were spent recollaring the 3 targeted males, FP79, FP104, and FP127. One day was spent hunting for an uncollared panther seen in the company of female FP136 during that morning's routine fixed-wing flight. Later that day, we treed a juvenile male with her, estimated at 8

months of age, but did not handle him because he was too high in the tree and was younger than permitted for collaring. On March 29, we recollared FP127 when he was accessible for capture.

We collared 2 new panthers, female FP136 and male FP138, both in survey block 6. We accidentally treed 2 panthers that did not need to be handled. Half of our hunting effort occurred in block 2 trying to capture FP93 or an uncollared female there. We spent little time in block 4, i.e., Addlands South, because water receded there for only a short time. Figure 4 shows our capture effort per block for the past 3 years.

### **Capture Season Summary:**

- 33 total hunt days
- 2 newly collared panthers (FP136, FP138)
- 0 failed collar replacement
- 2 attempted but failed recollar days
- 3 successful recollar days (FP79, FP104, FP127)
- 3 treed but not collared (FP138, FP133, male offspring of FP136)

### **Documentation of Uncollared Panthers**

Based on the criteria explained in the Methods Section, we documented the presence of 1 uncollared adult male south of Hwy 41. We did not document any uncollared male panthers between Hwy. 41 and I-75, however, the large movements of the 5 collared males in that area made documentation of an uncollared male difficult. We verified the presence of 1 uncollared male kitten with a collared female, 7 uncollared (or failed collar) adult females (2 with dependent kittens), and 1 dependent kitten in blocks 1, 2, 3, 4, 6, 7, and 9, and 10 in SBICY (Figure 5). These are minimal counts because several blocks had little or no survey or hunting effort during the study period (Figure 4).

### **Following is a synopsis of our findings:**

**Block 1:** On February 25, a photo was taken by a trail camera of an uncollared panther. Fresh tracks of an uncollared female and older tracks of an uncollared male were found at the site.

**Block 2:** Two uncollared (or failed collar) females, 1 with a kitten, were confirmed by tracks in East Crossing Strand and Baxter Island. On May 5, Roy McBride treed FP93 (failed collar) and documented sign of at least 2 small kittens with her. On May 9, he treed and photographed an uncollared female.

**Block 3:** Sign of an uncollared female was confirmed.

**Block 4:** On August 3, an uncollared panther was observed from the fixed-wing aircraft. Sign of an uncollared female with 1 kitten were also found while conducting capture work in the area.

**Block 5:** No confirmed sign but no hunting or scouting effort.

**Block 6:** This block has been used extensively this study period by radio-collared panthers, so it was difficult to determine if an uncollared female also used the area. An uncollared male offspring of FP136 was documented by aerial observation and subsequent treeing on March 4.

**Block 7:** Sign of an uncollared female was confirmed.

**Block 8:** No hunting or scouting occurred in this block and no uncollared panther was confirmed.

**Block 9:** Sign of a female (either uncollared or FP88 with a failed collar) was confirmed.

**Blocks 10, 11, and 12:** No hunting occurred in these blocks, however, scrapes of an uncollared male were documented and a reliable observation of a dependent kitten was reported. These observations were made where the 3 blocks converged.

## **Synopsis on Monitored Panthers**

We monitored 13 resident adult panthers between July 1, 2004 and June 30, 2005, 3 of whom died in SBICY during that time (Table 2). Figure 6 shows the geographical distribution of this year's SBICY panther monitoring in relation to the entire monitored population, and consists of 31% of the agency's monitoring efforts. Locations within Big Cypress boundaries represent 48% of the monitoring efforts, whereas 8% are obtained in EVER, and 44% occur outside the National Park units.

Figures 7 and 8 show the home range overlaps among the 5 resident males and 6 resident females inhabiting SBICY. FP55 and FP120 were not included because they were monitored only a few days in the reporting period prior to their deaths.

**Following is a summary of each panther's background, home range, reproductive activity, and status as of June 30, 2005.**

## **FP55**

This female is the only known offspring of FP23 to survive in the wild. She was born on December 12, 1992 in the Corn Dance Unit and first captured on January 25, 1994 at 2 years of age. She dispersed at 14 months of age. FP55 was last collared on April 4, 2003 at the age of 10 years. She was in excellent physical condition, weighing 36 kg, more than on any previous handling.

FP55 was first bred at 19 months of age and had denned 8 times of which 3 dens have failed. i.e., the kittens died prior to leaving the den. She last gave birth in August of 2003 at the age of 10.5 years. A kitten was briefly seen during the den search, however, it eluded capture. On the July 12, 2004 monitoring flight, FP55's collar emitted a mortality signal. Site inspection and the subsequent necropsy indicated that she probably died from intraspecific aggression, although results were not conclusive due to the degree of scavenging. It was estimated that she had been dead for up to 4 days, although the collar had not emitted the mortality signal during previous flights. No sign of kittens was found where she died, however, FP55's movements between October and July suggest that she was rearing a kitten. During her 10-year monitoring lifetime, her home range was 490 km<sup>2</sup>, all of which was in the Turner River Unit of SBICY (Figure 9).

## **FP70**

This female was born on May 7, 1997 in the Turner River Unit. She and her sibling were the first offspring of TX107, one of the 2 Texas cougars released into SBICY in 1995. FP70 was first captured on February 25, 1998 at the age of 10 months and dispersed at the age of 16 months but remained in the Turner River Unit. Her first litter, sired by FP79, was born June 14, 1999. Two females and 1 male were marked at the den and radio-collared while still with her. She successfully raised them to dispersal age. FP70's collar malfunctioned on January 24, 2000.

We recollared FP70 on March 10, 2003. She weighed 44 kg. and was in good condition. During subsequent tracking, we determined that she was raising 2 kittens, estimated at 6 months of age. She denned again on May 26, 2004 and, on June 6, we marked 3 kittens, 2 females and 1 male, at her den. We have received several confirmed observations of FP70 in the company of 2 juveniles, with the last report on August 31, 2005.

FP70's home range while she was raising young this reporting period was 131 km<sup>2</sup>, one-third of the 345-km<sup>2</sup> area she has used since she was first collared (Figure 10).

## **FP79**

This male was born to an introduced Texas cougar, Tx101, on the Seminole Indian Reservation

in September of 1995. He was first captured on March 3, 1999 at 3.5 years of age in the Turner River Unit, over 47 km from his birth site. He was monitored until his collar failed on October 4, 2003. We recaptured him on March 17, 2004 and fitted him with a Generation III GPS collar (Telonics, Inc.), programmed to obtain 5 evening to morning locations on a daily basis. On March 3, 2005, we removed the GPS collar and replaced it with a VHF collar. At 9.5 years of age, he weighed 61 kg, 6 kg less than the previous year. He was in excellent condition, and surprisingly had no bite wounds or scars from intraspecific fights. He tested negative for feline leukemia. The GPS component functioned for 56 days, providing 222 locations (79% of potential locations). An evaluation by Telonics, Inc. determined that the connections in his collar had been severed, likely by bites from another animal. His home range during the 5.5 months of this past year when he had a functioning collar was 712 km<sup>2</sup>. His total home range size as an adult was 1599-km<sup>2</sup> and encompassed almost half of SBICY (Figure 11).

### **FP102**

This female was born to FP55 on February 8, 1998 in the Turner River Unit. She was first captured on February 20, 2001 at 3 years of age. At least 2 kittens were with her, one of which, FP103, was captured a month later at an estimated 10 months of age. FP102 denned again on June 25, 2001 and 2 males were marked 3 weeks later. FP102 next denned on July 5, 2002, only a year after her previous den. One male and 1 female were marked at this den and their tracks were documented with hers on April 11, 2003. FP102 was recollared on March 24, 2004. She weighed 39 kg and was in late term pregnancy. She apparently lost the fetuses but was bred a month later and gave birth on July 22, 2004. We marked 3 kittens, 2 females and 1 male, at her den. FP102 inhabited a 166-km<sup>2</sup> home range, mainly in the Turner River Unit, while raising young during this reporting period. Her total home range to date is 212 km<sup>2</sup> (Figure 12).

### **FP103**

This female, an offspring of FP102, was first captured in the Turner River Unit on March 13, 2001 at an estimated 10 months of age. She was with FP102 through April, except for several days when FP102 was in the company of FP79, the territorial male. When FP103 dispersed at an estimated 11 months of age, she moved east into the Corn Dance Unit. Her collar failed prematurely on December 23, 2003, however, we recollared her on February 27, 2004. She weighed 32 kg, was in very good condition, and was not pregnant. Her home range this year was 220-km<sup>2</sup> and her total home range to date was 337-km<sup>2</sup> (Figure 13). FP103 is currently over 5 years of age, has been documented with male FP104 on 5 occasions this reporting period, but has not denned.

## **FP104**

This male was first captured on April 2, 2001 at the estimated age of 6 to 7 months. His parentage is unknown, however, it is suspected that he is the offspring of FP70 who wore a failed collar at the time and he was captured within her known home range. During capture, he sustained a mid-shaft fracture of the right radius and ulna and was removed from the wild. He was treated and housed at the Lowry Park Zoo for 8 weeks and, on June 4, 2001, was taken to White Oak Conservation Center (WOCC) for further rehabilitation. He was released into the Turner River Unit on November 28, 2001. FP104 ranged widely post-release, traveling west to Fakahatchee Strand Preserve State Park, southeast into the Loop and Stairsteps Units, and north under I-75 into Addlands North and Seminole Tribal lands.

On December 13, 2002, the FWC capture team recollared FP104 in the Addlands North to replace his break-away collar. We replaced his collar on March 1, 2005 with a GPS collar. He weighed 63 kg and was in excellent condition. He tested negative for feline leukemia. Reproductive physiologist from WOCC, Linda Penfold, assessed FP104's reproductive status through electro-ejaculation. Although the semen volume was adequate and his external organs were normal, no spermatozoa were found.

Since an adult, FP104 has been documented with 4 adult females on 19 occasions, i.e., 1 or more days at a time together. One of the females has denned and her denning date coincides with her association with him 3 months prior. The other 2 females died without producing young, and FP103 has been with FP104 on 5 occasions this reporting period and has not denned. This male panther's 631-km<sup>2</sup> home range during this reporting period encompassed the eastern SBICY. His total home range to date is 863 km<sup>2</sup> (Figure 14).

## **FP119**

This male was born to FP93 on April 12, 2002 in the Turner River Unit. We collared him at 12 months of age on April 2, 2003, at which time he weighed 34 kg and was in excellent physical condition. He did not reunite with his mother, but remained within a 1.6-km radius of the capture site for about 2 weeks. During this time, his mother was bred so his natural dispersal was imminent. When he left his natal range, he inhabited the Deep Lake and Turner River Units until the breakaway device on his collar separated on August 12, 2003. On November 17, 2004, the FWC team captured and collared him on the Florida Panther National Wildlife Refuge (FPNWR). He has not returned to SBICY.

## **FP120**

We first collared this female on April 8, 2003 in the Turner River Unit at an estimated 3 years



of age. Her parentage is unknown. She weighed 37 kg and was in excellent physical condition. Her 42-km<sup>2</sup> home range was bisected by Hwy. 41. In January 2004, FP120 denned south of Hwy. 41. We marked 2 kittens, 1 male and 1 female, on February 7 at her den. In mid-March, her movements indicated that she had left the den with the kittens, but remained south of Hwy. 41. Given her proximity to the road and the likelihood that she would eventually attempt to cross with her kittens, we requested assistance from the FWC Division of Law Enforcement in early May to increase monitoring of nighttime traffic in the Panther Speed Zone that had been established in the Ochopee area. FWC complied by conducting almost nightly enforcement of the posted 45-per-hour speed limit for over 2 months when she was near the road.

In spite of this effort, at 6:45 on the evening of July 11, #120 was struck by a vehicle, witnessed by FWC officers. The panther lay momentarily on the side of the road, but when approached, swam the canal on the north side and retreated into the woods. The next morning, FWC tranquilized her on the ground and removed her for examination. She had a compound fracture of the right femur and significant blood loss. She remained in captivity for 10 months and released into the northern portion of her home range on May 4, 2005. Within 2 days, she returned to Hwy. 41, 11 km from the release site, where she had last been with her kittens. On May 7, she was struck and killed during daylight hours at the same location where she had been injured and 1 of her kittens (K156) had been killed 10 months earlier. FP102's lifetime home range was 53 km<sup>2</sup> (Figure 15).

### **FP124**

On February 13, 2004, we captured and collared female FP124 and her 2 juvenile males, FP125 and FP126 in the Loop Unit. FP124 weighed 32 kg and was estimated to be 3 to 4 years old. FP126 was removed from Big Cypress and FP125 dispersed naturally. FP124 next denned in the Stairsteps Unit and, on September 29, 2004, we marked 1 male kitten. It survived to only 3 to 4 weeks of age. FP124 denned again in February 2005 in the Stairsteps Unit. On February 10, we marked 3 kittens, 2 males and 1 female. As of November, 2005, we have documented that she is raising 2 juveniles. FP124's home range while raising her young this year was 61 km<sup>2</sup> and her total home range to July 2005 was 198 km<sup>2</sup> (Figure 16).

### **FP125**

FP125, the offspring of FP124, dispersed naturally in July 2004 in an easterly direction into EVER. His collar was found on Krome Avenue at the northeastern edge of EVER on September 27, 2004. Figure 17 shows his area of use while being raised by FP124 and his dispersal movements.

## **FP126**

FP126, the offspring of FP124, was removed at 14 months-of-age from SBICY on May 28 at the request of the Miccosukee Tribe of Indians and released in Okaloacoochee Slough State Forest. He was killed by intraspecific aggression on January 1, 2005.

## **FP127**

We captured male FP127 in the Turner River Unit on February 16, 2004. He was in good condition, weighed 45 kg, did not have a transponder, and was estimated to be 2 years of age. He tested negative for feline leukemia. He initially inhabited the Turner River Unit, but then moved to the eastern side of Big Cypress where he has used both private lands and the Addlands North and South. He occupied a 231-km<sup>2</sup> home range during the reporting period (Figure 18).

## **FP129**

We captured female FP129 in the Corn Dance Unit on February 20, 2004. Her transponder chip verified that she is K89, born to panther FP87 on January 23, 2001. Her father was likely FP79. This 3-year-old female was in excellent physical condition, weighed 37 kg, and was not pregnant. On April 6, 2005, we handled 3 kittens, 2 males and 1 female, at her den in the Corn Dance Unit. She has occupied a 168-km<sup>2</sup> home range in the Corn Dance Unit during this reporting period (Figure 19).

## **FP133**

The FWC capture team caught this male panther, estimated at 4 to 5 years-of-age, on November 18, 2004 in the Bear Island Unit. Since then, his home range has encompassed 388 km<sup>2</sup> of the Bear Island, Deep Lake, and Turner River Units, with 66% of the time in SBICY (Figure 20).

## **FP136**

We caught adult female FP136 on January 13, 2005 in the Turner River Unit. She was in excellent condition, weighing 42 kg and estimated at 3 to 4 years of age. During our workup, we noted that she may have had a prior injury to her left scapula and adjacent vertebrae, but that it appeared completely healed. She tested negative for feline leukemia. On March 4, we observed an uncollared panther lying in a prairie with FP136. Later that day, we treed a male kitten, estimated at 8 months of age, but did not handle it due to its age and height in the tree.

Between May 25 and June 13, FP136 confined her movements to a small area. We thought that denning was unlikely yet did not receive a mortality signal from her collar. We checked her location on the ground on June 14 and found her dead and lying at open prairie. She was severely emaciated, having lost half her weight since her capture 4 months earlier. It was

determined at necropsy that she had died within 2 hours of retrieval, thus the mortality mode in the collar had not yet activated. She had recently sustained a lumbar vertebrae fracture and dislocation of the spinal column of the lower back. She also had bullet fragments beneath the skin and in the musculature on the right side of her chest and healed fractures in the bones of the left shoulder and back. Although chronic inflammation was present around the bullet fragments, the shooting likely occurred prior to her initial capture in January and had damaged the left scapula and vertebrae noted at that time. The home range of FP136 during the 5-monitoring period was 105 km<sup>2</sup> (Figure 21).

## **FP138**

We captured adult male FP138 on January 31, 2005 in the Turner River Unit. He was in very good condition, weighing 61 kg and estimated at 4 years-of-age. He bore obvious signs of intraspecific aggression, i.e., a deep nasal scar and a portion of the right ear missing, and had a comparatively heavy tick infestation. He tested negative for feline leukemia. The home range of FP138 during the 5-month monitoring period was 837 km<sup>2</sup>, of which 75% has been in SBICY (Figure 22).

The average home range (95% MCP) of the 5 resident males was 555 km<sup>2</sup> and the average home range of the 6 resident females 142 km<sup>2</sup> (Table 3).

## **Reproduction**

Three collared panthers denned on 4 occasions in SBICY during the reporting year and 1 female that was first collared this year had 1 male kitten with her:

- FP102: On August 5, 2004, we handled 3 kittens, 2 females and 1 male, at the den of FP102 in the Turner River Unit. This female is the 7.5-year-old offspring of FP55. This is her fourth known den since first captured at 3 years of age.
  
- FP124: On September 29, 2004, we handled 1 male kitten of FP124 in the Stairsteps Unit. This was the first time a den was confirmed in the Stairsteps Unit. It was found in a 0.5-ha tree island surrounded by an average of 30 cm of water. Since this occurred during the muzzleloading hunting season and was in an open tree island habitat, the Big Cypress with cooperation from FWC closed a 770-ha area around the den site to all use in order to lessen the likelihood of den abandonment and/or an encounter with this female as she was protecting her kitten. The closure was in effect for 21 days and recreational users were supportive of the action. FP124 was last located at her den on October 12, and about 2 weeks later was in estrus. The male kitten apparently died between 3 and 4 weeks of age.

- FP124 denned again 3 months later and on February 10, 2005, we marked 2 male and 1 female kittens at her den, again in the Stairsteps Unit. As of December 2005, 2 of these kittens have been survived and are still with FP124. This is the third known den of this female, estimated at 3 years of age.
- FP129: On April 6, 2005, we handled 3 kittens, 2 males and 1 female, at the den of FP129 in the Corn Dance Unit. She is the 4.5-year-old offspring of FP87 and granddaughter of FP55. This is possibly her first litter.
- FP136: When we handled adult female FP136, we did not detect that she had a juvenile with her. We documented a juvenile male, however, estimated at 8 months of age, after we saw it with her during a panther flight, and subsequently treed it.

Seven of 8 breeding age females monitored during this reporting period had kittens. All but FP103 were raising kittens during the reporting period. She had been documented in association with FP104 on 5 occasions, but failed to den.

The collection of information on kittens at dens began in 1992. The first 15 kittens handled at the first 6 dens were not marked with transponder chips. Between June 1995 and June 2005, 174 kittens at 81 dens have been individually and permanently marked. Of the 81 dens visited, 47 (58%) were found in Big Cypress. The sex ratio of the 189 kittens handled at dens was 51:49 (96 males; 93 females). The sex ratio of the 120 kittens handled in Big Cypress was 54:46.

Between 1986 and 1995, 12 dens documented by female movement patterns were not visited in Big Cypress. Thus, there have been 59 documented denning attempts by 25 female panthers in Big Cypress (Figure 23). Female movement patterns have indicated that a minimum of 10 dens failed. At least 1 offspring from 17 dens (37%) were radio-collared either while still with their mothers or when independent. Of the 120 kittens handled at dens in Big Cypress, 21 (18%) have been subsequently radio-collared.

Of interest is the fact that the number of dens located in Big Cypress more than doubled (18 vs 41) after enhancement of the Florida panther gene pool began in 1995. Although capture effort and success, number of females available for breeding, and genetic lineage are influencing factors, it has been apparent from a field perspective that the genetic restoration program has had a significant role in the increase in the panther population in SBICY (Figure 24).

The peak of the fawn drop occurs in February and March in SBICY (McCown 1991), providing

an increased prey base for denning females during the spring months. The increase in panther denning, however, occurred during May and June (34% of 50 dens), which is the onset of the rainy season (Figure 25). We have observed that the home range size of female panthers can decrease significantly during periods of high water in SBICY and may be due to the improved availability of prey on the remaining dry habitat.

Dense, almost impenetrable cover is a key component of panther dens (Maehr et al 1990). In Big Cypress, saw palmetto (*Serenoa repens*) is the major understory vegetative type in which the kittens are found. It provides not only protection from rain and wind, but also alerts the female and kittens when something moves through the dry fronds. Of the 53 dens that were visited in Big Cypress and had habitat recorded, all but 5 had a palmetto understory. Four had a hardwood understory and 1 den in the Loop Unit was in sawgrass (*Cladium jamaicensis*). The overstory of 41 dens (72%) was pine, with 3 dens occurring in hardwood hammocks and 1 in mixed hardwood swamp. Seven dens were in palmetto only and all but 1 of these occurred either in Bear Island or Addlands North.

## Mortality

We documented the deaths of 5 radio-collared and 4 uncollared panthers in or from SBICY during the reporting period. Seven occurred in SBICY (Figure 26).

- FP55, a 12.5-year-old female, died of intraspecific aggression on July 9, 2004.
- FP120, a female estimated at 4-years-of-age, was struck and injured by a vehicle on Hwy. 41 and removed on July 11, 2004. She was returned to SBICY on May 4, but was struck and killed on May 7.
- FP125, a 1.5-year-old male, was probably killed on Krome Avenue on September 27, 2004. Although he was not found, the impact was severe enough to tear the break-away leather piece and the collar itself was misshapen.
- FP126, a juvenile of FP124, was removed from SBICY on May 28, 2004 at the request of the Miccosukee Tribe of Indians and relocated to Okaloacoochee Slough State Forest. He was killed by another male panther on January 1, 2005 at 2 years-of-age.
- FP136, a female first collared on January 13, 2005 and died on June 14, 2005 of emaciation due to a spinal injury sustained in the wild, at an estimated at 4-years-of-age.
- K156, a 7-month-old male kitten of FP120, was killed on Hwy. 41 on August 2, 2004, 3 weeks after his mother was removed from SBICY due to her injuries.
- UCFP68, a female estimated at 3-6 years-of-age, was found dead in the Turner River Unit on September 30, 2004 of unknown causes.
- UCFP71, a male estimated at 2-3-years-of-age, was struck and killed by a vehicle on Hwy. 41 near 11-mile-road on February 4, 2005.

- UCFP72, a male estimated at 2-years-of-age, was struck and killed by a vehicle on S.R. 29 near Jerome on February 25, 2005.

### **Recommendations:**

- 1) Initiate interagency discussions on the construction of a wildlife underpass on Hwy. 41 near Turner River.**

This area has the highest level of known panther crossings, injuries, and deaths on Hwy. 41. The planned resurfacing of this road coupled with the forthcoming increase in tolls on I-75 will result in a higher volume of traffic and increased speed on Hwy. 41. It was found that even the enforced 45-mph speed limit was insufficient to prevent a collision when FP120 was crossing the road. Discussions should be initiated to build an underpass at Turner River similar to those built on S R 29 in high panther use and mortality areas.

- 2) Initiate interagency discussions on the extension of wildlife fencing along S.R. 29.**

The construction of sections versus continuous fencing adjacent to wildlife underpasses was agreed upon on an experimental basis as a cost-cutting measure and to continue to provide recreational fishing in the adjacent canals. Panthers and other wildlife, however, continue to be struck by vehicles along portions that are not fenced. Agencies responsible for panther recovery should work with FDOT to fund the construction of uninterrupted fencing on S.R. 29 as was done on I-75, with a series of gates to allow continued recreational use of the canals.

- 3) Maintain the level of capture effort in the Big Cypress study area in order to maintain an adequate sample of monitored panthers with which to meet the project objectives.**

## **Acknowledgments**

The success of our work this past year is once again due to Big Cypress staff support of the wildlife program. In the field, houndsman Cougar McBride used his tracking expertise to guide Rosie, Clack, Juno, Chili, Frankie, and Toody to areas where a panther had recently traveled. Emmett Blankenship, DVM, assured a safe capture and a comprehensive medical assessment and biomedical sample collection. Ranger John Bowie and Fire Specialist Matt Vanleeuwen assisted in captures. Helicopter pilot Bill Evans facilitated timely and safe captures in remote areas.

This work is funded by the National Park Service and we thank the Southeast Regional Office and management staff for their continued support of our efforts in determining the role of Big Cypress National Preserve in supporting and promoting the recovery of the Florida panther.

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**Table 1. Florida panthers captured and radio-collared in SBICY in 2005.**

| FP# | K#  | Capture Date     | Gender | Age (yrs) | Type     | Capture Location |          |
|-----|-----|------------------|--------|-----------|----------|------------------|----------|
|     |     |                  |        |           |          | Easting          | Northing |
| 79  | K19 | March 3, 2005    | M      | 9.5       | resident | 475457           | 2877889  |
| 104 | -   | March 1, 2005    | M      | 4.5       | resident | 503869           | 2872095  |
| 127 | -   | March 29, 2005   | M      | ~3        | resident | 503384           | 2889866  |
| 136 | -   |                  | F      | ~3-4      | resident | 481890           | 2866181  |
| 138 | -   | January 31, 2005 | M      | ~4        | resident | 486601           | 2875817  |

Table 2. Known resident radio-collared Florida panthers in SBICY - 2003 - 2005.

| FP#                    | Sex | In SBICY<br>July 1, 2003 | Status    | In SBICY<br>July 1, 2004 | Status    | In SBICY<br>July 1, 2005 | Status             | Comments   |
|------------------------|-----|--------------------------|-----------|--------------------------|-----------|--------------------------|--------------------|--|
| 55                     | F   | yes                      | resident  | yes                      | resident  | no                       | resident<br>- dead | died July 9, 2004  |
| 60                     | M   | yes                      | resident  | no                       | captivity | -                        | -                  | removed June 29, 2004  |
| 70                     | F   | yes                      | resident  | yes                      | resident  | yes                      | resident           |  |
| 79                     | M   | yes                      | resident  | yes                      | resident  | yes                      | resident           |  |
| 86                     | F   | yes                      | resident  | no                       | dead      | -                        | -                  | died Nov. 6, 2003  |
| 88                     | F   | ?                        | -         | ?                        | -         | ?                        | -                  | collar failed Oct. 23, 2002                                      |
| 91                     | F   | yes                      | resident  | no                       | dead      | -                        | -                  | died Dec. 3, 2003  |
| 93                     | F   | yes                      | resident  | ?                        | -         | ?                        | -                  | collar failed Aug. 30, 2003                                      |
| 102                    | F   | yes                      | resident  | yes                      | resident  | yes                      | resident           |  |
| 103                    | F   | yes                      | resident  | yes                      | resident  | yes                      | resident           |  |
| 104                    | M   | yes                      | resident  | yes                      | resident  | yes                      | resident           |  |
| 119                    | M   | yes                      | disperser | no                       | emigrant  | -                        |                    | now a resident north of I-75                                     |
| 120                    | F   | yes                      | resident  | yes                      | resident  | no                       | resident<br>- dead | injured July 11, 2004; released May 4, 2005 and died May 7, 2005 |
| 124                    | F   | -                        | -         | yes                      | resident  | yes                      | resident           |  |
| 125                    | M   | -                        | -         | yes                      | disperser | no                       | dead?              | only collar found Sept. 27, 2004                                 |
| 126                    | M   | -                        | -         | yes                      | relocated | no                       | dead               | killed by another panther Jan. 1, 2005                           |
| 127                    | M   | -                        | -         | yes                      | disperser | yes                      | resident           |  |
| 129                    | F   | -                        | -         | yes                      | resident  | yes                      | resident           |  |
| 133                    | M   | -                        | -         | -                        | -         | yes                      | resident           |  |
| 136                    | F   | -                        | -         | -                        | -         | yes                      | resident<br>- dead | collared Jan. 13, 2005; died June 14, 2005                       |
| 138                    | M   | -                        | -         | -                        | -         | yes                      | resident           |  |
| <b>Known residents</b> |     |                          | <b>11</b> |                          | <b>9</b>  |                          | <b>13</b>          |  |

Table 3. Known extent of use of SBICY by Florida panthers from July 2004 - June 2005.

| ID# | Gender | Origin    | # Locations in SBICY | % in SBICY | MCP Home Range (km <sup>2</sup> ) | Status                                 |
|-----|--------|-----------|----------------------|------------|-----------------------------------|--|
| 55  | F      | SBICY     | -                    | -          | -                                 | dead July 8, 2004                      |
| 70  | F      | SBICY     | 145                  | 100        | 131                               | alive                                  |
| 79  | M      | immigrant | 146                  | 100        | 712                               | alive                                  |
| 88  | F      | SBICY     | -                    | -          | -                                 | Unknown; failed collar (Oct. 23, 2002) |
| 93  | F      | SBICY     | -                    | -          | -                                 | unknown; failed collar (Aug. 30, 2003) |
| 102 | F      | SBICY     | 148                  | 100        | 166                               | alive                                  |
| 103 | F      | SBICY     | 144                  | 100        | 220                               | alive                                  |
| 104 | M      | SBICY     | 142                  | 99         | 631                               | alive                                  |
| 120 | F      | unknown   | -                    | -          | -                                 | injured July 11, 2004                  |
| 124 | F      | unknown   | 154                  | 100        | 61                                | alive                                  |
| 125 | M      | SBICY     | -                    | -          | -                                 | left SBICY July 5, 2004                |
| 127 | M      | unknown   | 121                  | 84         | 231                               | alive                                  |
| 129 | F      | SBICY     | 144                  | 100        | 168                               | alive                                  |
| 133 | M      | unknown   | 59                   | 66         | 388                               | alive                                  |
| 136 | F      | unknown   | 59                   | 100        | 105                               | dead                                   |
| 138 | M      | unknown   | 41                   | 75         | 837                               | alive                                  |

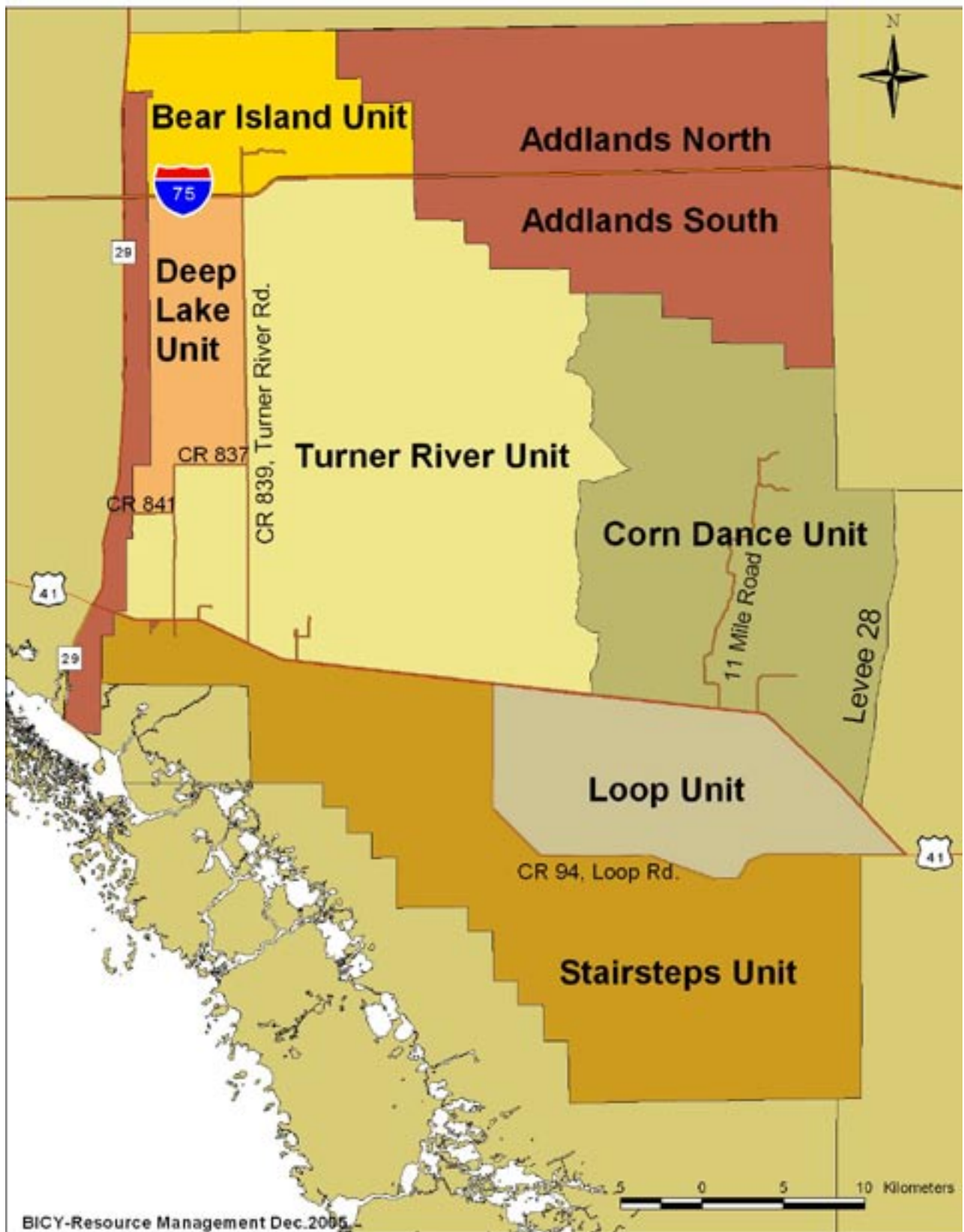


Figure 1. Management units and roads in Big Cypress National Preserve.

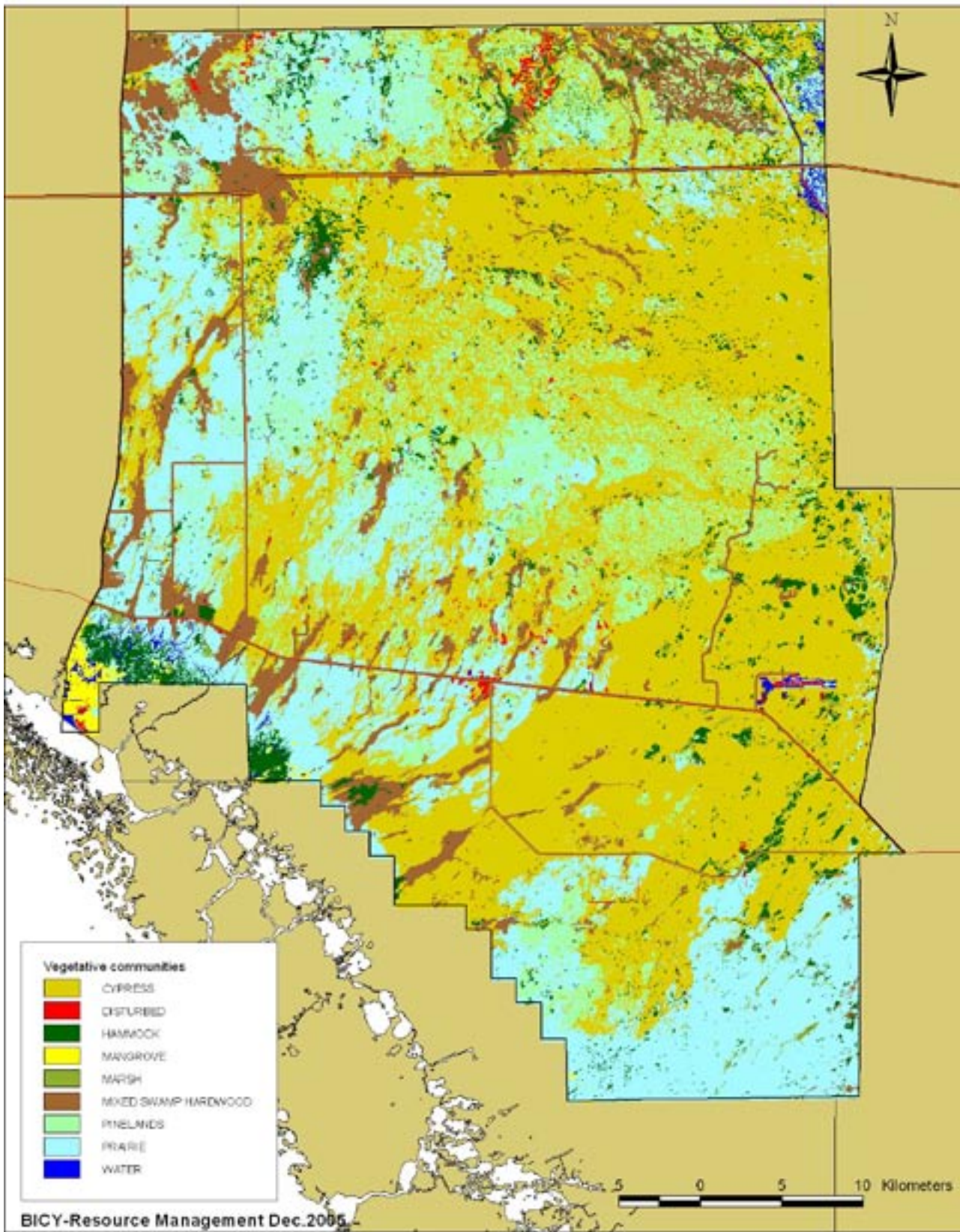


Figure 2. Vegetative communities in Big Cypress National Preserve.

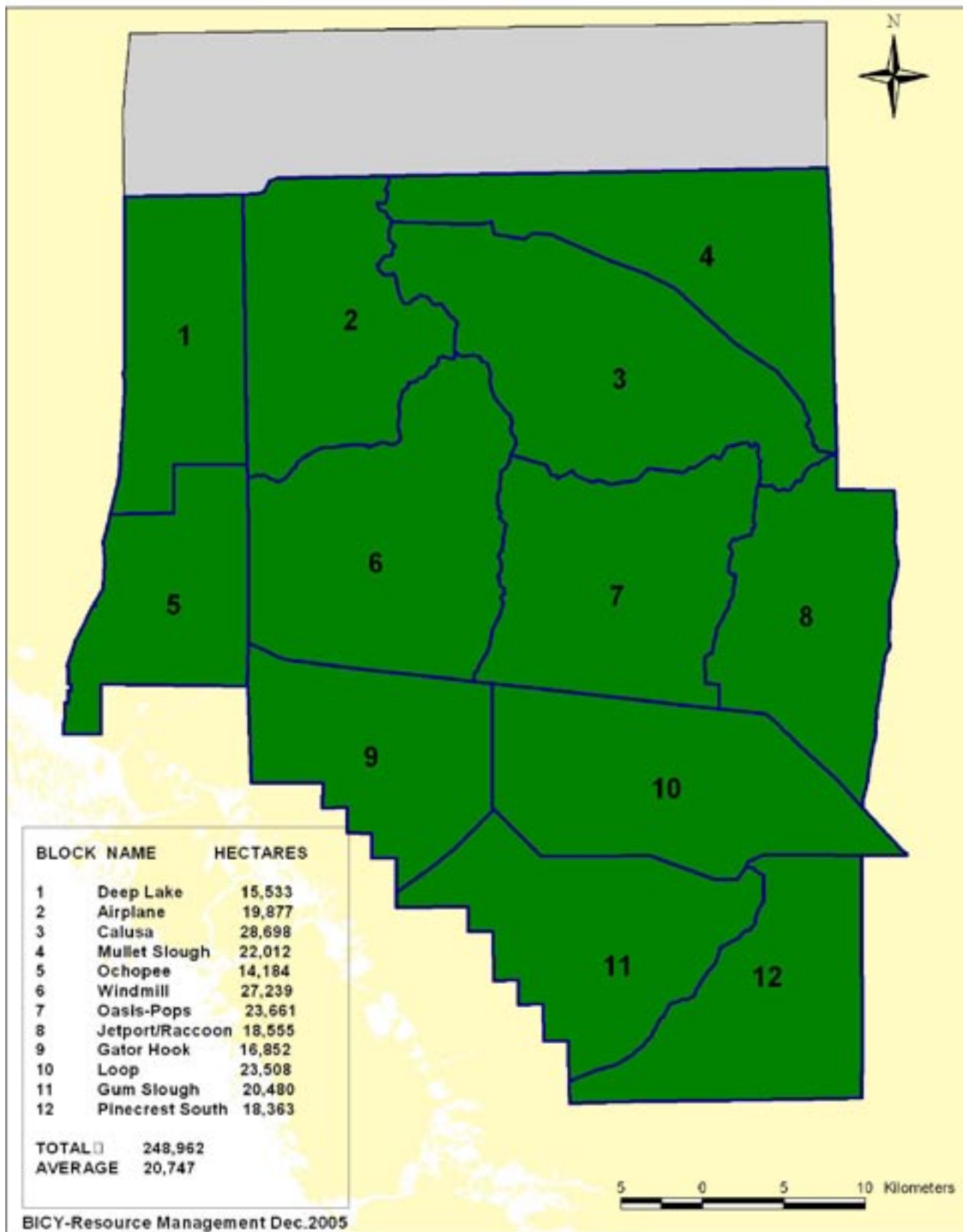
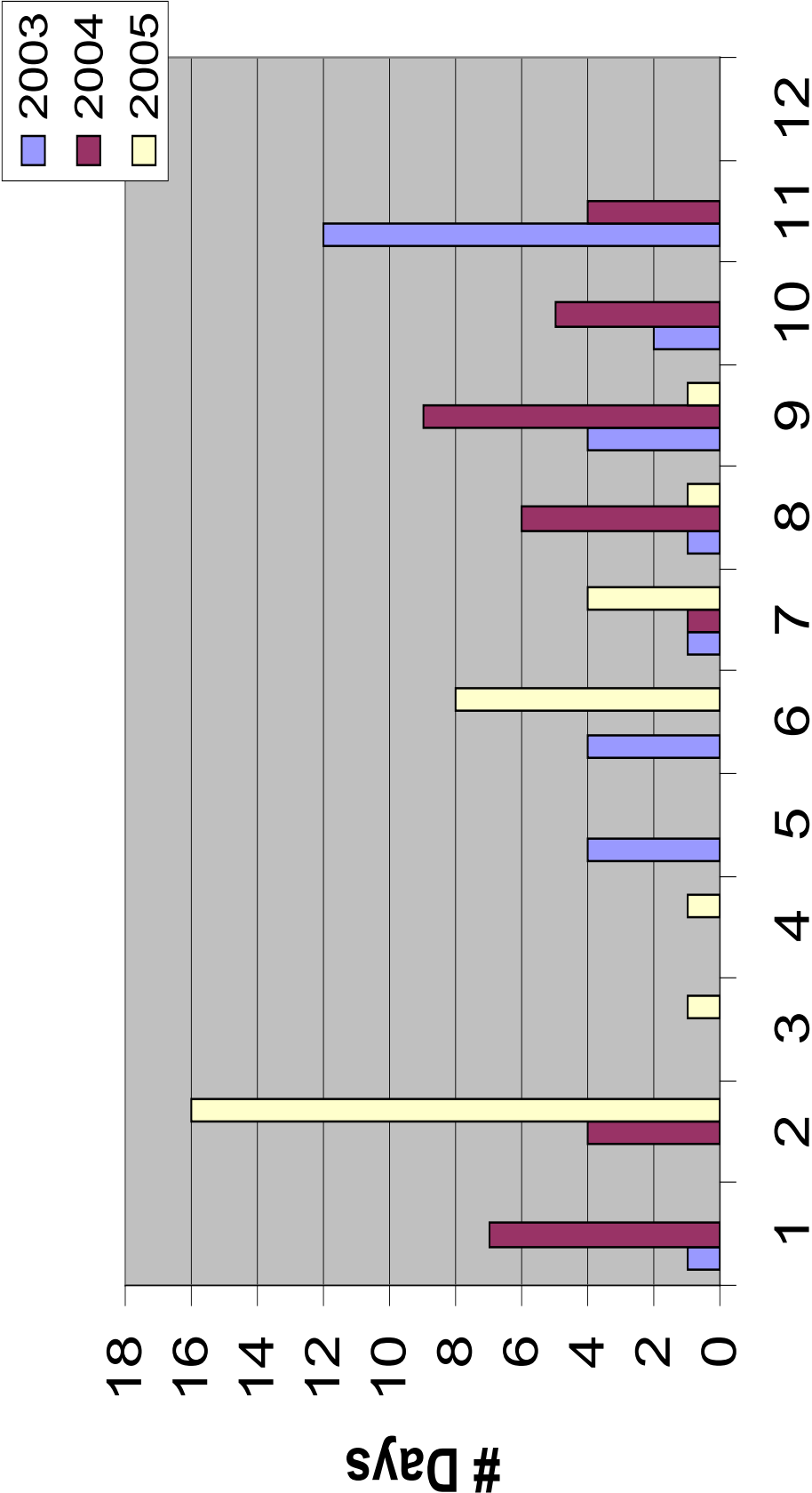


Figure 3. Panther survey blocks in SBICY.



**Figure 4. 2003-2005 Hunt Effort/Survey Block in SBICY.**



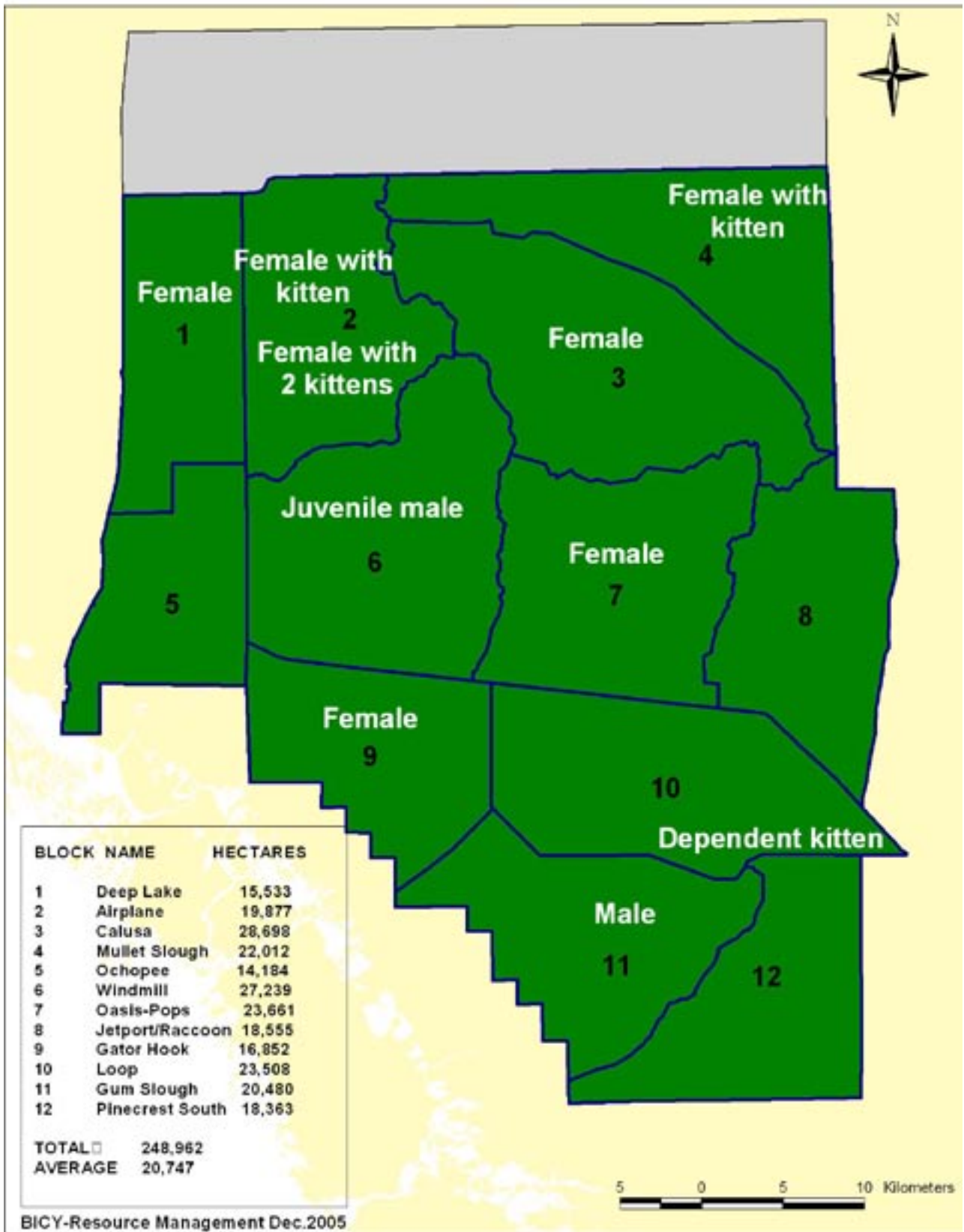


Figure 5. Documented presence of uncollared panthers in SBICY from July 2004-June 2005.

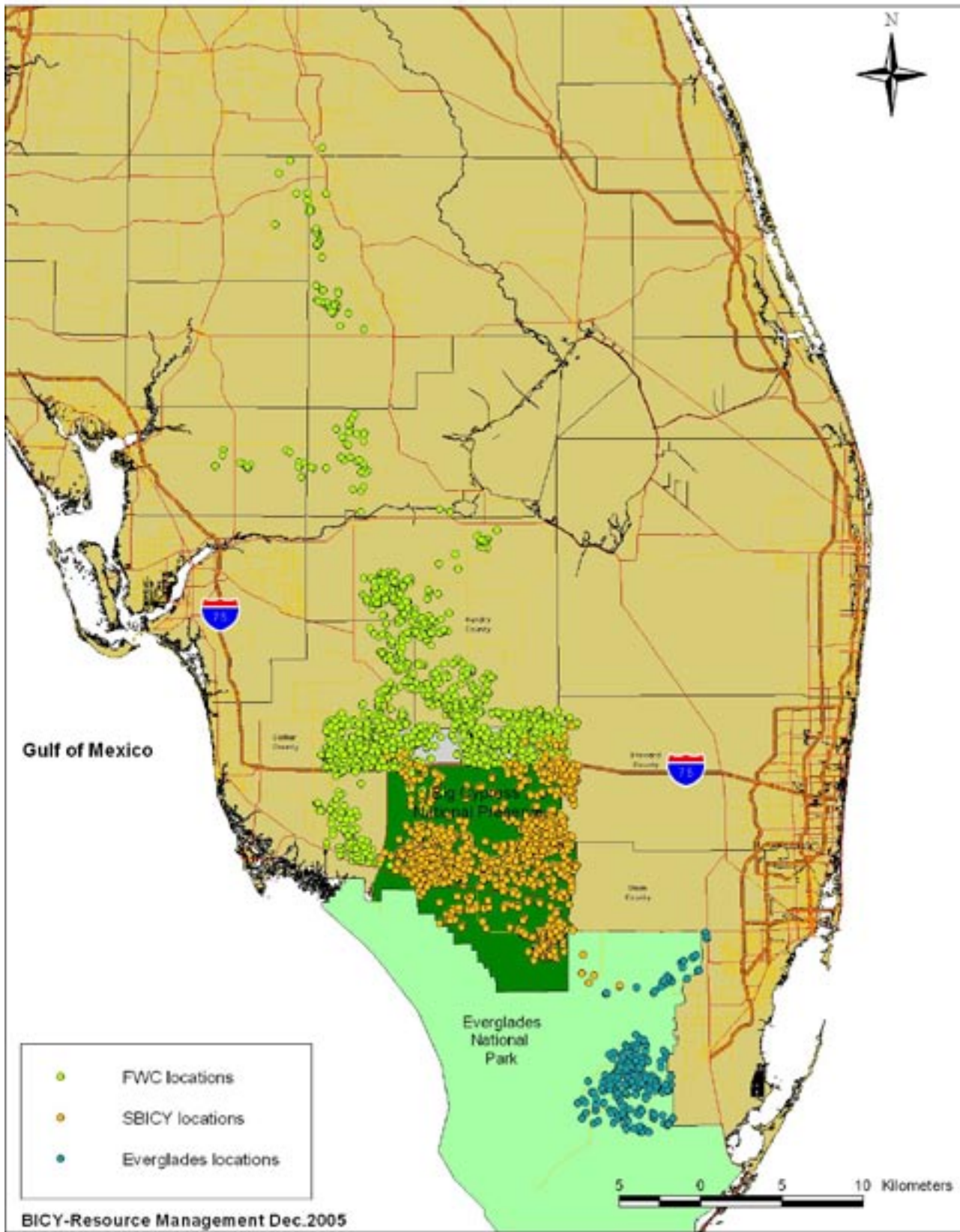


Figure 6. Geographical distribution of all Florida panther telemetry locations from July 2004-June 2005.

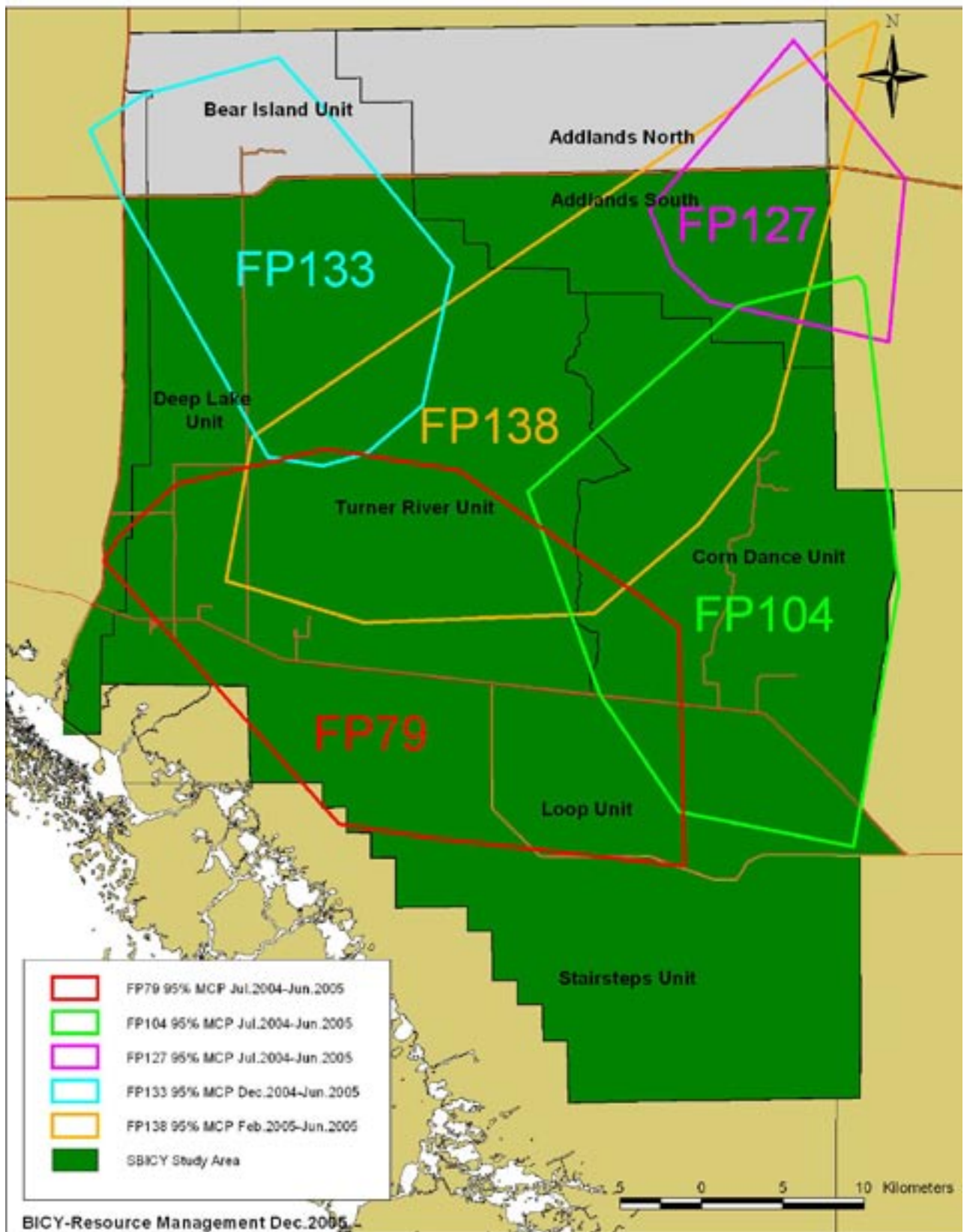


Figure 7. Home ranges of adult male Florida panthers monitored in SBICY from July 2004-June 2005.

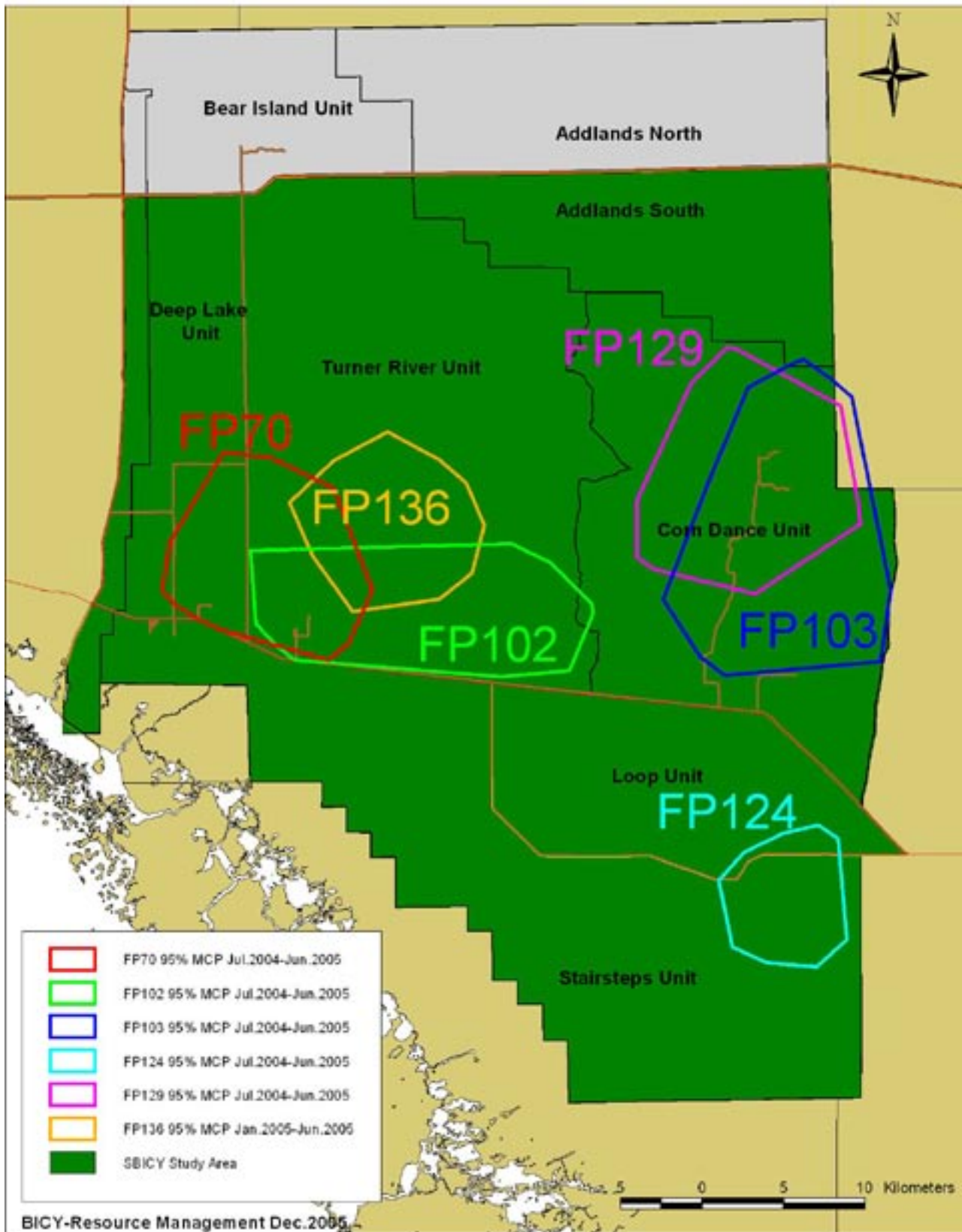


Figure 8. Home ranges of adult female Florida panthers monitored in SBICY from July 2004-June 2005.

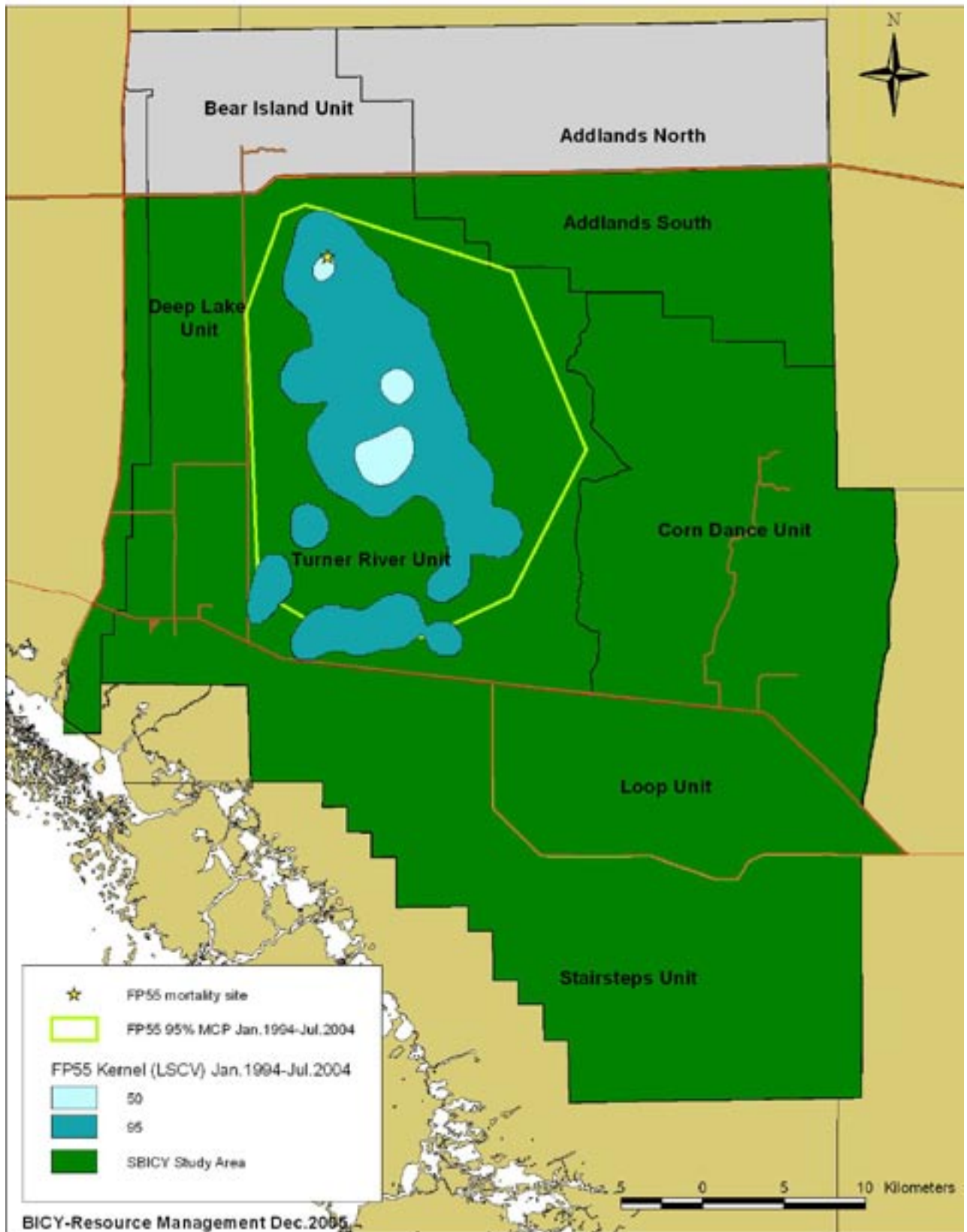


Figure 9. Lifetime home range of female Florida panther #55.

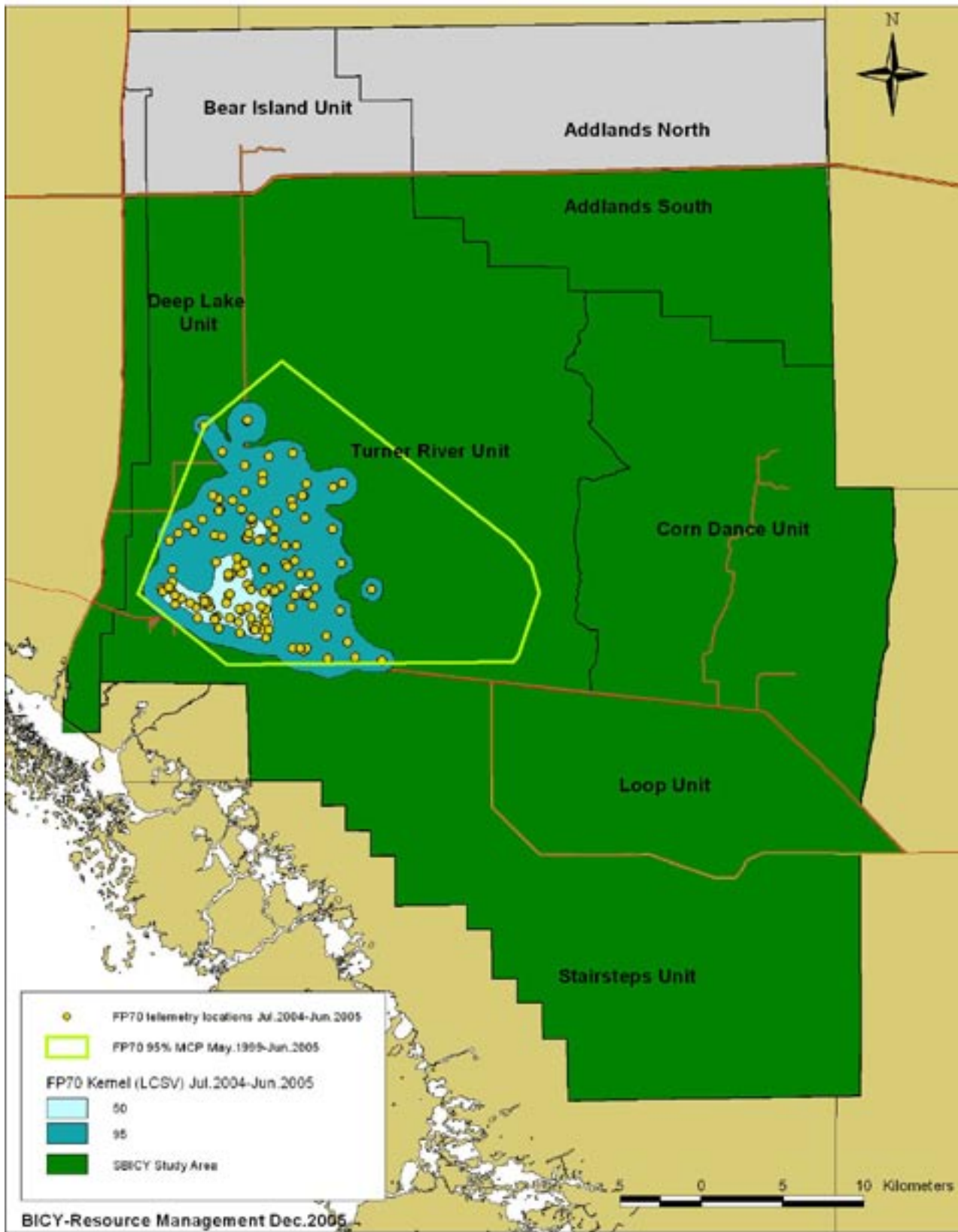


Figure 10. Home range of female Florida panther #70.

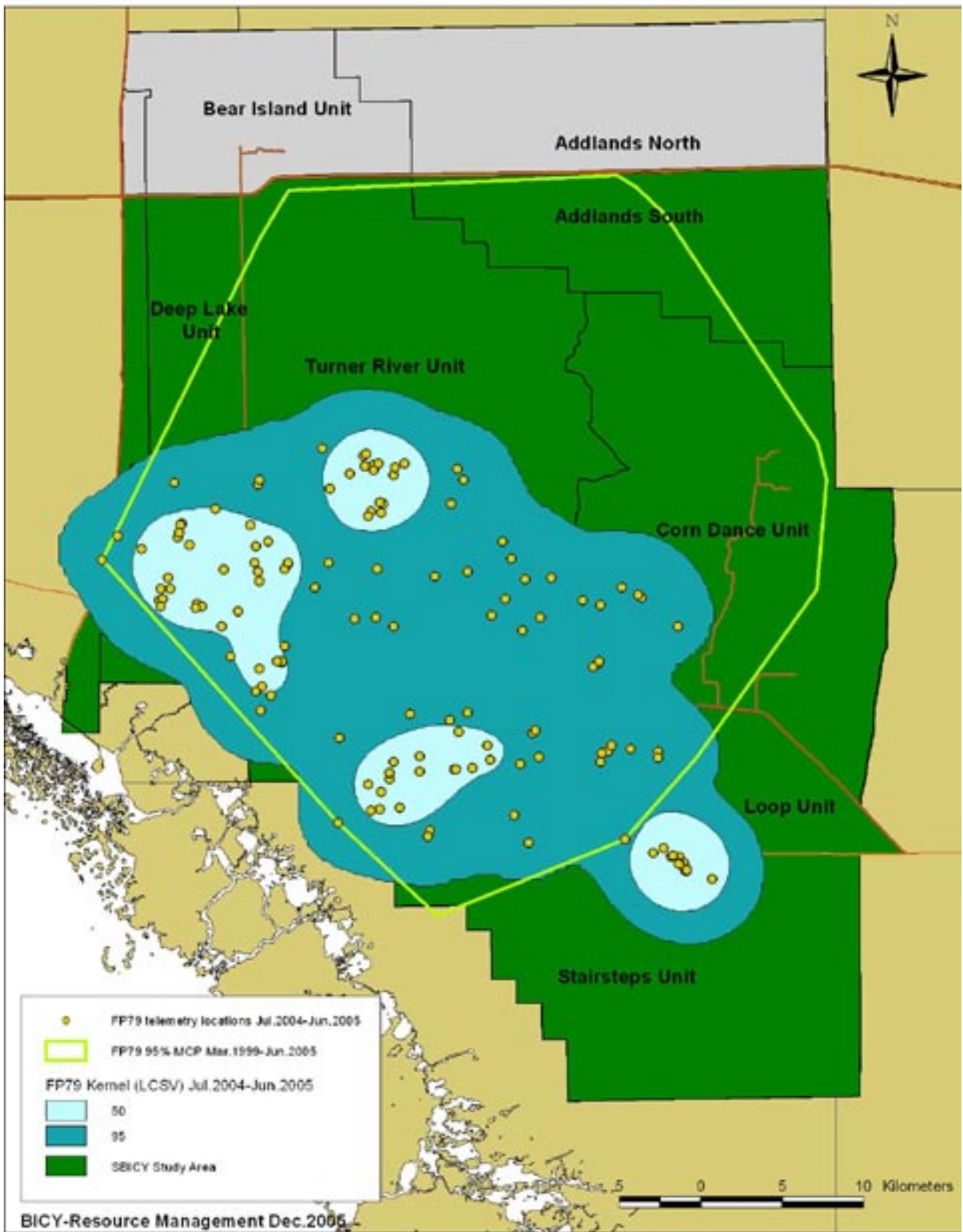


Figure 11. Home range of male Florida panther #79.

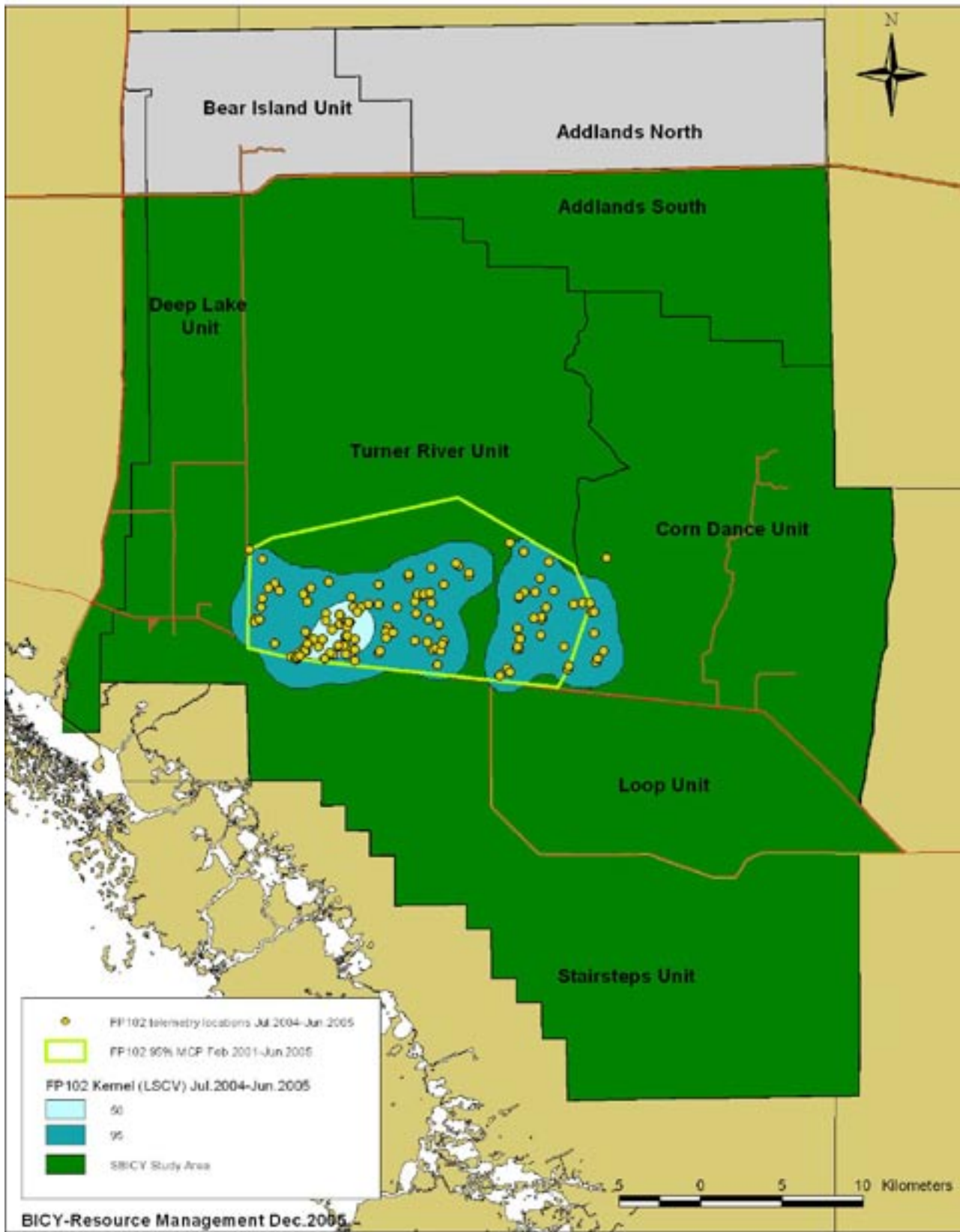


Figure 12. Home range of female Florida panther #102.



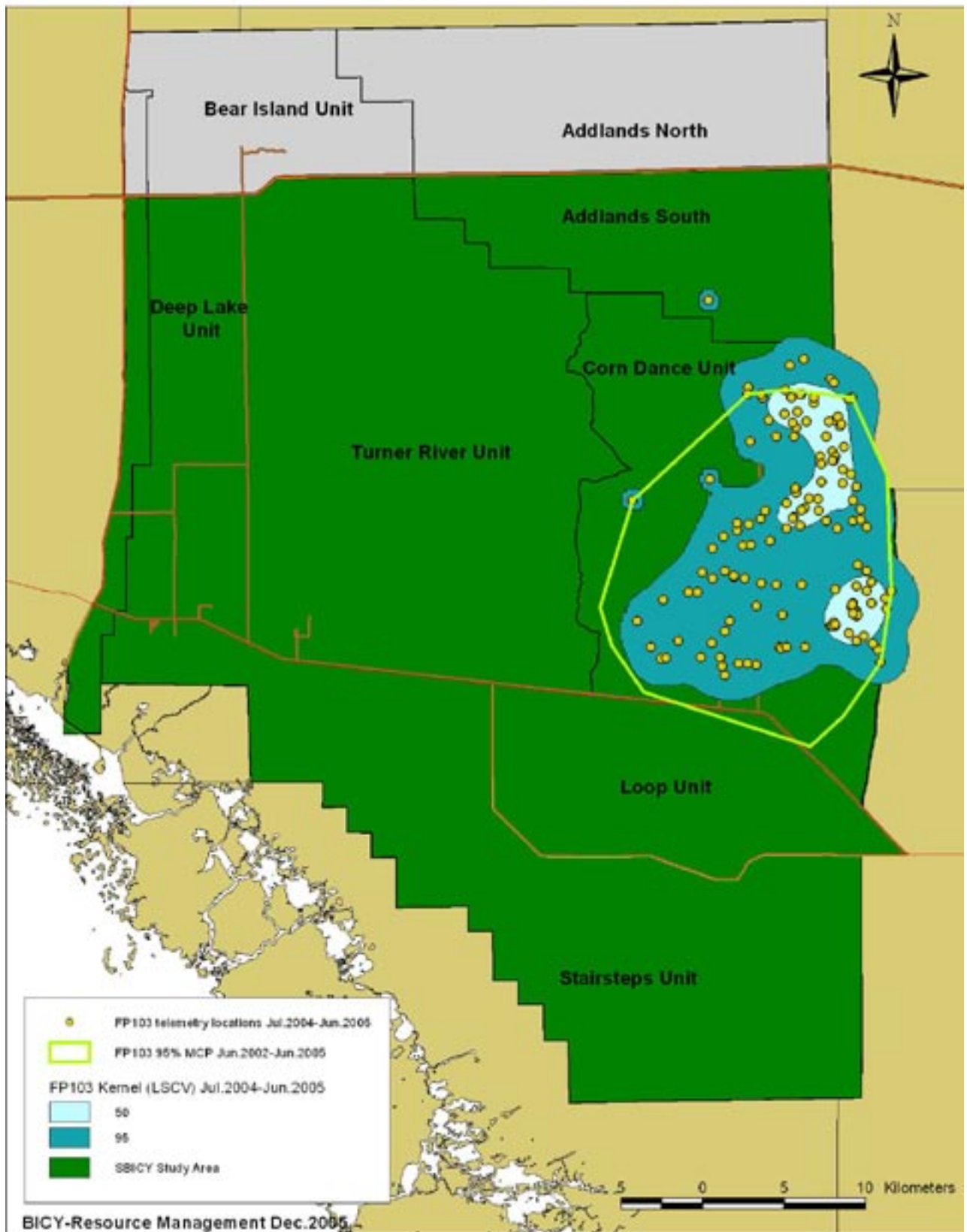


Figure 13. Home range of female Florida panther #103.

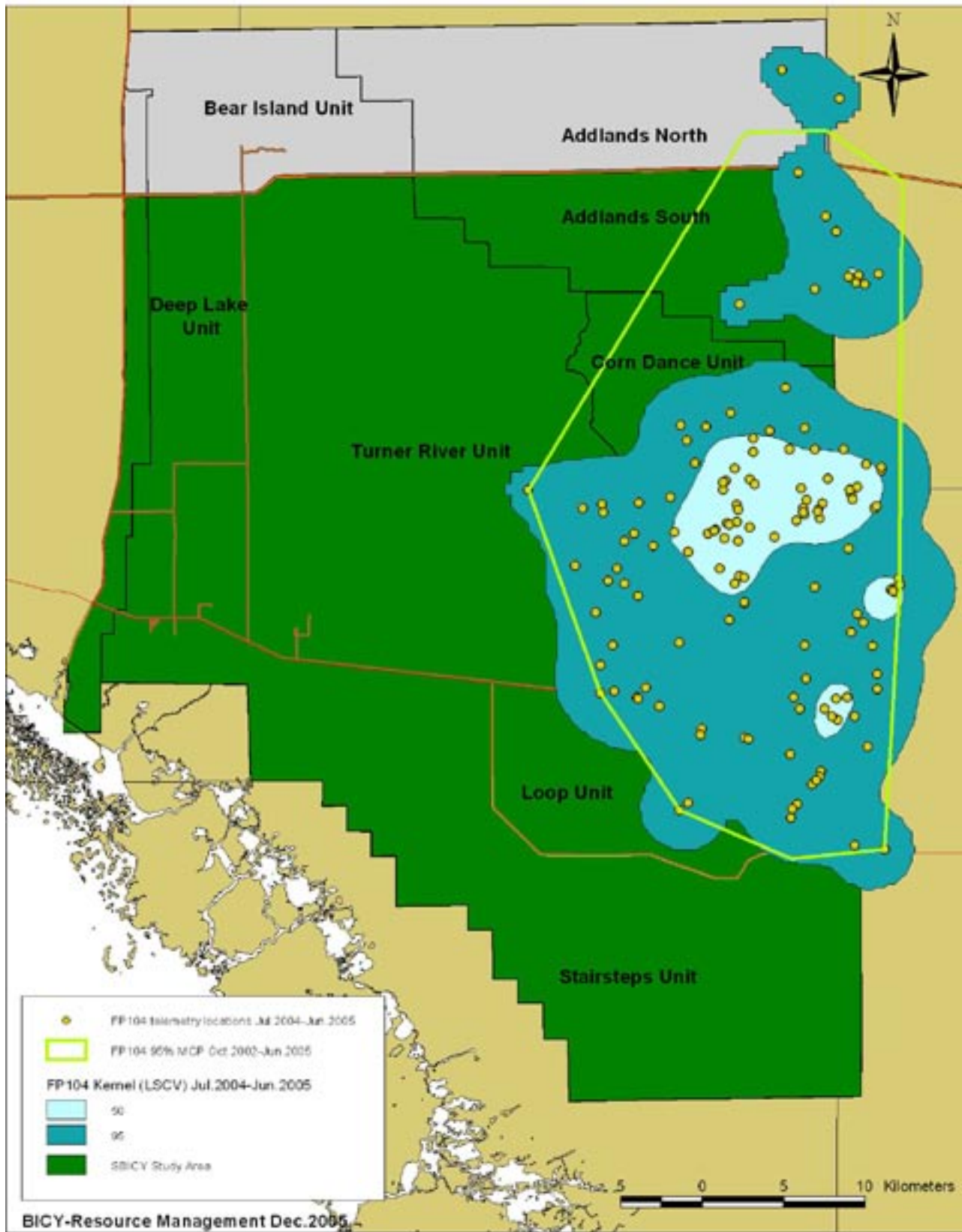


Figure 14. Home range of male Florida panther #104.

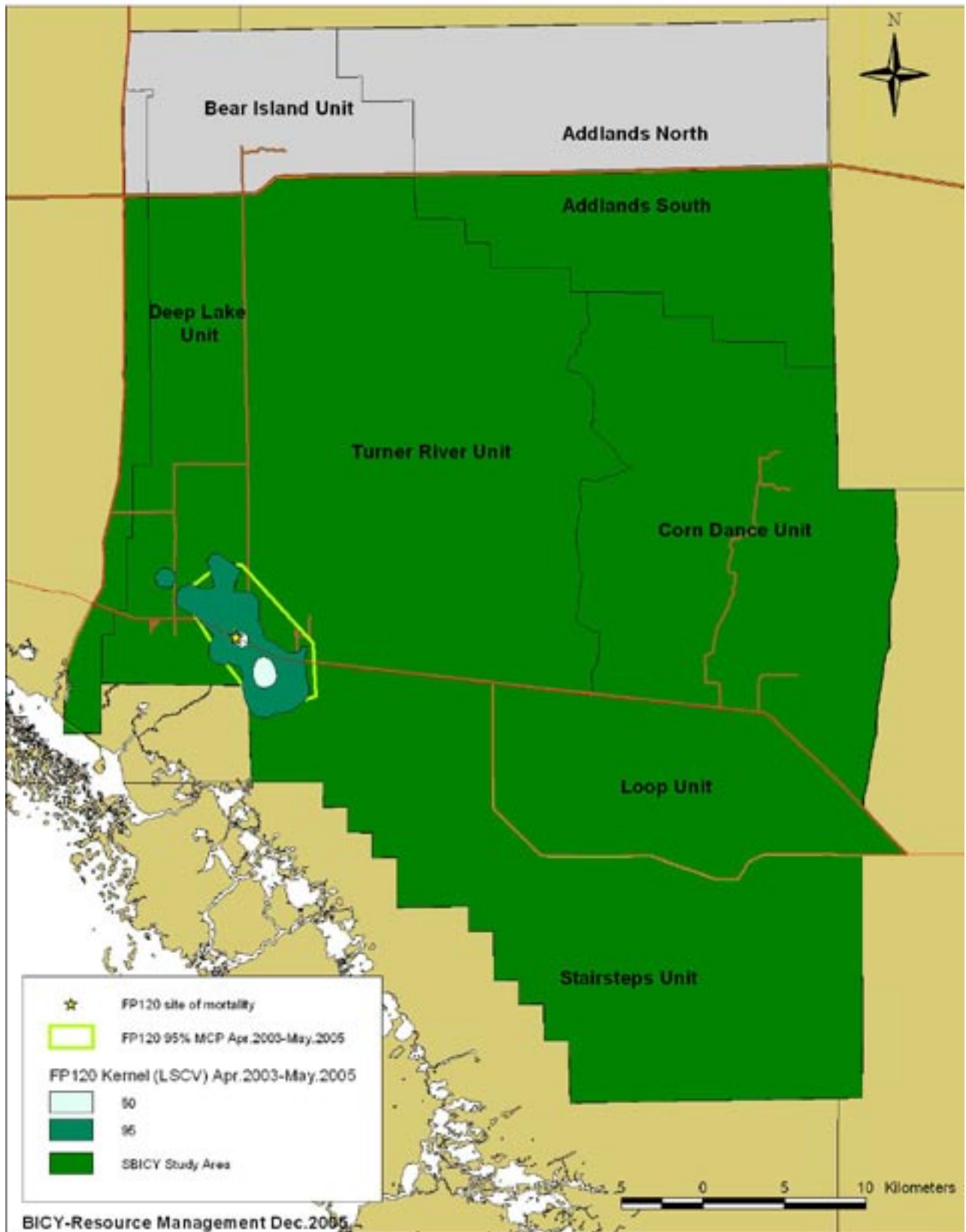


Figure 15. Lifetime home range of female Florida panther #120.

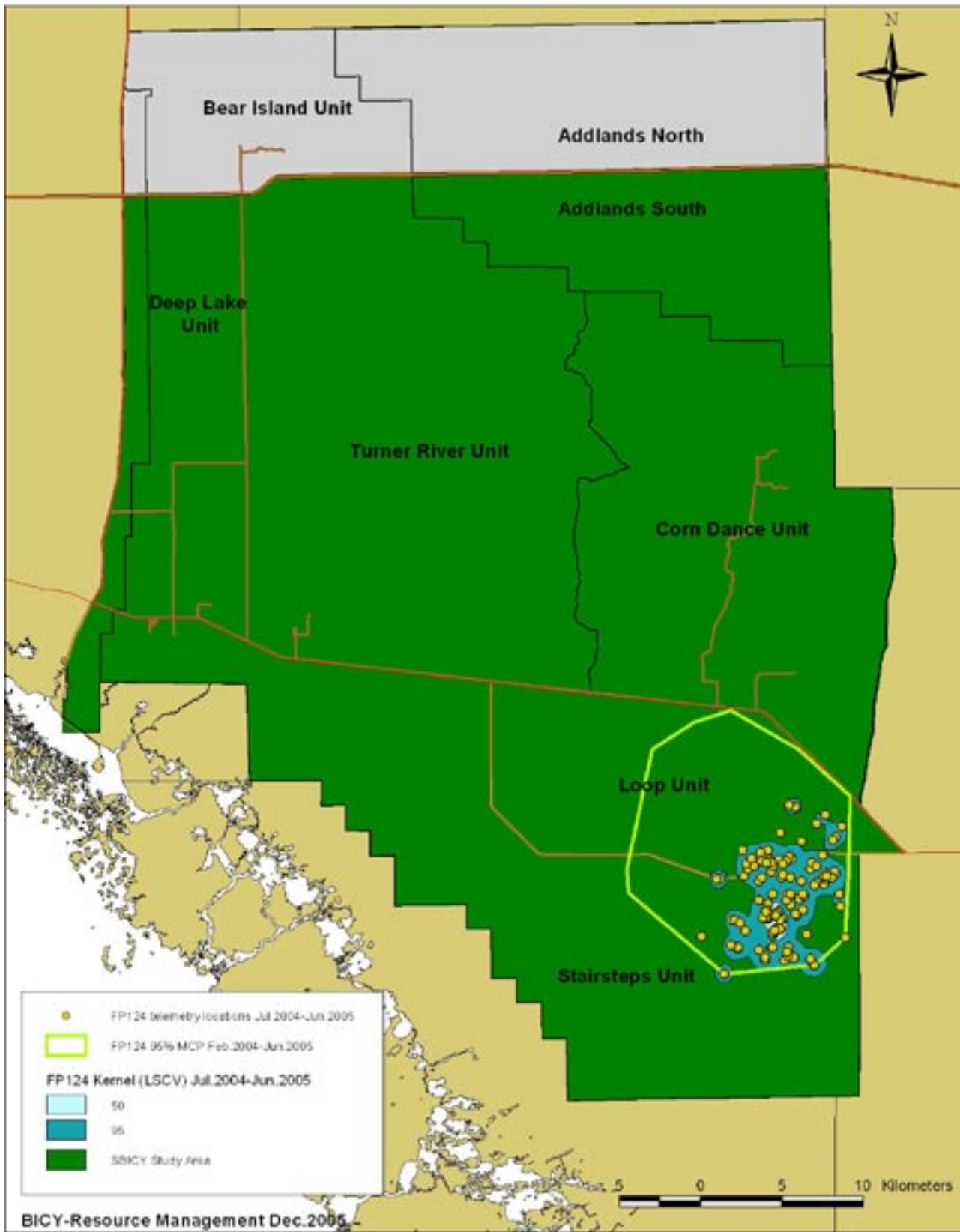


Figure 16. Home range of female Florida panther #124.

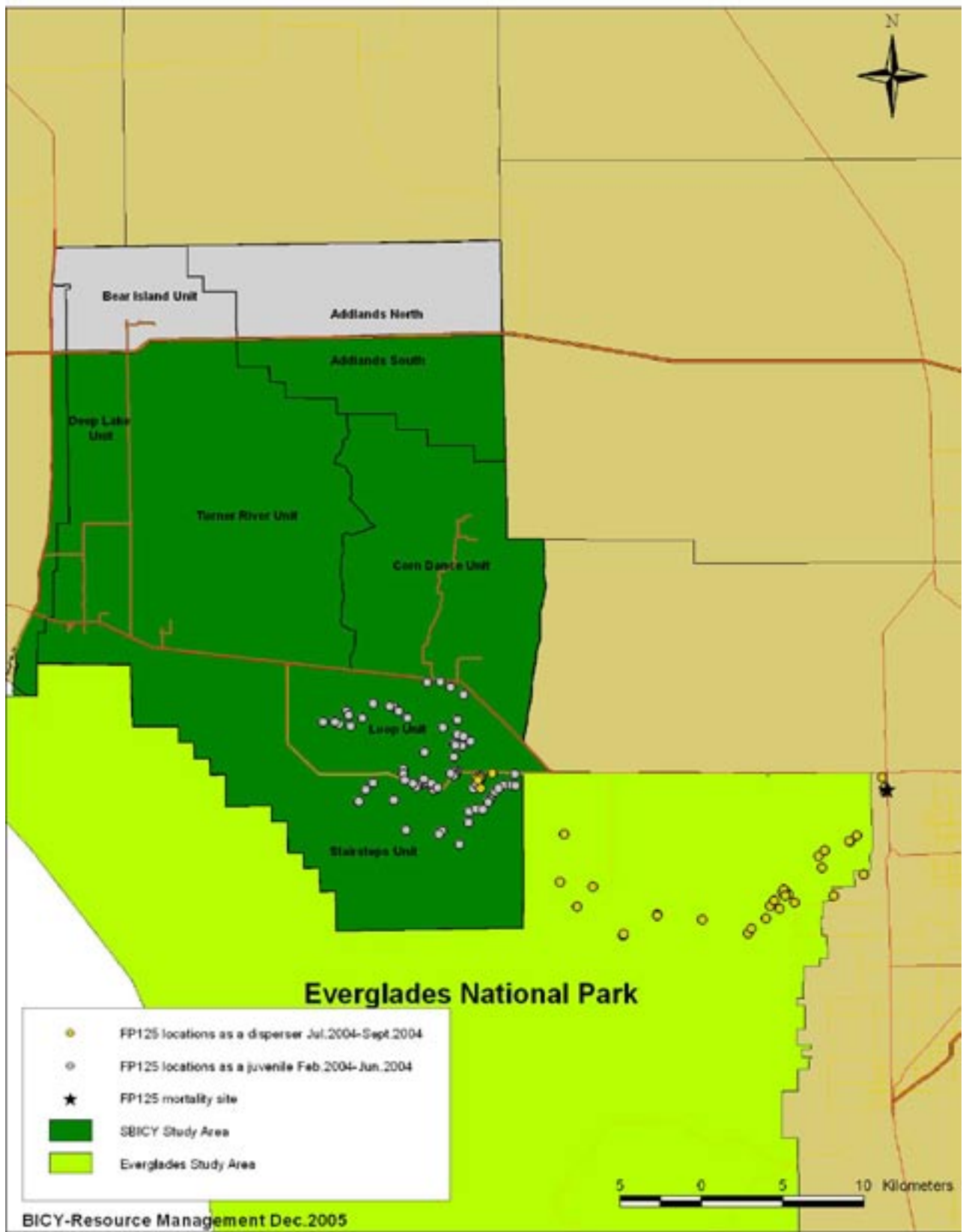


Figure 17. Area of use by male Florida panther #125 as a dependent kitten and as a disperser

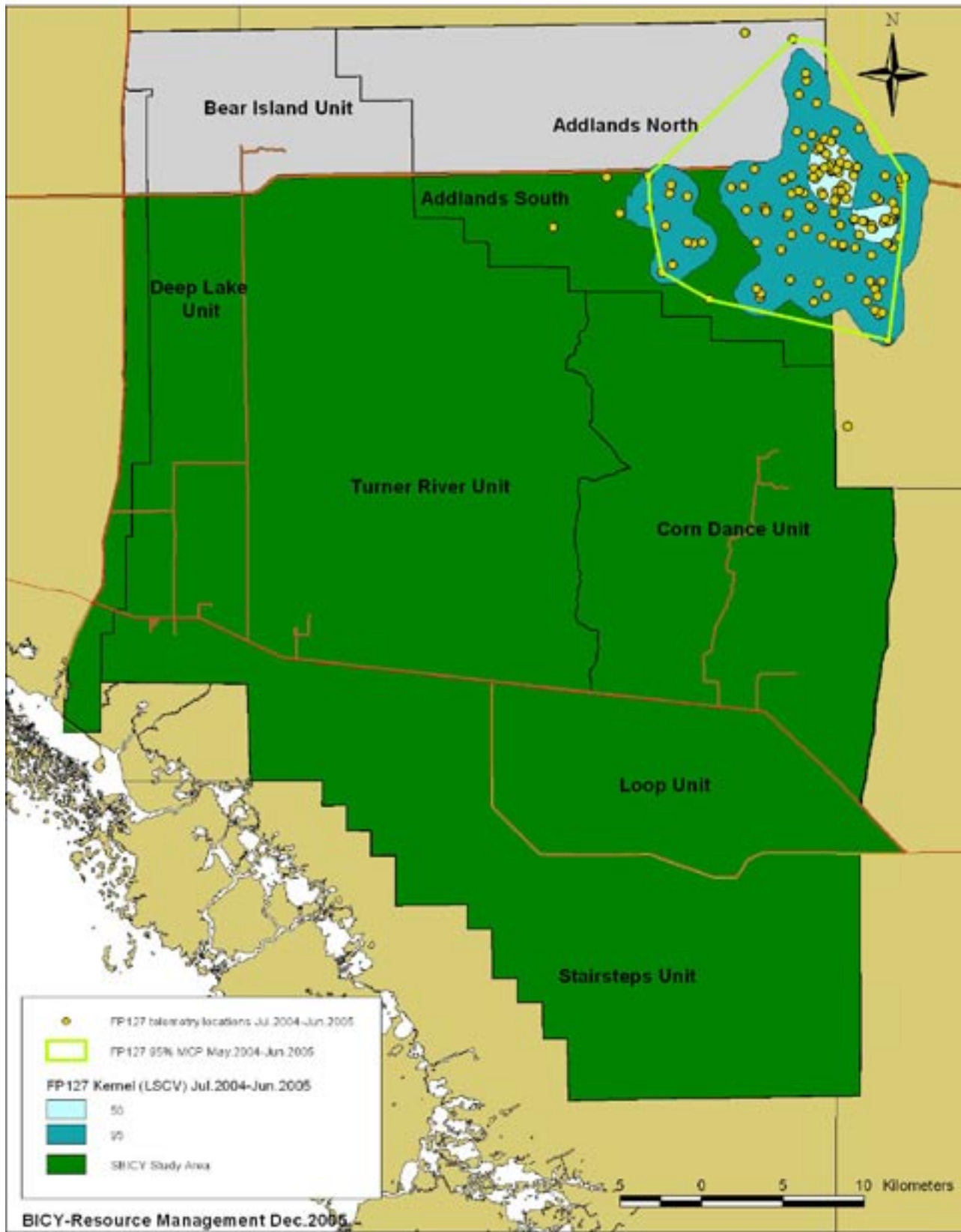


Figure 18. Home range of male Florida panther #127.

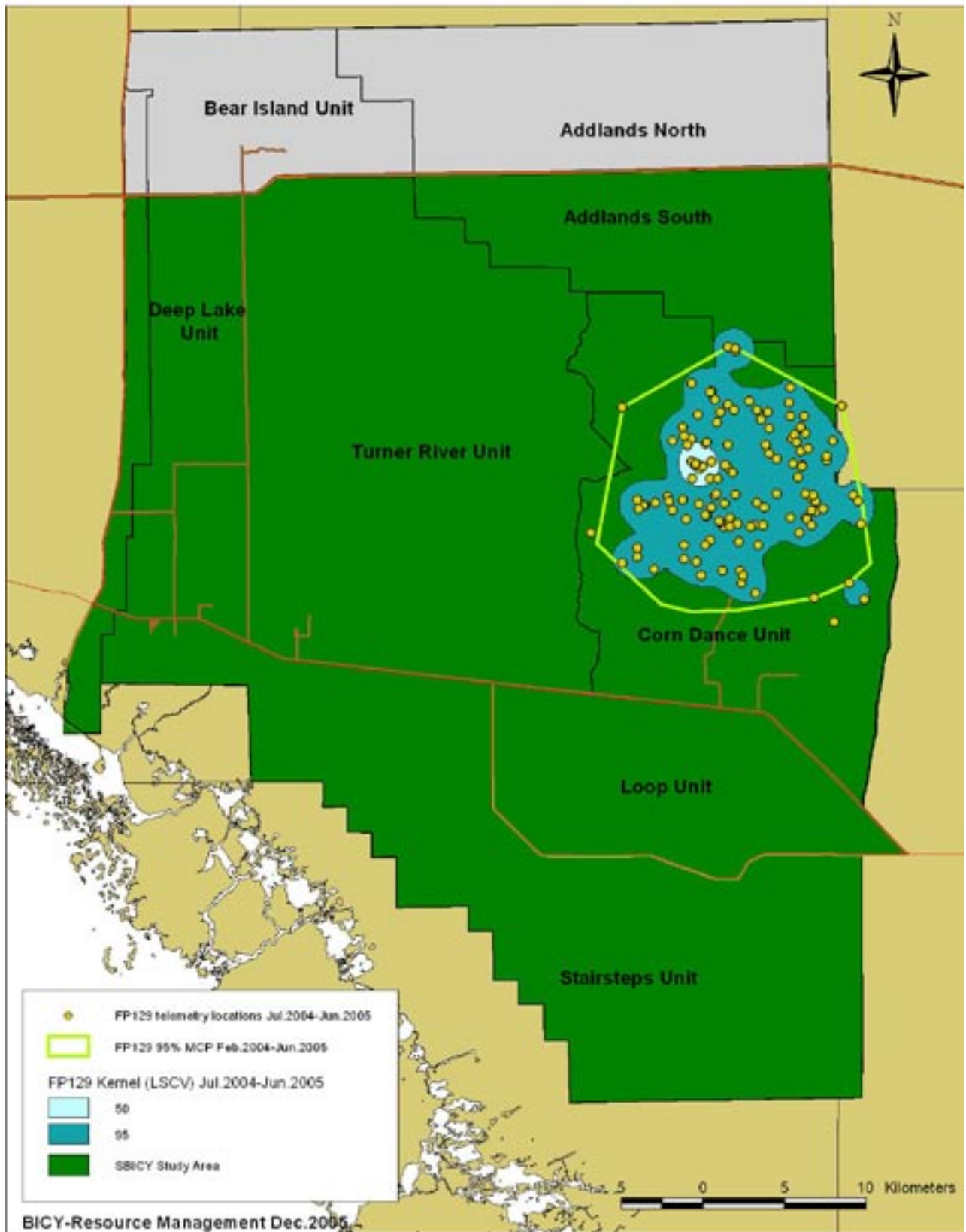


Figure 19. Home range of female Florida panther #129.

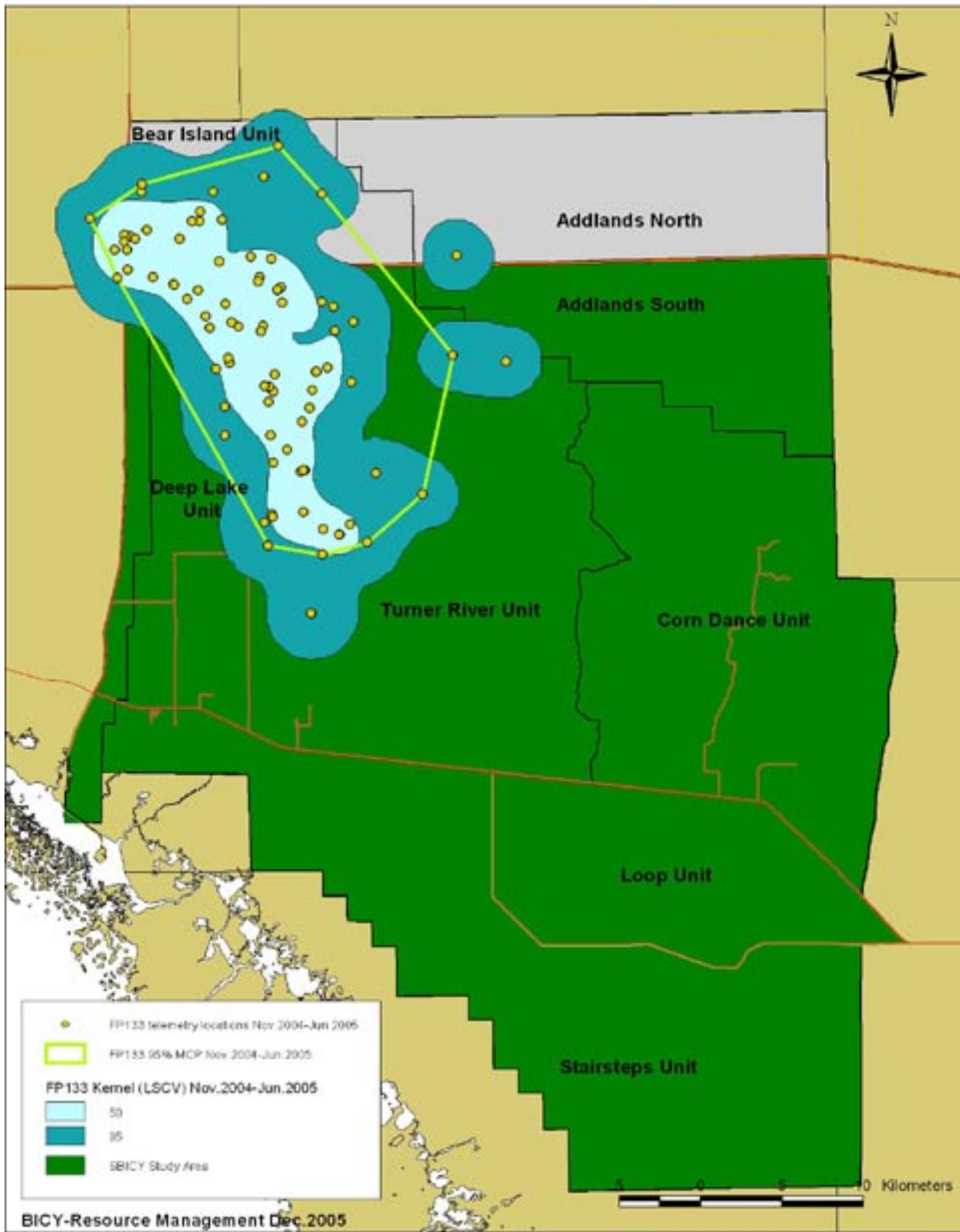


Figure 20. Home range of male Florida panther #133.



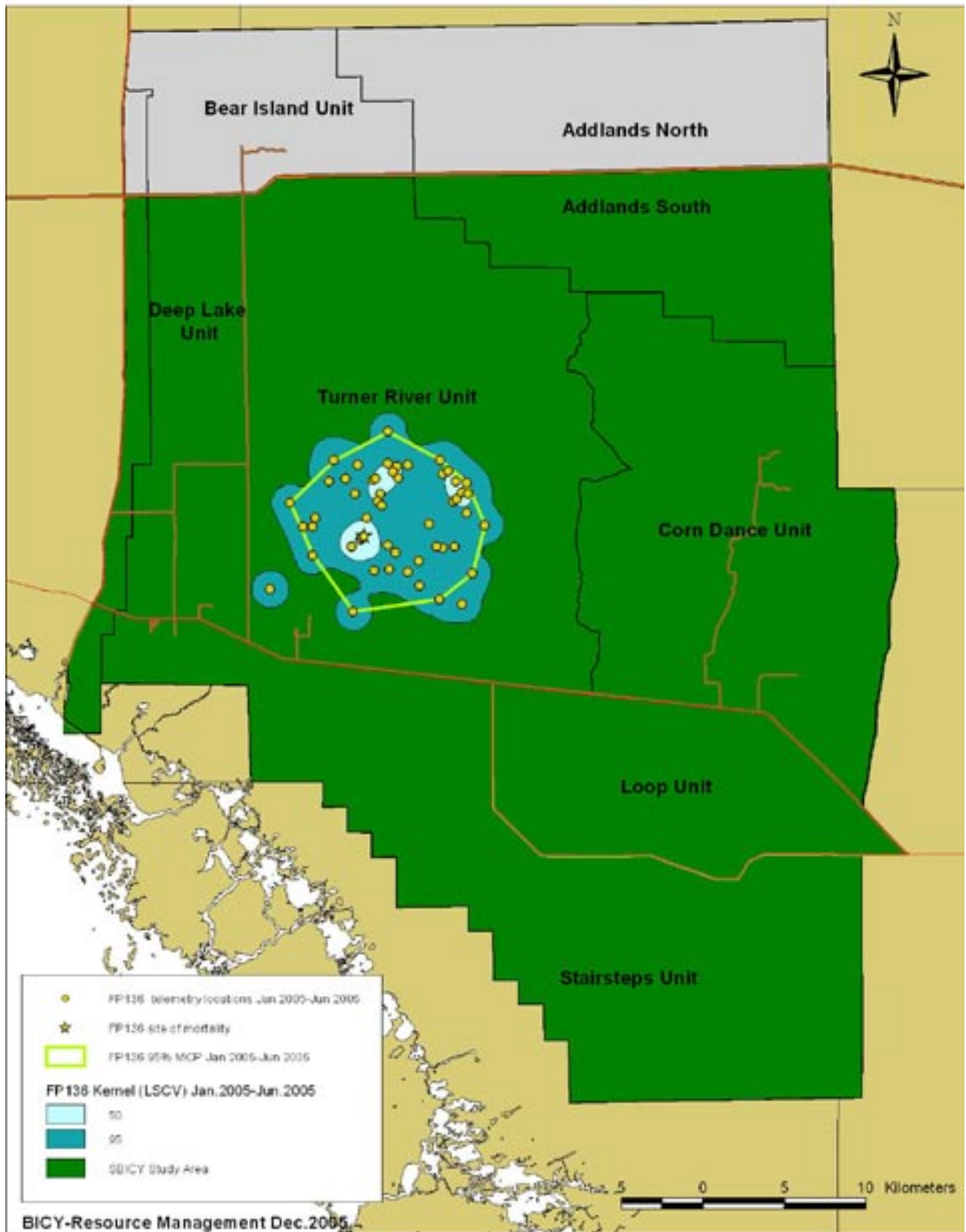


Figure 21. Home range of female Florida panther #136.

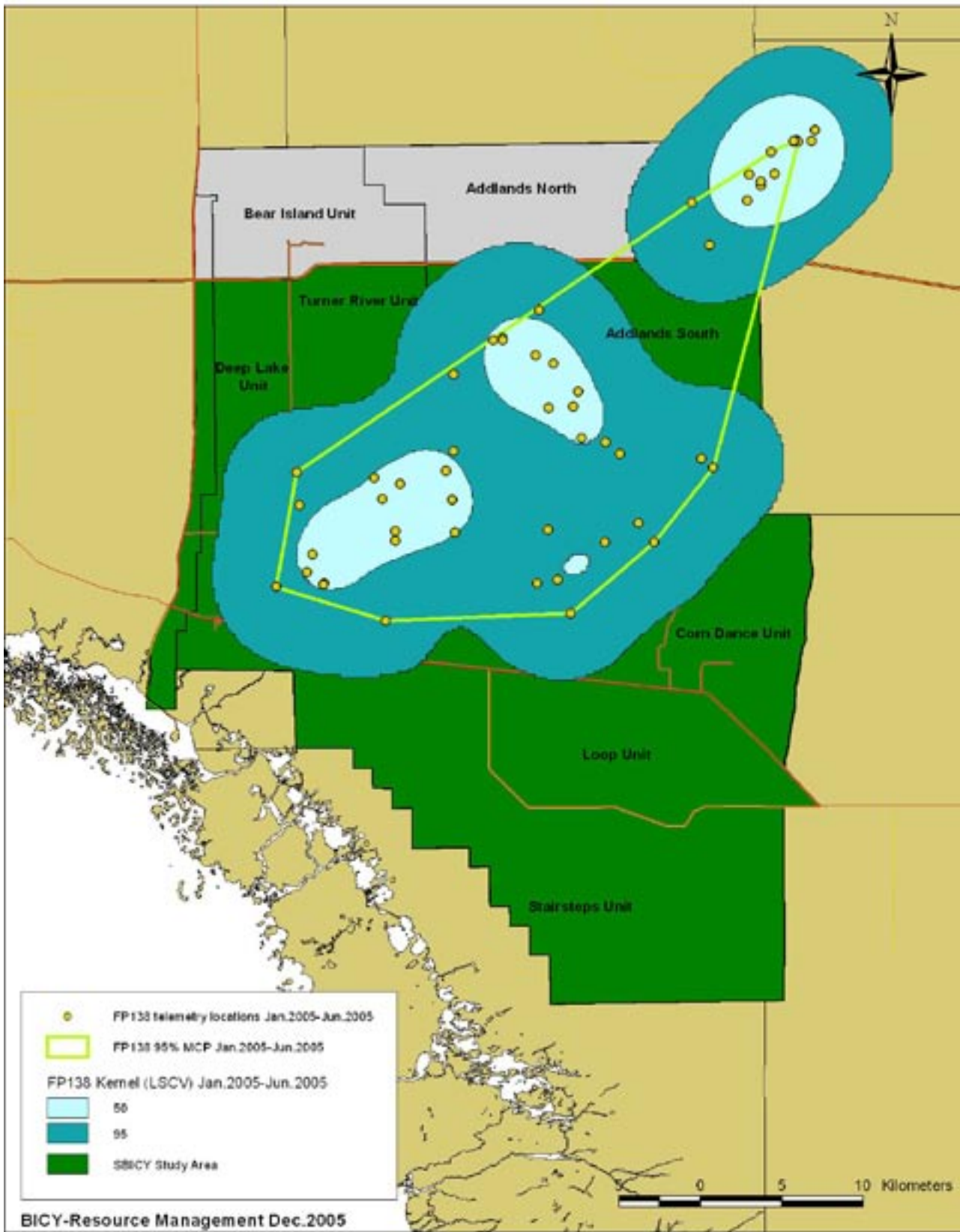


Figure 22. Home range of male Florida panther #138.

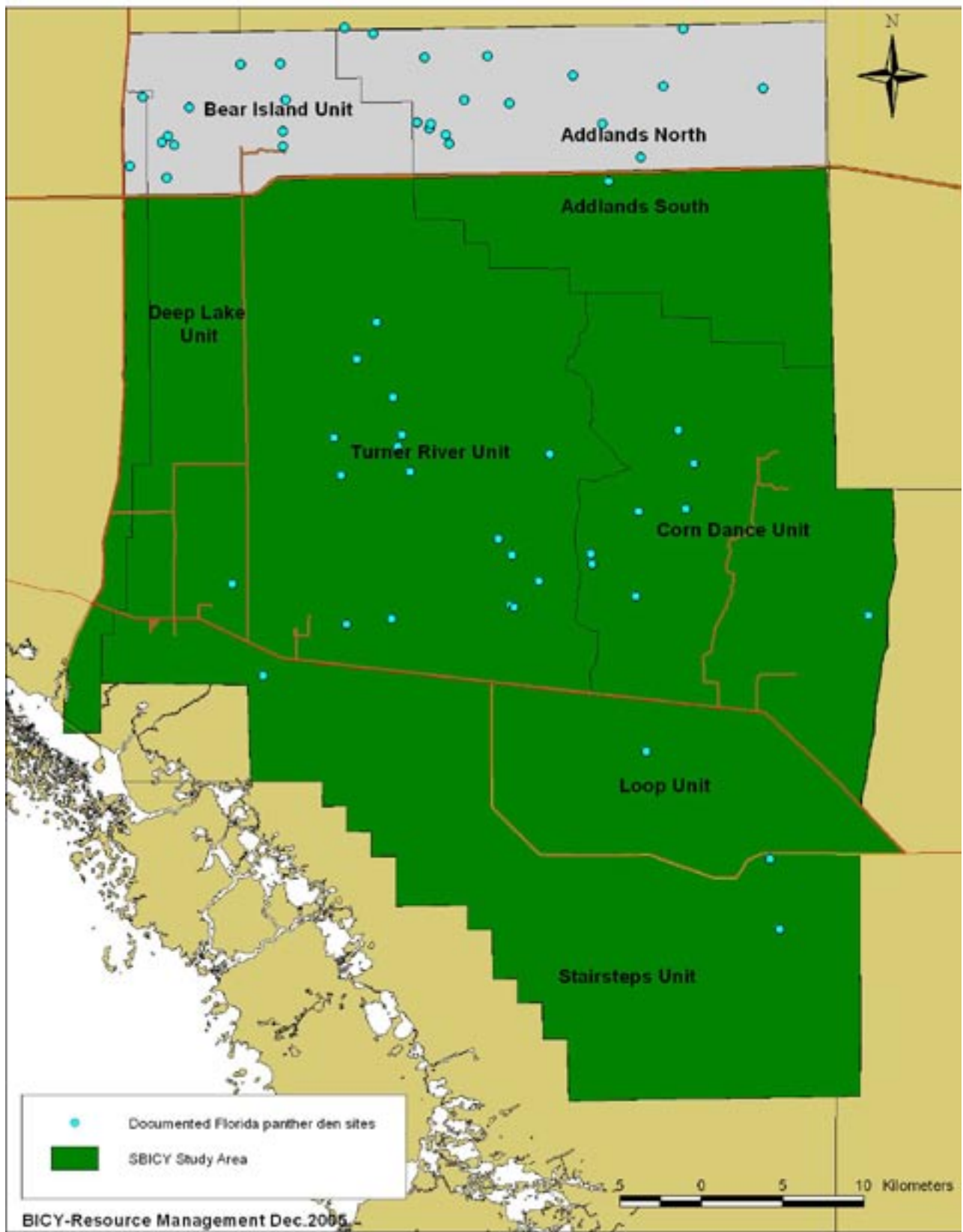
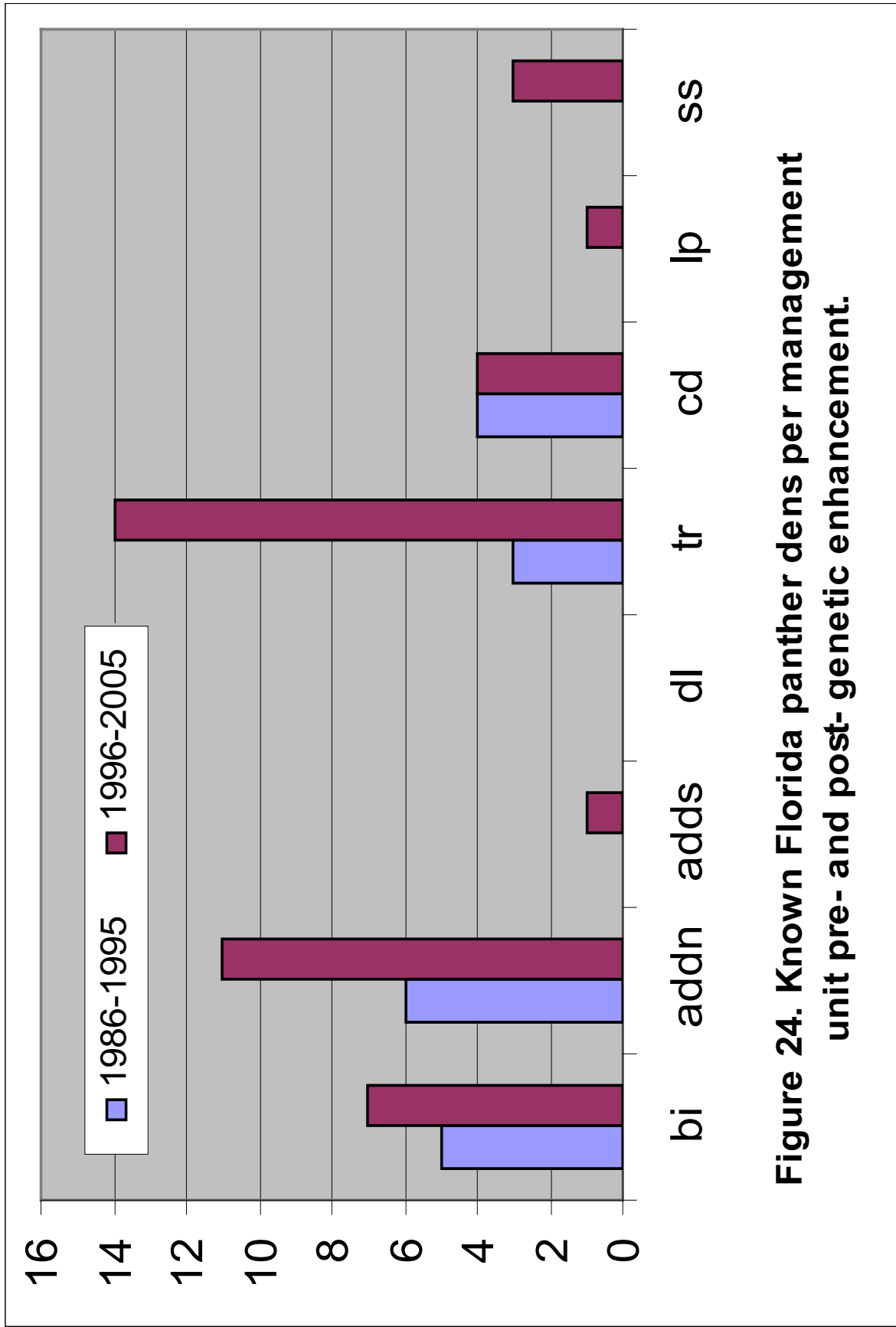


Figure 23. Distribution of known Florida panther den sites in Big Cypress National Preserve from May 1986-June 2005.



**Figure 24. Known Florida panther dens per management unit pre- and post-genetic enhancement.**

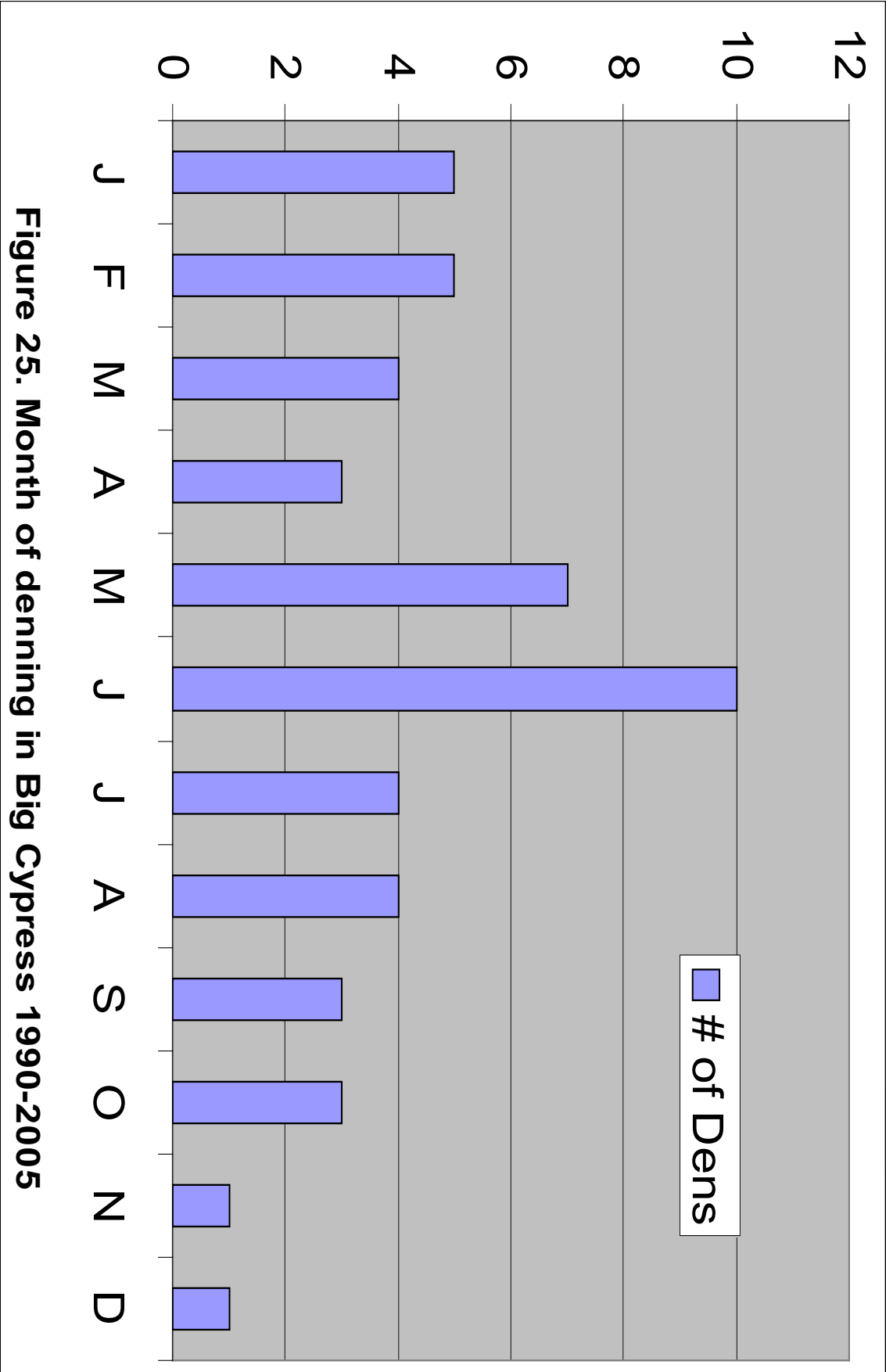


Figure 25. Month of denning in Big Cypress 1990-2005



Figure 26. Distribution of known Florida panther deaths in SBICY from July 2004-June 2005.