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Big Cypress National Preserve
Ochopee, FL

BIG CYPRESS NATIONAL PRESERVE

FLORIDA PANTHER (*Puma concolor coryi*) RESEARCH AND MONITORING 2005-2006 ANNUAL REPORT

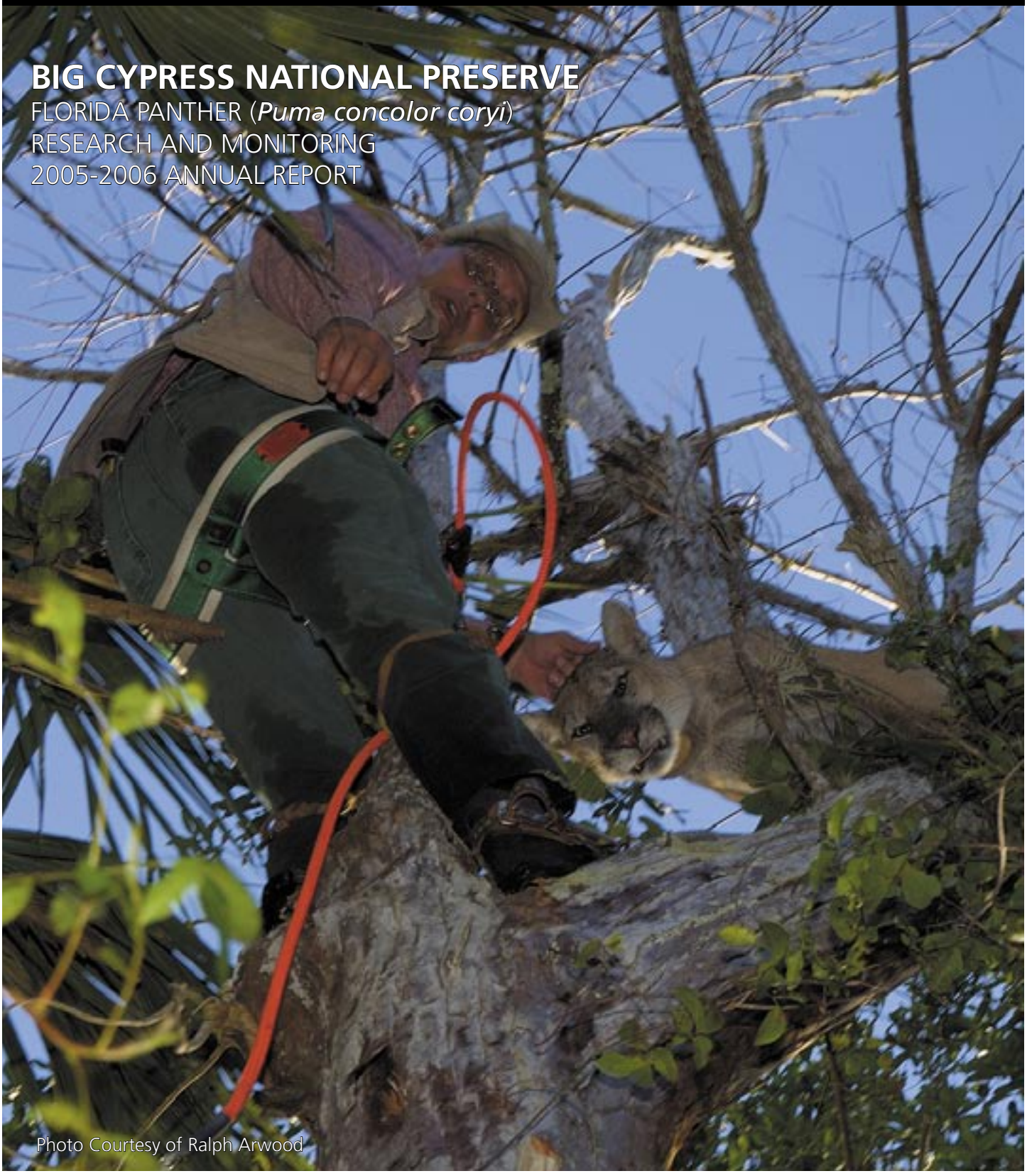

Photo Courtesy of Ralph Arwood

FLORIDA PANTHER (*Puma concolor coryi*) RESEARCH AND MONITORING IN BIG CYPRESS NATIONAL PRESERVE

2005-2006 ANNUAL REPORT

submitted to U. S. Fish and Wildlife Service
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and
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FP147 photographed by Ralph Arwood on March 3, 2006

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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 217,409-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, 2005 to June 30, 2006. During 33 hunting days, we captured and handled 5 adult panthers. Two were previously uncollared, 1 had its failed collar replaced, 1 was translocated within its home range, and 1 was removed in critical condition. We verified the presence of a minimum of 1 uncollared adult male and 6 uncollared adult females in the study area. We monitored 12 adult panthers during the year, 4 of which were lost from the sample: 1 female died from perforation of the carotid artery, 1 female was killed by a collision with a vehicle, 1 male died of unknown natural causes, and 1 male was removed from the wild due to persistent depredations on his part. Two other panthers previously handled in SBICY died on roads in south Florida. Three monitored females denned, producing 8 kittens, 2 males and 6 females, all of which we marked with transponders and from which we obtained biomedical samples. We determined that the average home range of the 5 resident females was 203 km^2 and that of the 5 resident males was 679 km^2. Initial funding was awarded for the construction of a wildlife underpass at Turner River on Highway 41, the 2 programmed underpasses along the northwest boundary of Big Cypress are under construction, and the expansion of fencing at existing underpasses on SR. 29 remains a recommendation.

Report Background

This is the fourth 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, 2005 and June 30, 2006 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.

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 and 2005 annual reports covered capture and monitoring work in SBICY between July 1 to June 30 of those years in keeping with the fiscal year reporting requirements of FWC (Jansen et al. 2004, Jansen et al. 2005).

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. This past year's submission of development proposals on private lands in the Primary Zone of panther occupancy (Kautz et al. 2006) accelerates the need to determine to what extent Big Cypress can support panthers (Goal 2 below), given the likelihood that the current public lands in south Florida will someday be the only remaining suitable habitat for panthers in south Florida. What we are learning now will facilitate appropriate management of what may become an even smaller isolated population of this endangered species.

Project Goals

As part of the renewal application for the U S Fish and Wildlife Service (FWS) permit to conduct panther capture work, we evaluated the goals of the 2002 proposal to FWS and developed new goals, based on current panther issues and research needs. Goals 1 through 5 below were identified in the 2002 proposal, whereas goals 6 through 8 are new 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. Continue to provide the samples necessary to assess of the impacts of the Genetic Restoration Project on the panthers in Big Cypress south of Interstate-75 to determine whether it will remain predominately *stanleyana* intercrosses.

Goal 5. Monitor the prevalence of feline leukemia through testing of all panthers handled.

Goal 6. Determine the nighttime movements and habitat use of panthers through GPS technology.

Goal 7. Identify crossing and mortality sites with which to recommend highway enhancements that resolve panther-vehicle collisions.

Goal 8. Provide timely response to panther-human interactions that occur within Big Cypress through monitoring of radio-collared panthers and, when warranted, through marking of panthers involved in these interactions.

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 Miami-Dade Counties. The enabling legislation of Big Cypress allows for 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 (C R 841), Wagonwheel (C R 837), Turner River (C R 839), and Loop (C R 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 (2001-2005) average for hunter pressure was 13,817 man-days, with a mean harvest of 187 deer (bucks only) and 33 hogs (FWC 2005 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 survey "blocks", based on roads and recognizable geographic features, to aid in quantifying our survey and capture efforts (Figure 3). The size of the blocks ranges 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 (Appendix A: 2006 Panther Capture Season Plans for Big Cypress National Preserve).

2006 Capture Season Plans

In the SBICY 2006 Capture Season Plan (Appendix A) presented at the 7 November 2005 Panther Capture Season Planning meeting in Naples, Florida, we identified 1 panther, FP70, whose collar needed replacement. We targeted females in the Deep Lake and Loop Units, and the Addition Lands south of I-75 for capture, based on the fact that we were not currently monitoring any females in those areas. We planned to work in the Addition Lands because the FWS 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. Based on the above needs, we prioritized blocks 1, 2, 3, 4, 9, and 10 for hunting effort.

We had 4 Generation III GPS collars (Telonics, Inc.), slated for placement on 2 adult males and 2 adult females and programmed to obtain 5 evening-to-morning locations to complement the existing 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. Although many of these observations were compelling, it was difficult in most cases 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 confirmed by individuals experienced in sign, such as tracks, scat or scrapes.

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 updated as new information becomes available. Biomedical procedures were similar to those outlined in Cunningham (2004) and 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 to confirm habitat use due to the complexity and intermingling of vegetative types in SBICY.

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, and in the office used a Geographic Information System with aerial photos geo-referenced in North American datum 83 to obtain accurate UTMs. 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, 2005 and June 30, 2006 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" home range, i.e., the monitoring period as an adult, for 4 panthers, FP70, 79, 104, and 129, that either died or were removed from the study area during the reporting year. We determined the area of use for FP147, including the time he was with his mother and his dispersal movements within SBICY. We generated home range maps using the ArcView 3.2 Spatial Analyst (Environmental Systems Research Institute, Inc.).

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 delineate 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 II in Florida Fish and Wildlife Conservation Commission (2006) lists all panther kittens handled at dens from 1992 to June 2006 and Appendix III lists all known dens of radio-collared female panthers from June 1985 to June 2006.

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), a 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 the evidence and obtain detailed information. We submitted the carcass to FWC. Some aspects of necropsy results are incorporated into this report. Appendix IV in Florida Fish and Wildlife Conservation Commission (2006) lists known panther injuries and mortalities from 1972 to June 2006.

Reporting

We used the reporting period of July 1, 2005 to June 30, 2006 to correspond 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.

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 during the reporting period, 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 into SBICY 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 between February 6 and March 17, 2006 in 8 of the 12 survey blocks. We captured and collared 3 panthers, i.e., FP93 in survey block 2 whose collar had failed in 2003 and 2 new animals, FP145 in block 1 and FP147 in block 8 (Table 1). We had no recollar tasks because FP70 was struck and killed on Hwy. 41 prior to the onset of our capture season. We caught FP79 in Ochopee after reports of depredation at a private campground. We moved him to an edge of his home range in Raccoon Point on February 9 and removed him from SBICY on February 16 after his depredation behavior persisted.

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 4 years.

Capture Season Summary:

33 total hunt days
2 newly collared panthers (FP145, FP147)
1 failed collar replacement (FP93)
2 treed but not collared (FP104, FP133)

Documentation of Uncollared Panthers

Based on the criteria explained in the Methods Section, we documented the presence of 4 uncollared female panthers between I-75 and Hwy. 41. We did not document any uncollared male panthers there, however, the large movements of the 3 collared males in that area made documentation of an uncollared male difficult. We verified the presence of 1 uncollared male and 1 uncollared female south of Hwy. 41 (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 and verified observations by others:

Block 1: Hunted 1 day. Caught FP145 on February 16.

Block 2: Hunted 15 days. Caught FP93 on February 11. Documented sign of an uncollared female using Baxter Island and Airplane Prairie.

Block 3: No hunting in this area.

Block 4: No hunting in this area, however, on August 3, 2005, an uncollared panther was observed during the routine panther tracking flight.

Block 5: Hunted 3 days. Documented sign of an uncollared female in this area.

Block 6: Hunted 4 days. On January 1, 2006, an uncollared female with 3 kittens was photographed by a visitor.

Block 7: Hunted 5 days. Documented sign of an uncollared female in this area.

Block 8: Hunted 2 days. Caught FP147 on March 3. Also treed a female kitten but did not collar it.

Block 9: Hunted 2 days. Documented sign of an uncollared male and uncollared female (or FP88 with a failed collar).

Block 10: No hunting in this area. There was, however, a compelling report of a collared panther observed on October 28, 2005, walking along Hwy. 41. If valid, this could only have been FP88.

Block 11: Hunted 1 day. Documented sign of an uncollared male and female, but could be same as the panthers verified in Block 9.

Block 12: No hunting in this area. Had several confirmed reports of FP124 with 2 juveniles along Loop Road (C R 94).

Synopsis on Monitored Panthers

We monitored 12 resident adult panthers between July 1, 2005 and June 30, 2006, 3 of which died and 1 which was removed from SBICY during that time (Table 2). Figure 6 shows the geographical distribution of this year's SBICY panthers in relation to the entire monitored population, and consists of 31% of the agency's monitoring efforts. Locations within Big Cypress boundaries represent 44% of the monitoring efforts, whereas 10% were obtained in EVER, and 46% occur outside the National Park units. Figures 7 and 8 show the home range overlaps among the 5 resident males and 7 resident females inhabiting SBICY. FP147 was not included because he was a disperser.

Following is a summary of each panther's background, home range, reproductive activity, and status as of June 30, 2006.

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. On January 14, 2006, she was struck and killed by a vehicle on Hwy. 41 at Turner River in Ochopee. FP70's home range during this reporting period, i.e., July 1, 2005 to January 12, 2006 was 151 km^2, and during her monitored lifetime was 361 km^2 (Figure 9).

FP79

This male was born in September of 1995 to an introduced Texas cougar, Tx101, on the Seminole Indian Reservation. 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 wiring in his collar had been severed, likely by bites from another animal.

Beginning in January, 2006, FP79 was involved in a series of depredations in 2 small communities, Ochopee and Copeland, which eventually resulted in his removal from the wild. More specifically, on January 27, FP79 attacked 2 domestic dogs at a residence on Turner River Road in SBICY. Between February 7 and 9, he killed chickens, a housecat, and a turkey at a private residence and a private campground. He was captured using hounds on February 9. No apparent injuries or abnormalities were found and he weighed only 2 kg less than a year

ago. FP79 was transported by ground to a remote area within his home range, 35 km from the capture site. It was hoped that this contact with humans would alter his depredation behaviors.

He, however, returned to the campground in 2 days. Agency staff monitored FP79 day and night and use modified aversive conditioning, i.e., sirens and air-horns when he was seen. He returned to the private residence and killed another chicken and a duck. The pens that housed the remaining fowl were surrounded with electric fencing, as a second aversive conditioning attempt on the part of the agencies. On February 13, he was observed touching the fence, jumping, and running off into the woods. Two days later, he was located in Copeland, a community in the Fakahatchee Strand Preserve State Park (FAKA) in which a hog had been killed the previous night.

Because of FP79's repeated depredations, the failure of aversive conditioning to deter him, and the array of free-roaming pets and domestic livestock in Copeland, this panther was permanently removed from the wild on February 17. The subsequent biomedical assessment of this 10.5-year-old male did not reveal an obvious cause of his behavioral change. He is currently at Busch Gardens in Tampa, Florida, where he is housed away from the public. He has adjusted well to captivity. FP79's home range this past reporting period, July 1, 2005 to February 14, 2006, was 702 km^2, and his lifetime home range was 1655 km^2 (Figure 10).

FP93

This female was born to Tx107 on February 22, 1999 in the Turner River Unit. She was first captured on April 10, 2000 at 14 months of age. She did not reunite with her mother post-capture, but was seen on May 1 with an uncollared panther, likely one of her 2 siblings.

When FP93's malfunctioning collar was replaced on February 28, 2002, her progesterone levels indicated she was pregnant. She gave birth to her first litter on April 6, 2002, consisting of 3 females and 1 male. She was observed from the monitoring plane with 3 kittens on October 11, 2002 and the tracks of 3 offspring, 2 females and 1 male, were observed with hers on March 31, 2003. Her male offspring, K115, was captured on April 2, 2003. The status of the 2 females is unknown. FP93 next denned on July 16, 2003. On August 5, 3 kittens, 2 males and 1 female, were marked. One of these males, K153, was killed on C R 951 in Naples on August 29, 2005. FP93's collar malfunctioned on August 30, 2003, and she was not caught again until February 11, 2006. She was in good condition and weighed 35 kg. She initiated denned in late June in the Turner River Unit and on July 1, 2006, we handled 3 female kittens at 18 days of age. Based on FP93's associations with radio-collared male panthers, it is likely that these kittens did not survive to 6 months. Her home range from February to June 2006 was 74 km^2 (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. She denned again 2 years later, in June 2006, and 2 male kittens were marked at the den. Her home range during this reporting period was 237 km^2 (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. FP103 is almost 7 years of age, has been documented with 2 male panthers, FP104 and FP127, but has not denned. It has been confirmed that FP104 was sterile, however, the status of FP127's semen has not been assessed. FP103's home range during the reporting period was 274 km^2 (Figure 13).

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 home range. During capture, he sustained mid-shaft fractures 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 FAKA, 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 this 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.

On February 23, FP104 was inadvertently treed but not handled. He appeared to be in good condition. He continued normal movements until the beginning of March, when he made only small movements within the same hammock for 4 flights. On March 9, the SBICY capture team found him in poor condition, i.e., dehydrated, lying on his side and unable to move his legs. He was removed from the wild for evaluation and died enroute. The necropsy indicated a bacterial pneumonia and septicemia, the cause of which was not found. Evaluation of his reproductive status confirmed that he was sterile. FP104's home range during this reporting period, i.e., July 1, 2005 to March 8, 2006 was 357 km^2, and during his lifetime as an adult was 856 km^2 (Figure 14).

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 on May 28, 2004 and died from intraspecific conflict on January 1, 2005. FP125 dispersed naturally in July 2004 and his collar was found on a road in Miami-Dade County 2 months later on September 27. 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. Subsequent sightings up to December 26, 2005 indicated that she successfully raised 2 of the 3 offspring to 11 months of age. She was seen with 1 juvenile during the April 19, 2006 routine monitoring flight. Her home range during the reporting period was 167 km^2 (Figure 15).

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. With the death of FP104, FP127 has shifted his home range to the south and, during the reporting period, it consisted of 544 km^2 (Figure 16).

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.

After detection of a mortality signal during the routine location flight on March 22, 2006, BICY biologists and law enforcement found FP129 dead. FP147, her radio-collared male offspring, was located about 100 meters away. Her other 2 offspring had not been radio-collared. FP129 had 3 small lacerations, but otherwise no sign of trauma or the presence of other adult panthers were found at the site. The necropsy concluded that she had died of massive hemorrhaging in her head that may have been caused by perforation to the left carotid artery. No venom was found in her system. During the reporting period, July 1, 2005 to March 22, 2006, she has occupied a 185-km^2 home range, with a lifetime home range of 221 km^2 (Figure 17).

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. His 433-km^2 home range during the reporting period encompasses the Bear Island, Deep Lake, and Turner River Units of Big Cypress, with 60.5% of the locations in SBICY (Figure 18).

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. His 1360 km2-home range during the reporting period encompassed the Turner River and Corn Dance Units south of I-75 and the Addlands, Seminole Indian Reservation, and private lands north of I-75, of which 69% have been in SBICY (Figure 19).

FP145

The female was captured on February 16, 2006 in the Deep Lake Unit. She was in good condition, weighed 29 kg, and was estimated at 1.5 to 2 years of age. She had not been handled as a kitten at a den, so her lineage was unknown. On June 23, 2006, 3 female kittens were marked at her den. This was the first panther den documented in the Deep Lake Unit. Her home range during the reporting period, February 17 to June 30, 2006, was 39 km^2 (Figure 20).

FP147

This male panther, K184, is the offspring of FP129. He was radio-collared at 11 months on March 3, 2006 in SBICY. He was in good condition and weighed 27 kg. After his mother died on March 22, FP147 dispersed west through Big Cypress, FAKA, Picayune Strand State Forest, and, as of December 31, 2006, is south of Naples, Florida. Figure 21 shows his dispersal movements through SBICY during the reporting period.

The average home range (95% MCP) of the 5 resident males was 679 km^2 and the average home range of the 5 resident females 203 km^2.

Reproduction

Seven adult females were monitored in SBICY, 2 of which, FP70 and FP129, died during the reporting period. Two other female panthers did not den during the reporting period. FP103 has not denned in her 5 years as an adult and FP124 was raising young. The remaining 3 monitored females denned in June 2006.

- FP145: On June 23, we handled 3 female kittens at 12 days of age in the Deep Lake Unit. This is likely FP145's first litter, given her estimated age of 2 years. It is not known, based on her movements, if any kittens are still with her.

- FP93: On July 1, 2006, we handled 3 female kittens at 18 days of age in the Turner River Unit. Based on her movements and interactions with male panthers, it is likely that these kittens did not survive.

- FP102: On July 12, 2006, we handled 2 male kittens at 18 days of age in the Turner River Unit. Based on her movements, it is probable that at least one of the kittens are still with her.

Mortality and Removals

We documented the death or removal of 4 radio-collared and 2 uncollared panthers in or from SBICY during the reporting period. Five occurred in SBICY (Figure 22).

- K153, the 2-year-old male offspring of FP93, was struck and killed on CR 951 in Naples on August 29, 2005. He had not been handled since marked as a kitten.

- K49, the 8-year-old female offspring of FP55, was struck and killed by a vehicle on December 1, 2005 on SR 29 on the western boundary of SBICY. She had not been handled since marked as a kitten.

- FP70, the 9-year-old offspring of TX107, was struck and killed on Hwy. 41 on January 14, 2006.

- FP79, the 10.5-year-old offspring of TX101, was removed from the wild on Feb. 17, 2006 due to continued depredation and unsuccessful aversive conditioning attempts.

- FP104, the 5.5-year-old male offspring of probably FP70, died during removal for evaluation of his poor condition on March 9, 2006. Necropsy indicated a bacterial pneumonia and septicemia, the cause of which was not determined.

- FP129, the 5-year-old female born to FP87 in January of 2001, died of massive hemorrhaging in the brain from perforation of the left carotid artery on March 21, 2006. It is not certain if this was caused by intraspecific conflict.

Recommendations

In last year's annual report, we recommended the initiation of interagency discussions on the construction of a wildlife underpass on Hwy. 41 near Turner River. The agencies collaborated with the Defenders of Wildlife in the preparation of a grant proposal to the Florida Department of Transportation (FDOT) to build a wildlife underpass and associated fencing in this location. In October 2006, FDOT committed $425,000 during fiscal year 2009 to initiate the engineering, public involvement, and environmental study phases of the project.

Another 2005 recommendation was to 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 implemented on an experimental basis as a cost-cutting measure and 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. On December 1, 2005, K49, the 8-year-old female offspring of FP55, was struck and killed by a vehicle while she was between the fenced portion of SR 29 on the western boundary of SBICY.

We also recommend continuation of the level of capture effort in the Big Cypress study area in order to achieve an adequate sample of monitored panthers with which to meet the project objectives.

We will continue to strive for a sample of 20 radio-collared panthers in SBICY distributed through the sampling blocks.

Acknowledgments

We thank houndsman Rocky McBride for providing his many years of feline hunting expertise to the project. We thank Emmett Blankenship whose veterinary skills enabled the safe capture and biomedical assessment of each panther. A special thank you to Ralph Arwood who volunteered many hours of his time and documented our work through photos and video, and to Dennis Giardina who provided impressive tree climbing skills. I'll never forget him scurrying up the oak tree in Copeland to safely lower Don Juan for the last time.

Once again, the success of our work is due to Big Cypress staff support of the wildlife program. This project was funded by the National Park Service at Big Cypress and by special funding from the NPS Southeast Regional Office.

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Table 1. Florida panthers captured and radio-collared in SBICY in 2006.

FP#	K#	Capture Date	Gender	Age	Type	Capture Location	
						Easting	Northing
93	K58	Feb. 11, 2006	F	7 yrs	resident	480334	2877797
145	-	Feb. 16, 2006	F	~2 yrs	resident	473293	2886582
147	K184	March 3, 2006	M	11 months	juvenile	506224	2867436

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

FP#	As of July 1, 2004	Status	As of July 1, 2005	Status	As of July 1, 2006	Status	Comments
55	yes	resident	no	dead	no	dead	died July 9, 2004
60	no	captivity	no	captivity	no	captivity	removed June 29, 2004
70	yes	resident	yes	resident	-	dead	died on Jan. 14, 2006
79	yes	resident	yes	resident	no	captivity	removed Feb. 17, 2006
86	no	dead	no	dead	no	dead	died Nov. 6, 2003
88	?	?	?	?	?	?	collar failed Oct. 23, 2002
91	no	dead	no	dead	no	dead	died Dec. 3, 2003
93	yes	resident	yes	resident	yes	resident	collar failed Aug. 30, 2003; recollared Feb. 11, 2006; alive Dec. 31, 2006
102	yes	resident	yes	resident	yes	resident	alive Dec. 31, 2006
103	yes	resident	yes	resident	yes	resident	alive Dec. 31, 2006
104	yes	resident	yes	resident	no	dead	died March 9, 2006
119	no	emigrant	no	disperser	no	disperser	now a resident north of I-75; alive Dec. 31, 2006
120	yes	resident	no	dead	no	dead	injured July 11, 2004; released May 4, 2005 and died May 7, 2005
124	yes	resident	yes	resident	yes	resident	alive Dec. 31, 2006
125	yes	disperser	no	dead?	no	dead?	only collar found Sept. 27, 2004
126	yes	relocated	no	dead	no	dead	killed by another panther Jan. 1, 2005
127	yes	disperser	yes	resident	yes	resident	alive Dec. 31, 2006
129	yes	resident	yes	resident	no	dead	died March 21, 2006
133	-	-	yes	immigrant	yes	resident	alive Dec. 31, 2006
136	-	-	yes	dead	no	dead	collared Jan. 13, 2005; died June 14, 2005
138	-	-	yes	resident	yes	resident	alive Dec. 31, 2006
145					yes	resident	alive Dec. 31, 2006
147					no	disperser	alive Dec. 31, 2006
# of residents		**9**		**10**		**8**	

Appendix A:

2006 Panther Capture Season Plan for Big Cypress National Preserve

Prepared by Deborah Jansen, Wildlife Biologist, NPS
7 November 2005

Goals

To achieve and maintain a sample of 20 radio-collared panthers distributed throughout the 295,142-ha study area of Big Cypress south of I-75 with which to determine the status of the panther population and their behavioral and demographic responses to existing or proposed management actions. Currently, 11 panthers, 6 females and 5 males, (see attached draft figures), are being monitored in SBICY.

Survey and capture efforts

The southern Big Cypress study area has been divided into 12 survey blocks (Figure 1). Capture efforts over the past 3 years have targeted blocks 2, 6, 9, and 11 (Figure 2). This year we will target blocks 1, 2, 3, 4, 9, and 10 where no resident females are being monitored.

Individuals/areas targeted for capture

One panther, **#70**, is due for recollaring. She will be handled when monitoring indicates that she is in an area favorable for an efficient and safe capture. Other targeted panthers include:

1) **a female in the Deep Lake Unit** where female home range, habitat use, movements, and denning success have never been documented.

2) **one to two females in the Addition lands south of I-75** where information on female home range, habitat use, movements, and denning success has been documented through monitoring only 1 female. Panther #71 was monitored for 30 months between March 1998 and July 2000 when her collar failed prematurely. One den was documented as well as her use of this area when raising her offspring. Panthers will be targeted in this area in order to obtain a sample of panther activity to aid in the development of the Addition Lands General Management Plan, to address the recommendations from the FWS Biological Opinion on the I-75 Access Points EA, and to obtain baseline information on panthers prior to opening the area to recreational activities.

3) **one to two females in the Loop Unit** or western Stairsteps Unit where no female panthers have been monitored for the past 3 years and information on habitat suitability and denning success consists of only one denning occurrence by female panther #88 and no subsequent monitoring of offspring. Panther #88 was monitored from March 2002 to October 2002, when her collar failed prematurely. A recent observation indicates that she is still alive so we will attempt to replace her failed collar and/or collar a new female in this area.

Biomedical protocol

All panthers handled will be given a field test for feline leukemia virus and, if positive, will be removed from the field for further evaluation as recommended by Dr. Mark Cunningham, DVM, in *Feline leukemia virus in Florida panthers: management recommendation*. If field test results are negative, they will be vaccinated against feline leukemia virus and, if possible, given a booster within 4 weeks.

Radio-collar specifications

The GPS radio-collars available for deployment in SBICY will be 2 Telonics Generation III 3500 store-on-board radio-collars and 2 Telonics Generation III 3400 store-on-board radio-collars. The 3500 collars will be placed on adult males, whereas the 3400 collars, that have a different canister configuration and weigh almost half that of a 3500, will be placed on adult females. These are programmed to obtain 5 "fixes" daily, from dusk through early morning, in keeping with the programming of 3 other GPS collars that have been deployed in SBICY. The goal is to obtain information on nighttime panther activity to complement the daytime locations that are obtained through VHF monitoring in SBICY. Also available for deployment are Telonics MK9 collars that are duty-cycled to save battery life.

Timeframe

The timeframe for capture work has not been finalized and will depend on when environmental conditions are favorable for tracking, travel by ORV, and safe handling of panthers. Any malfunctioning collars will be replaced as soon as possible and targeted capture opportunities taken if a safe capture is possible. The Big Cypress capture team will work for approximately 8 weeks, probably from mid-January through mid-March, although a request has been made to establish an agreement with FWC to meet our goals at other times through the use of Rancher's Supply and a local veterinarian.

Team members

The team will consist of Deborah Jansen, project leader, a houndsman from Rancher's Supply, Emmett Blankenship, veterinarian, Steve Schulze and/or Ian Lundgren, tree climber, and Annette Johnson, field assistant, with additional support from other NPS personnel as needed.

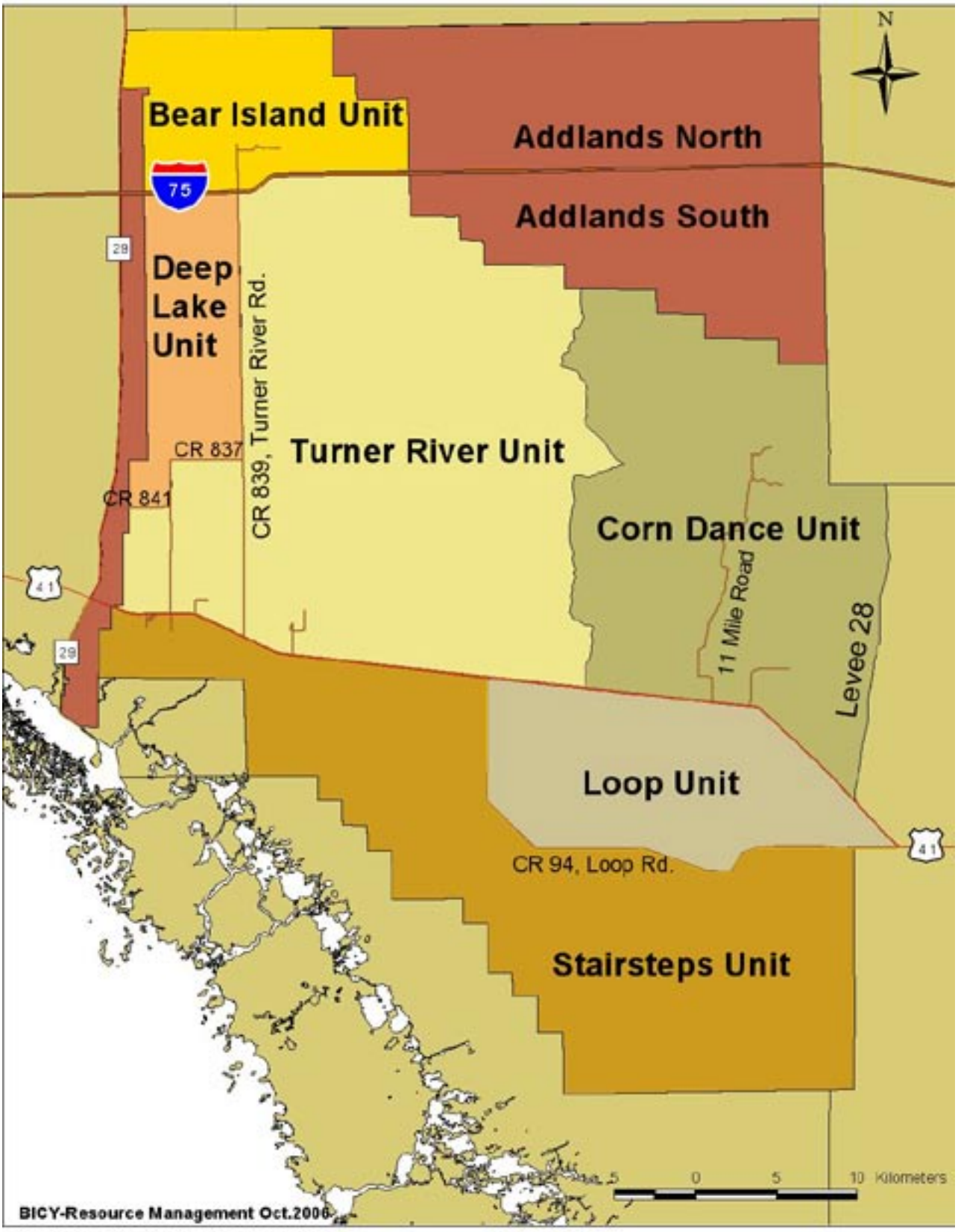


Figure 1. Management units and roads in Big Cypress National Preserve.

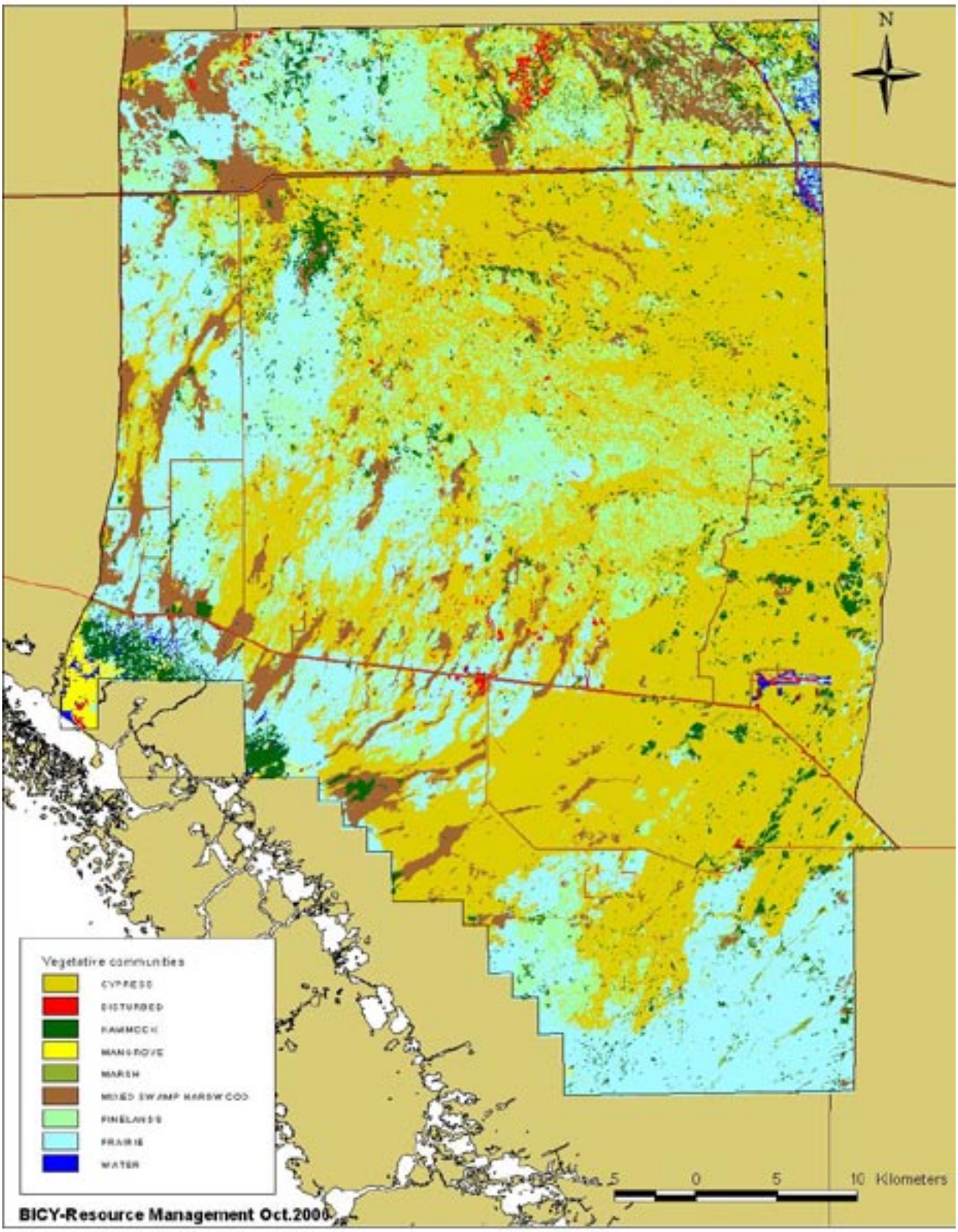


Figure 2. Vegetative communities in Big Cypress National Preserve.

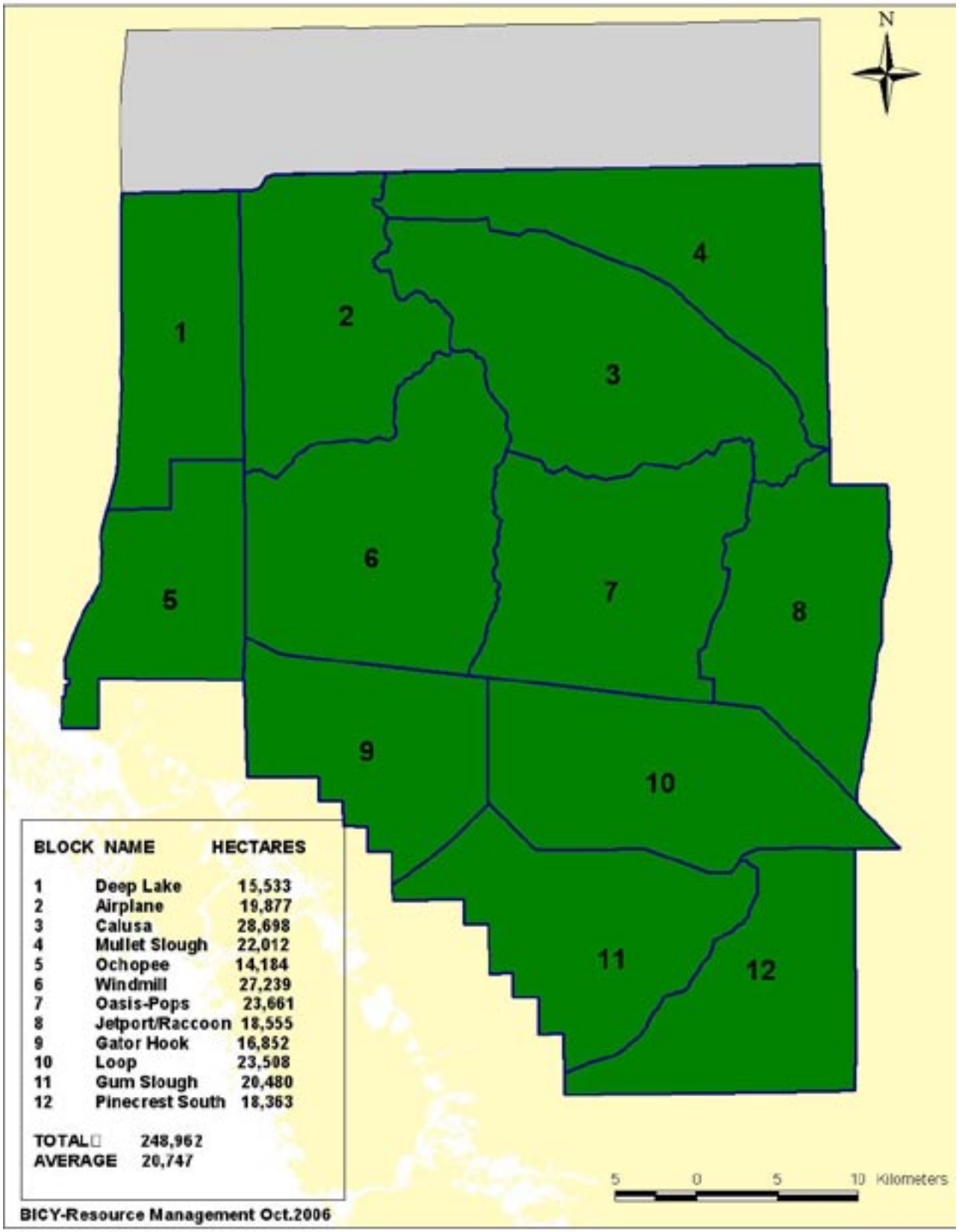


Figure 3. Panther survey blocks in SBICY.

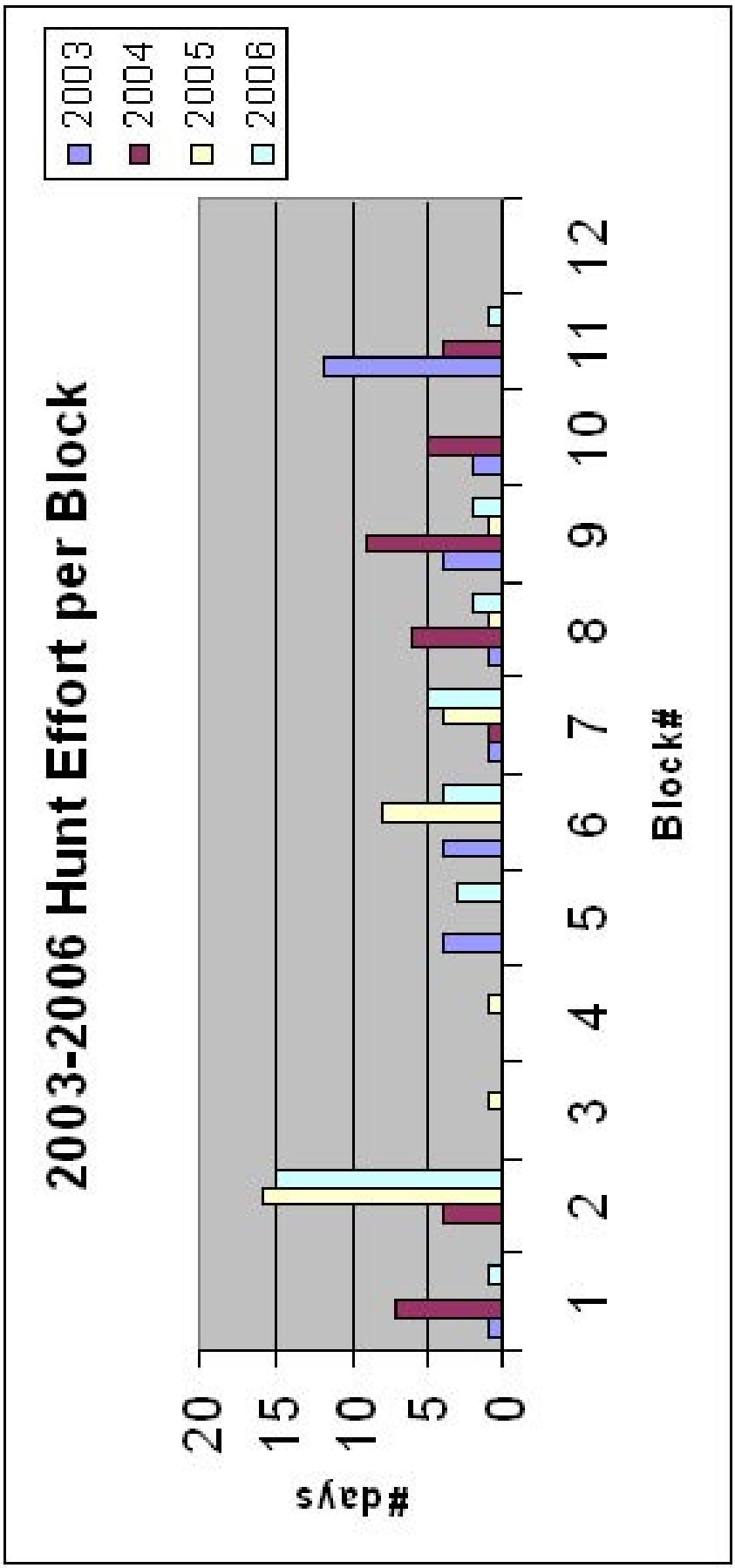
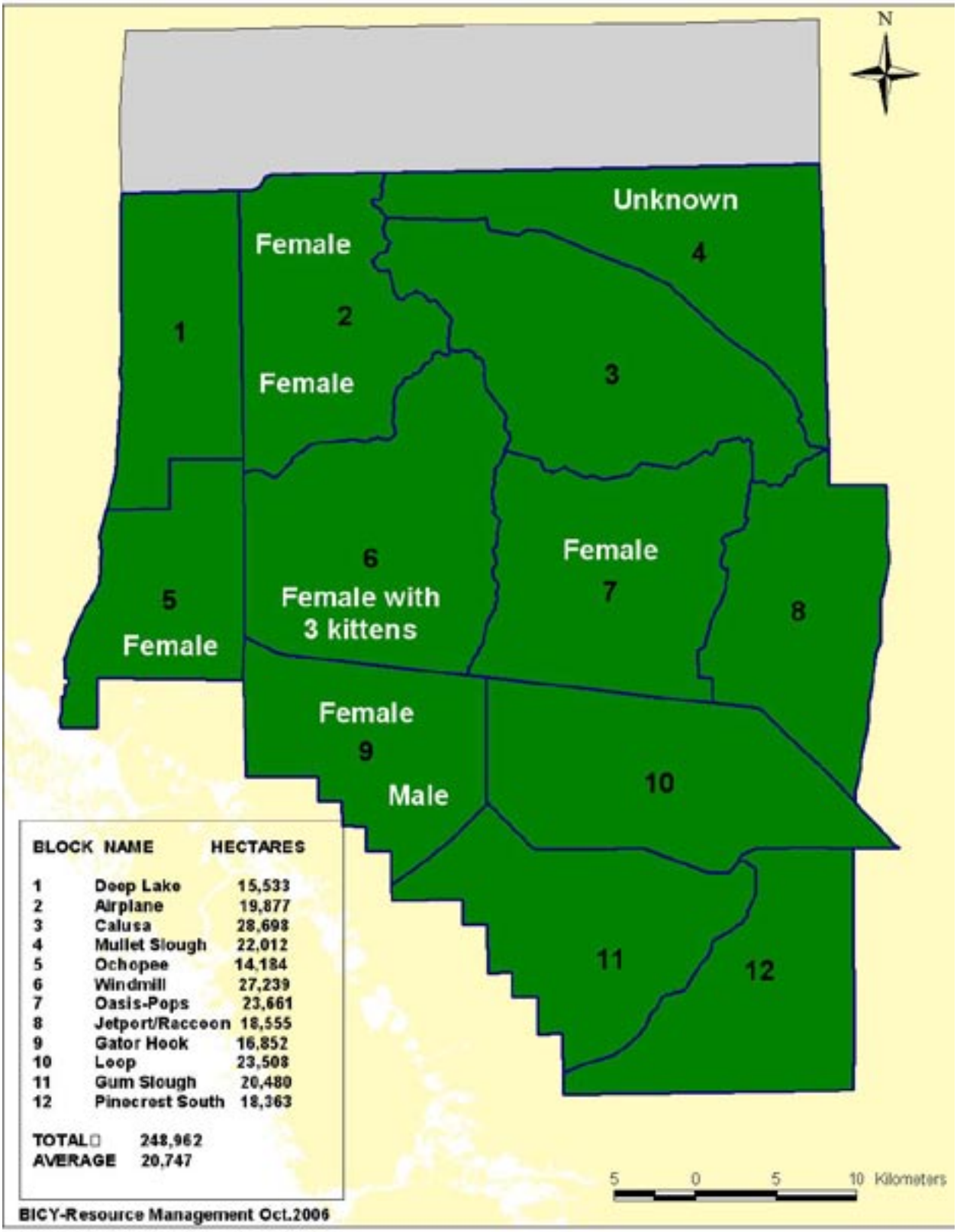


Figure 4. Panther Capture effort per survey block – 2003 -2006



BLOCK	NAME	HECTARES
1	Deep Lake	15,533
2	Airplane	19,877
3	Calusa	28,698
4	Mullet Slough	22,012
5	Ochopee	14,184
6	Windmill	27,239
7	Oasis-Pops	23,661
8	Jetport/Raccoon	18,555
9	Gator Hook	16,852
10	Loop	23,508
11	Gum Slough	20,480
12	Pinecrest South	18,363
TOTAL		248,962
AVERAGE		20,747

Figure 5. Documented presence of uncollared panthers in SBICY from July 2005-June 2006.

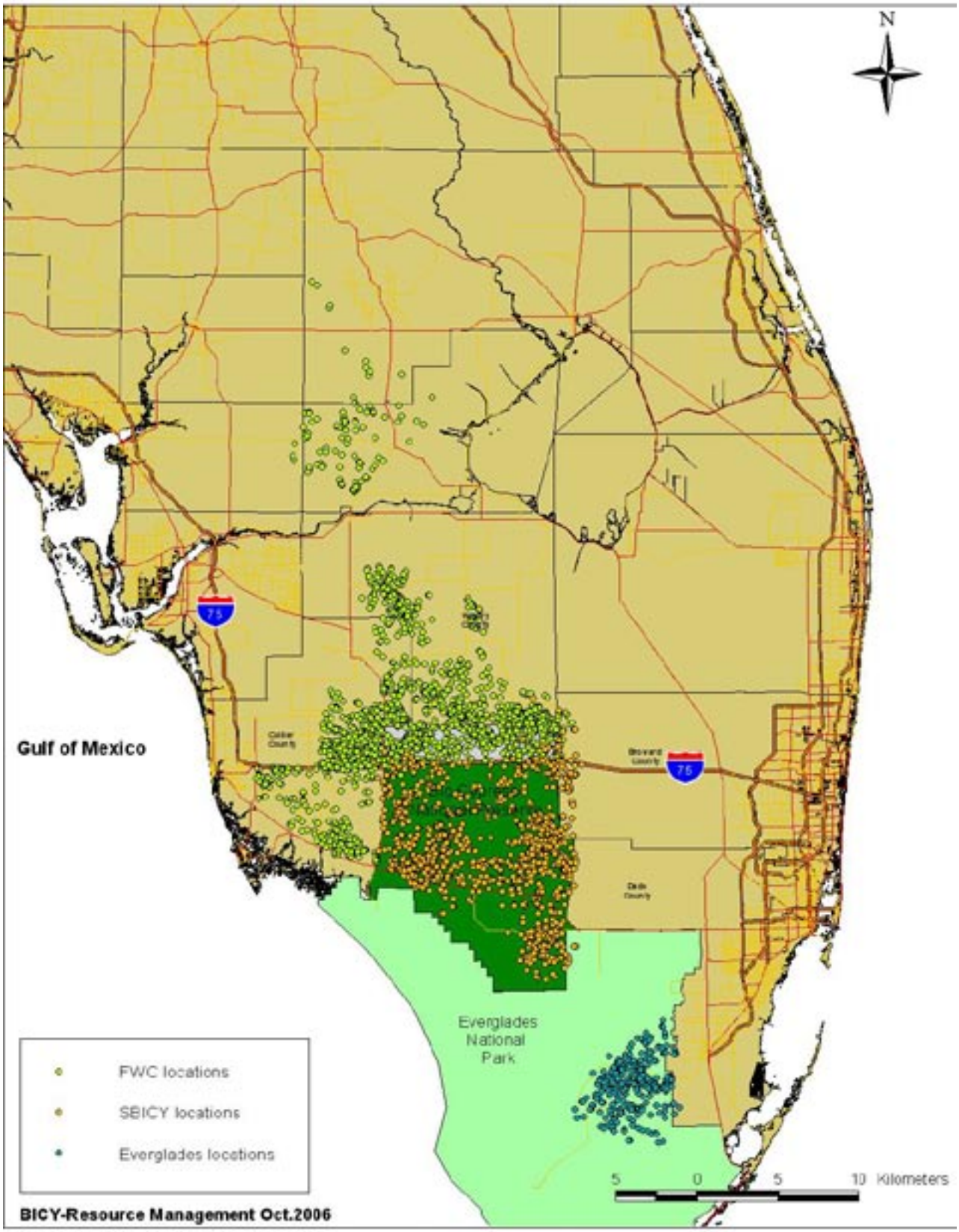


Figure 6. Geographical distribution of all Florida panther telemetry locations from July 2005-June 2006.

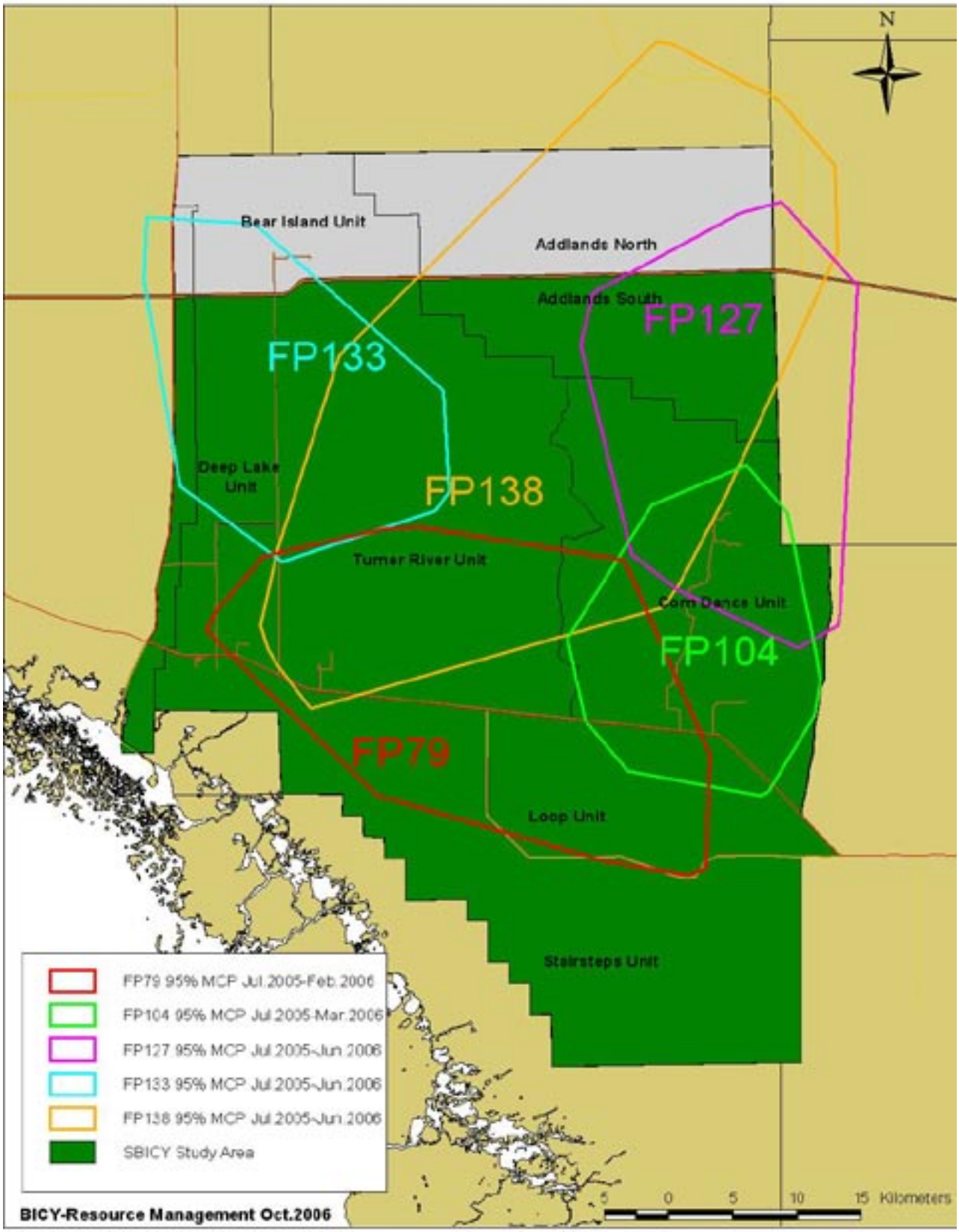


Figure 7. Home ranges of adult male Florida panthers monitored in SBICY from July 2005-June 2006.

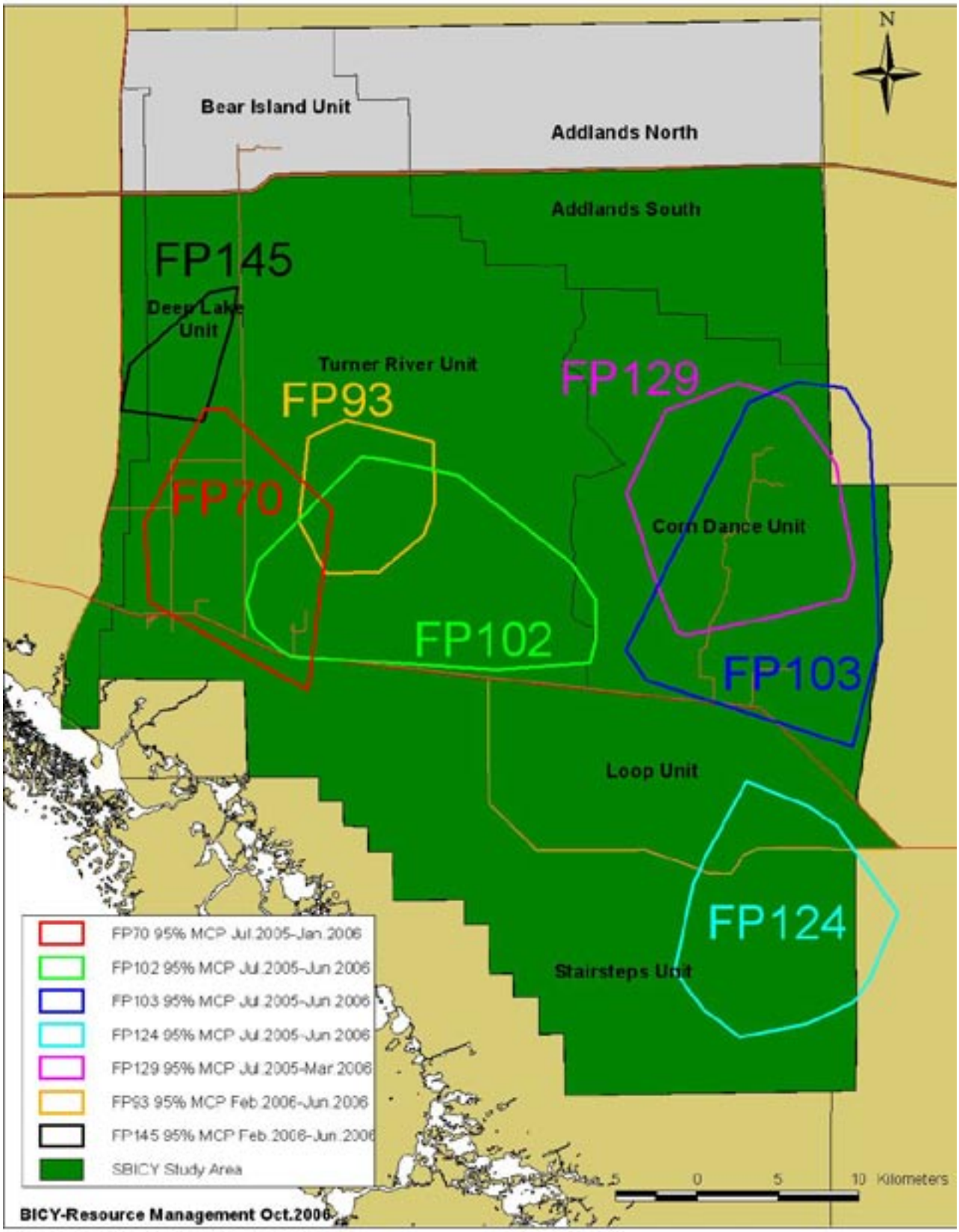


Figure 8. Home ranges of adult female Florida panthers monitored in SBICY from July 2005-June 2006.

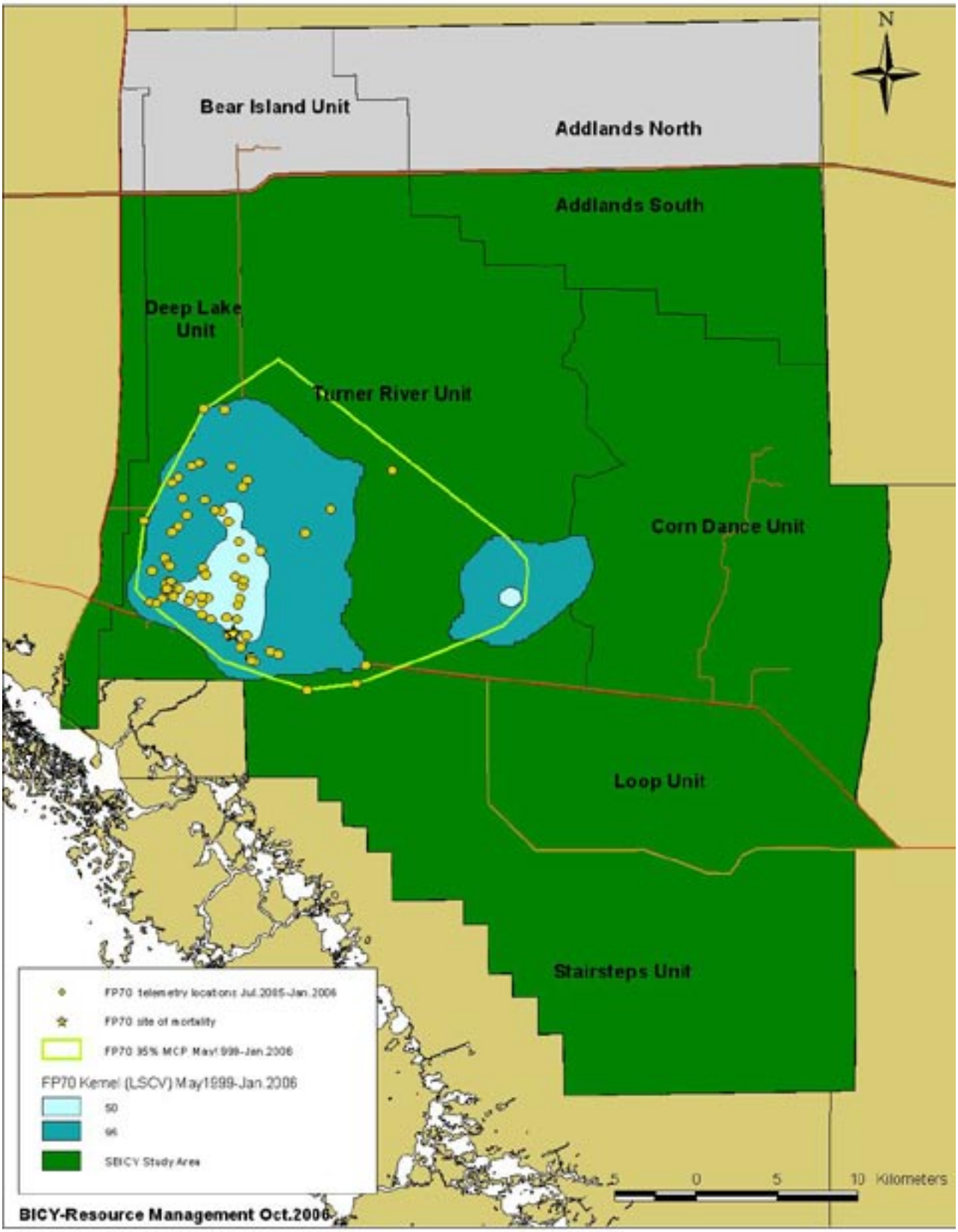


Figure 9. Home range of female Florida panther #70.

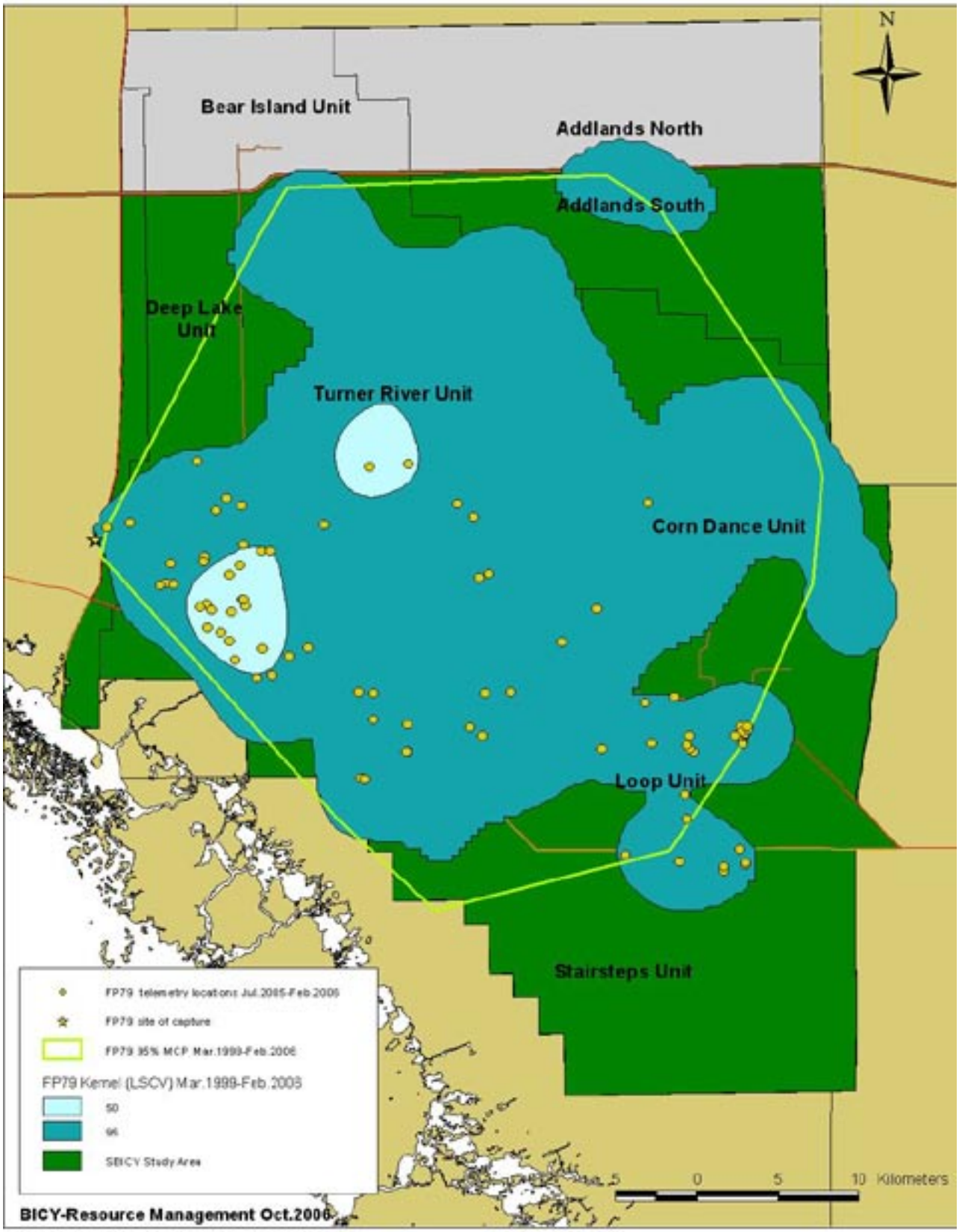


Figure 10. Home range of male Florida panther #79.

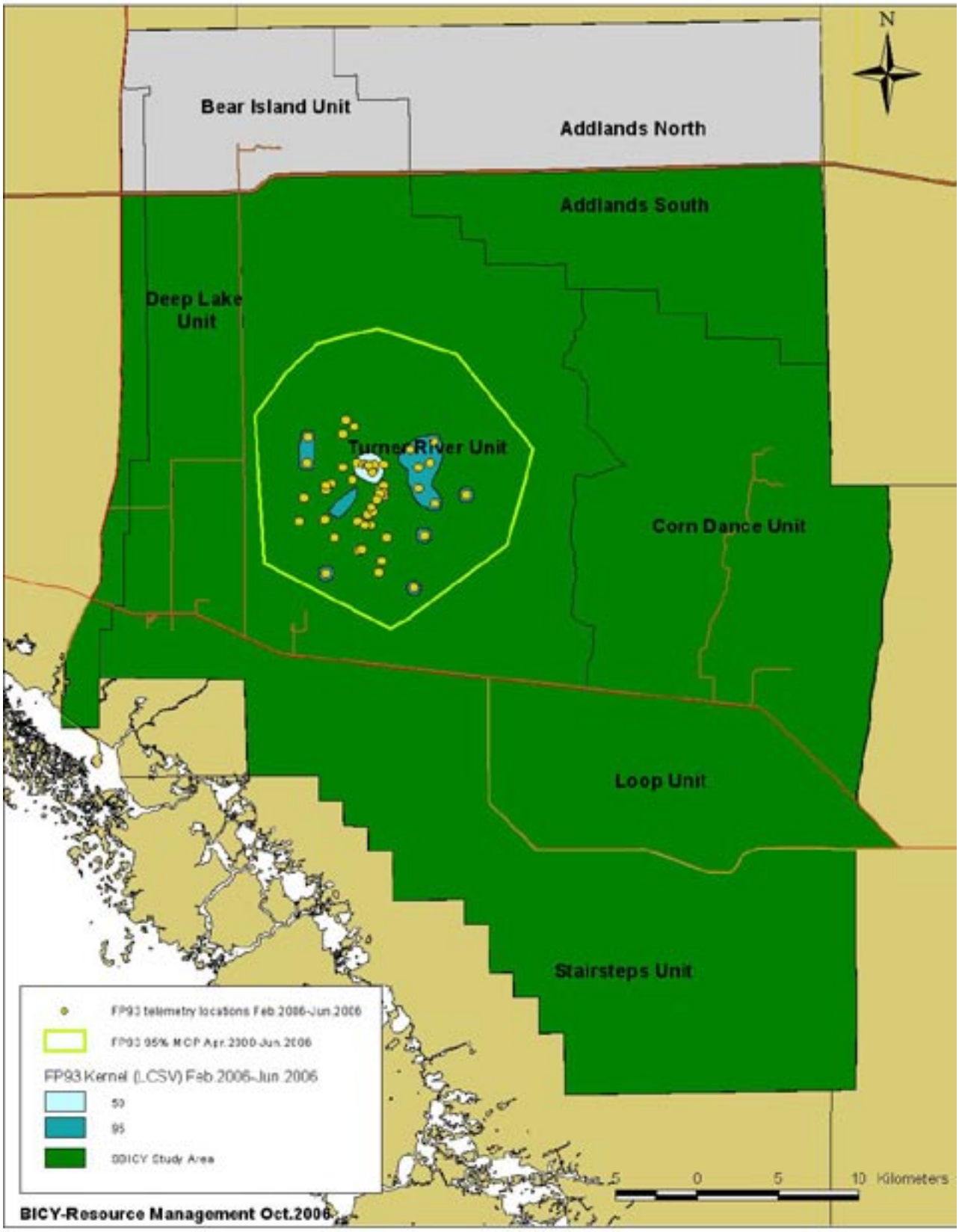


Figure 11. Home range of female Florida panther #93.

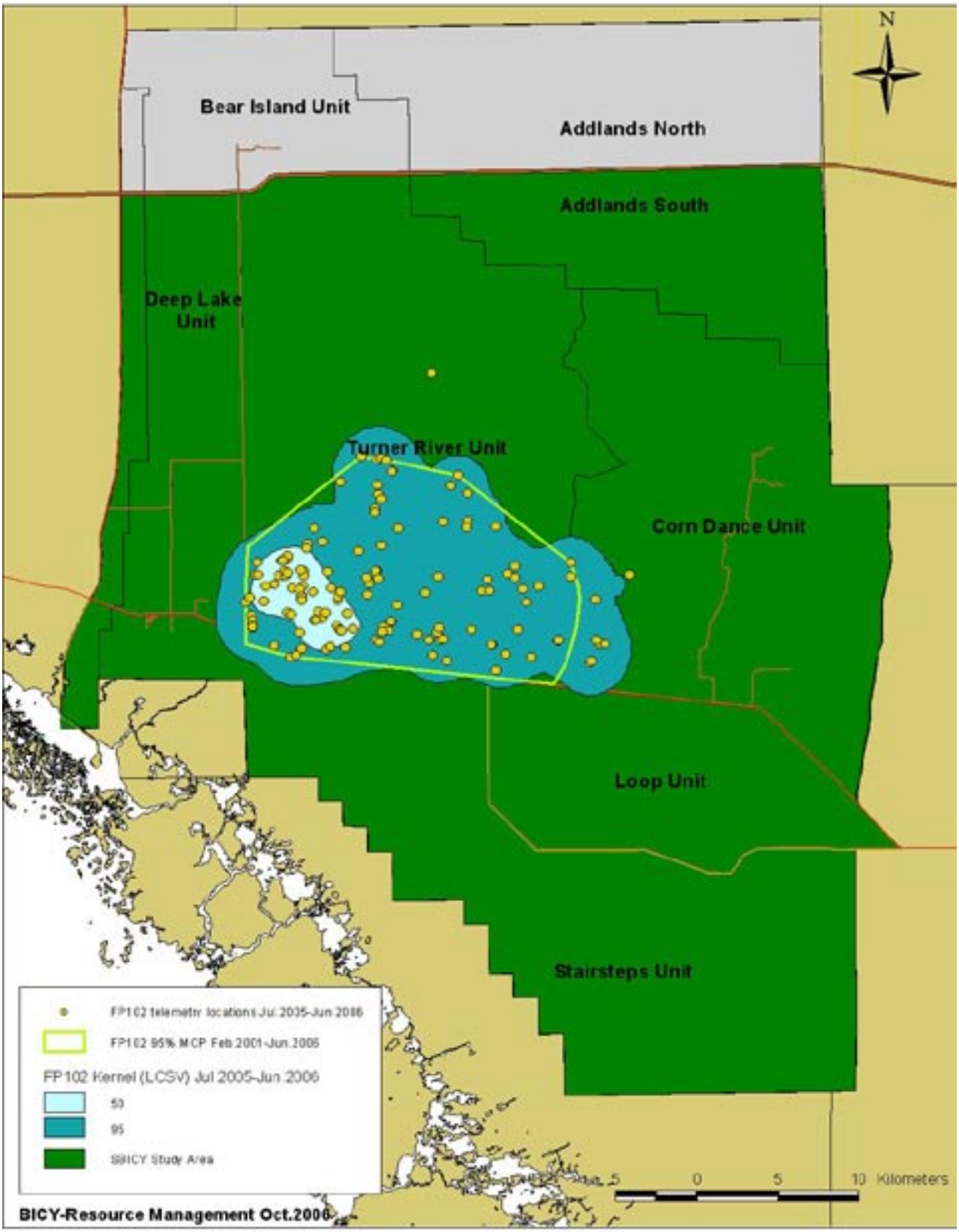


Figure 12. Home range of female Florida panther #102.

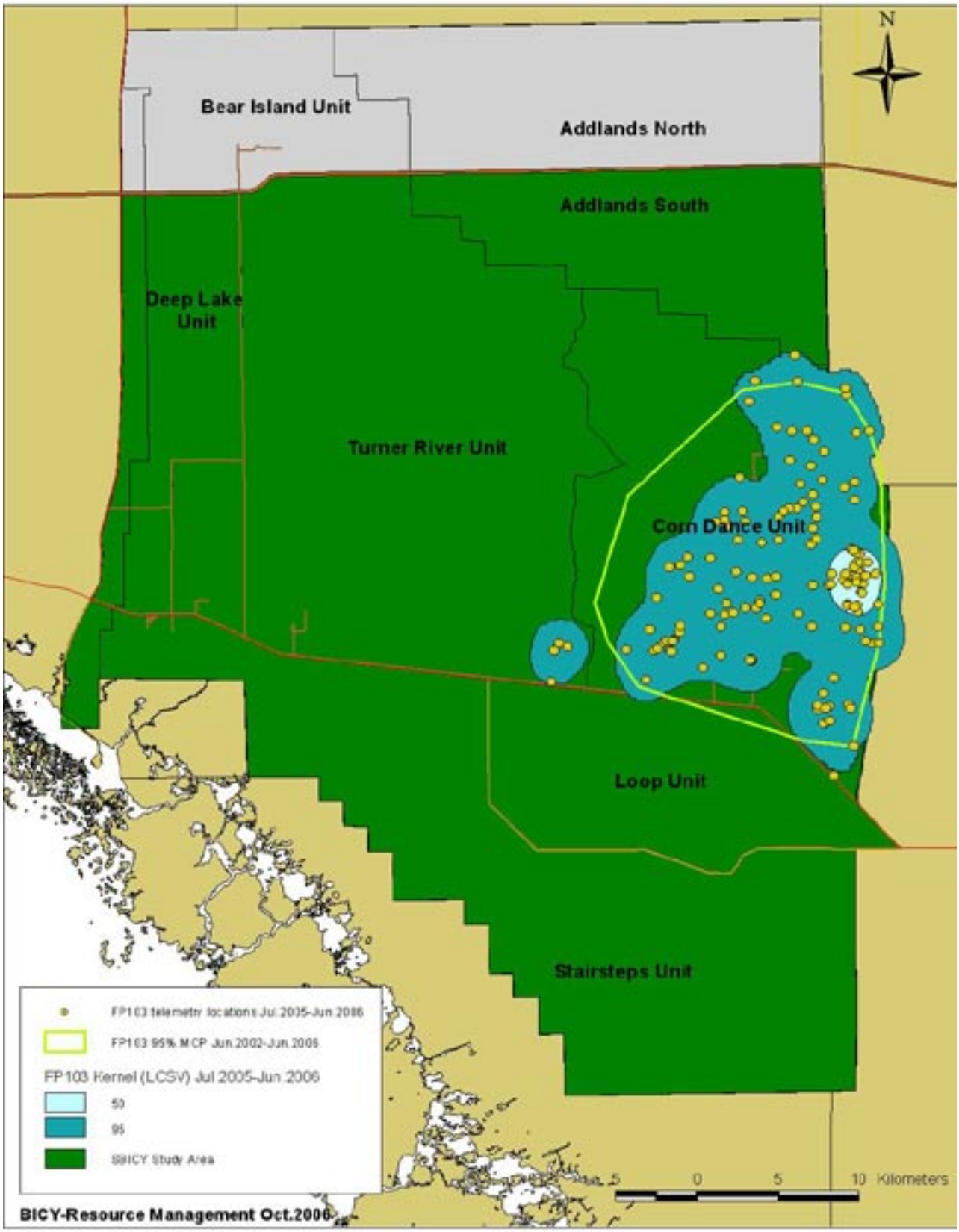


Figure 13. Home range of female Florida panther #103.

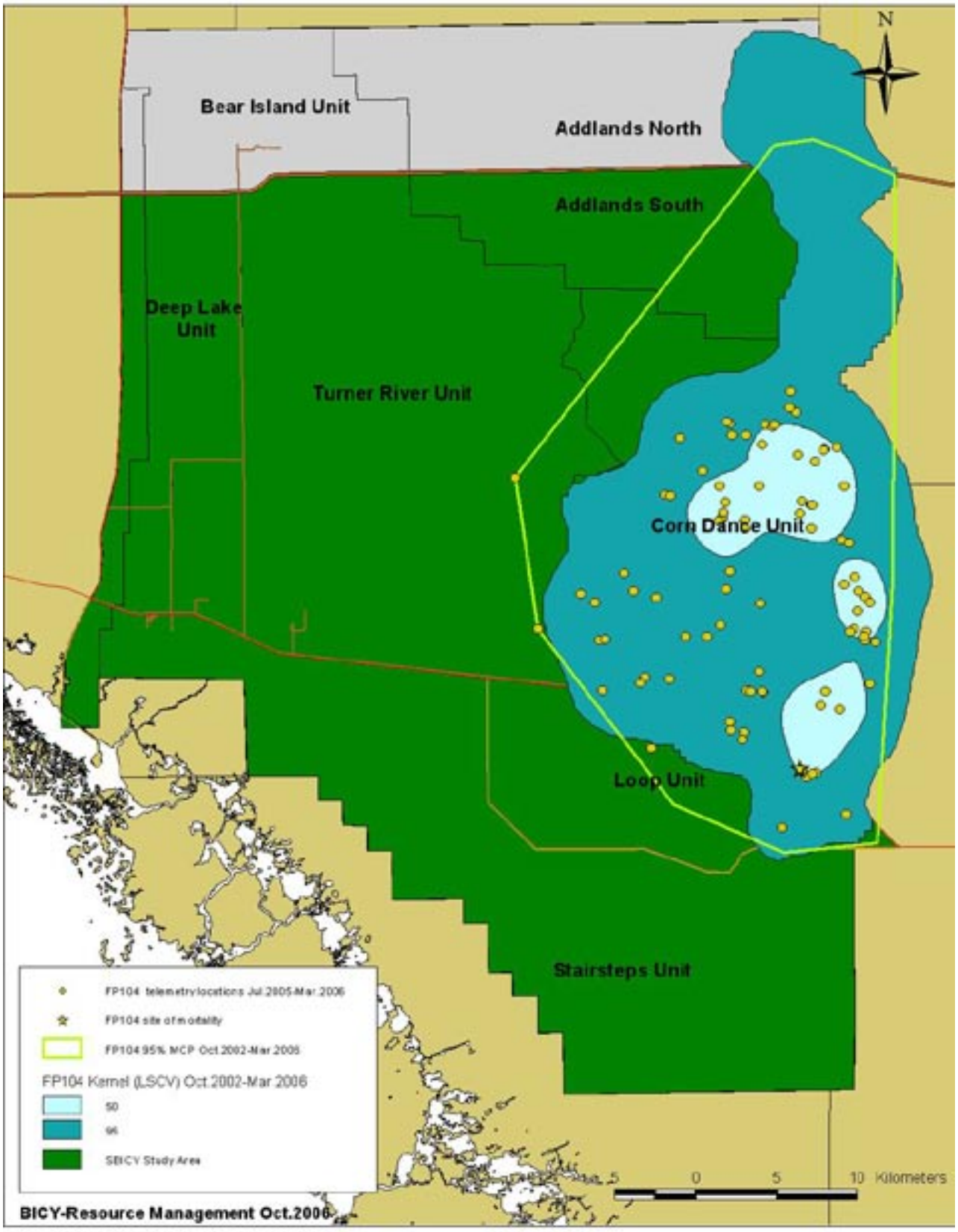


Figure 14. Home range of male Florida panther #104.

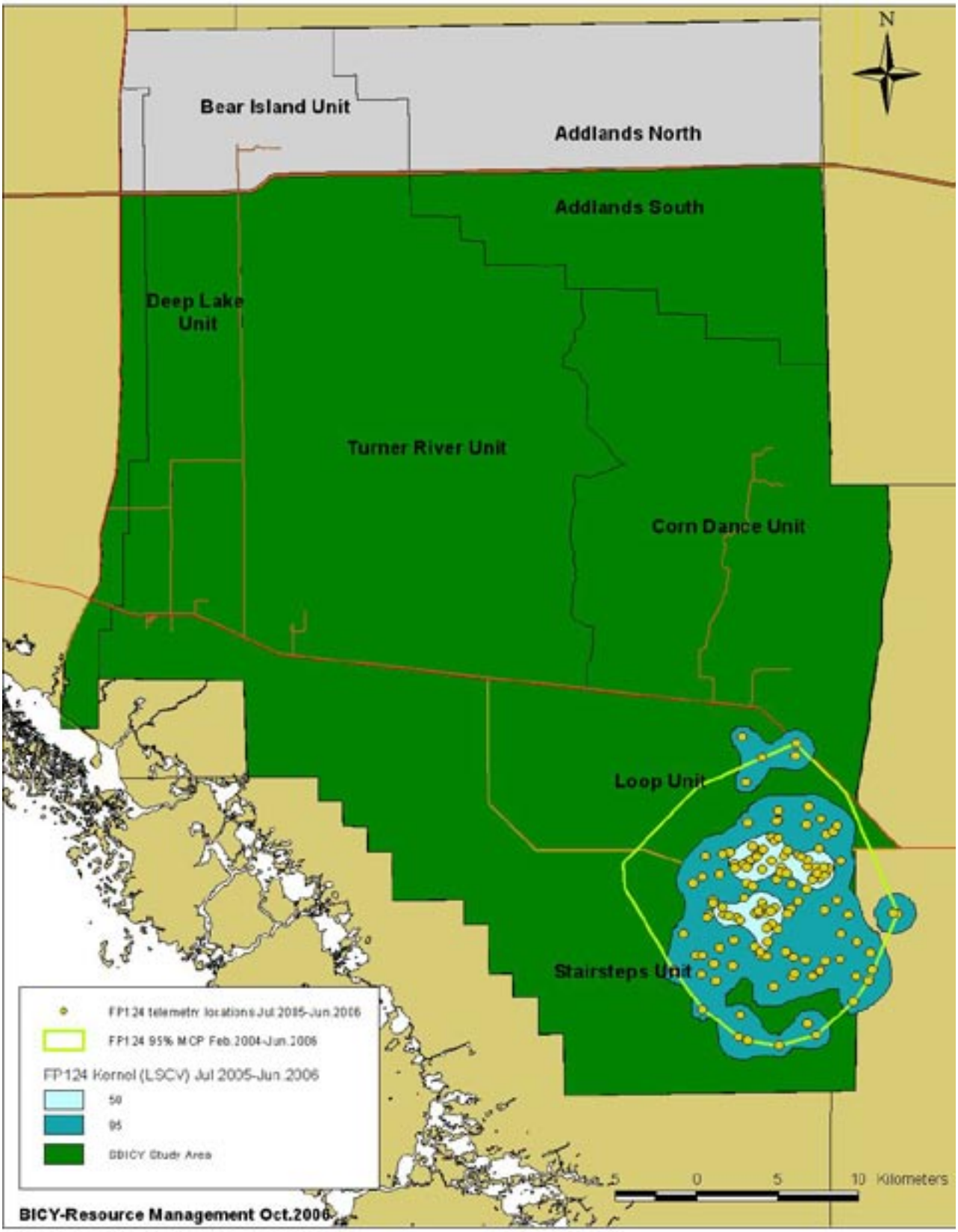


Figure 15. Home range of female Florida panther #124.

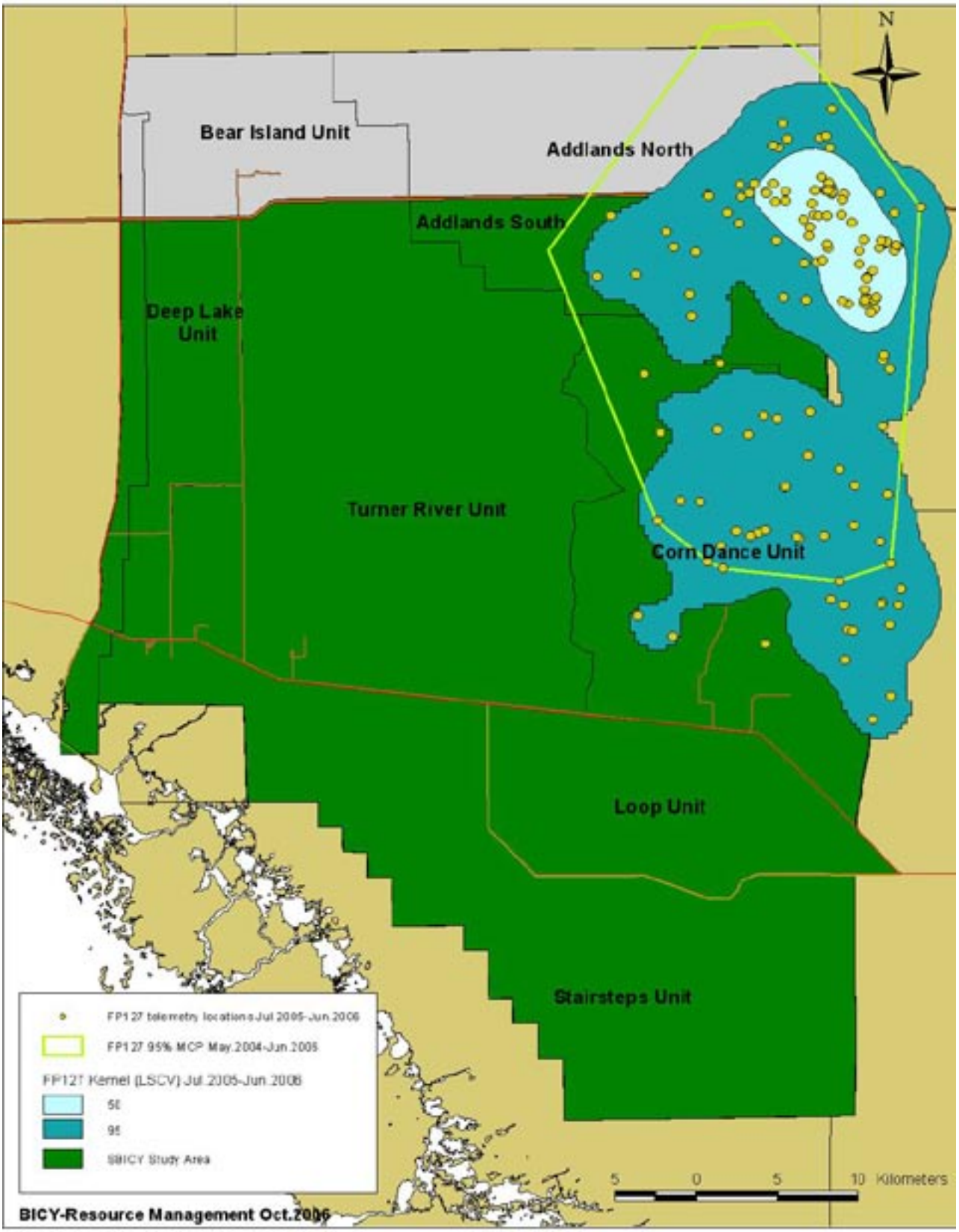


Figure 16. Home range of male Florida panther #127.

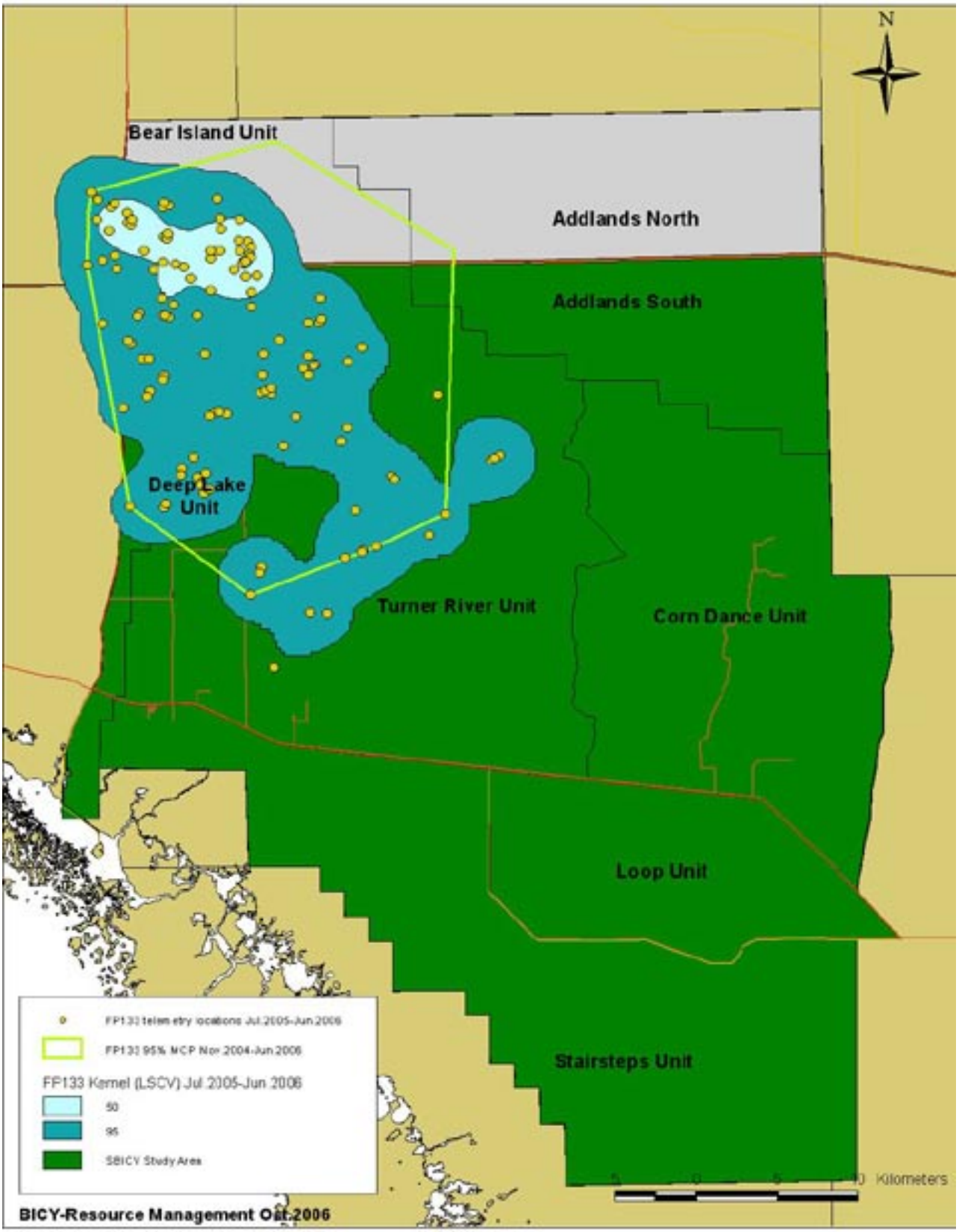


Figure 18. Home range of male Florida panther #133.

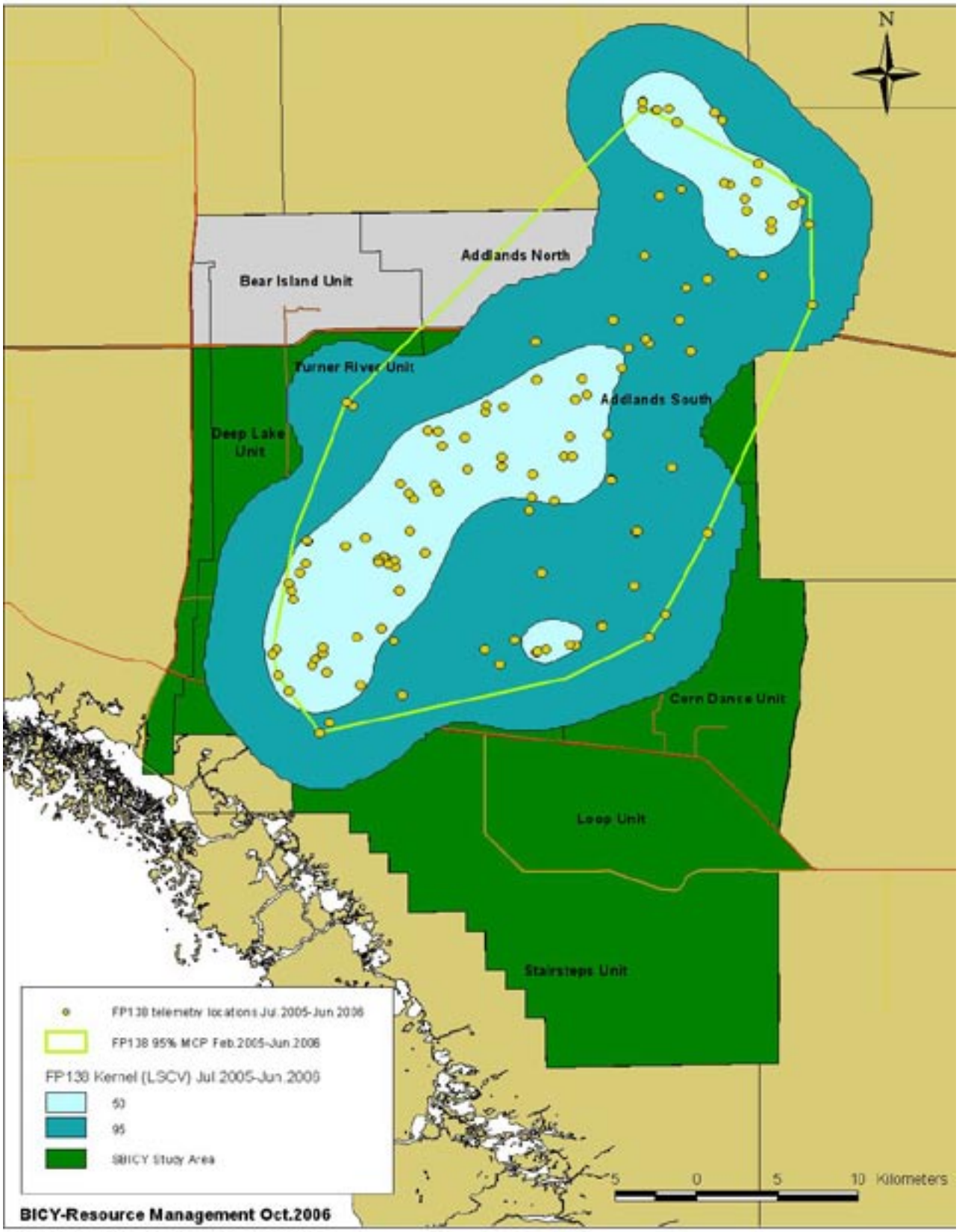


Figure 19. Home range of male Florida panther #138.

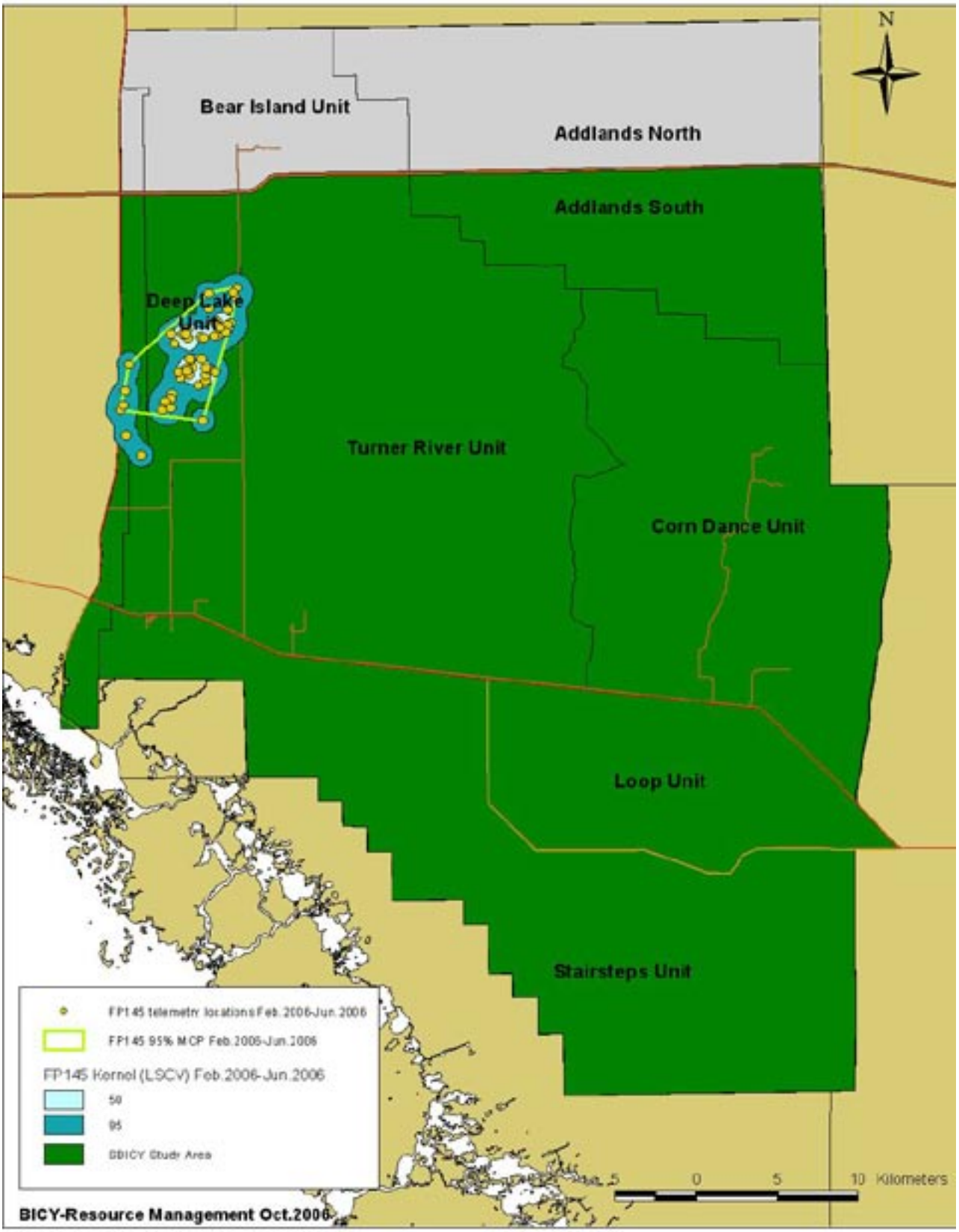


Figure 20. Home range of female Florida panther #145.

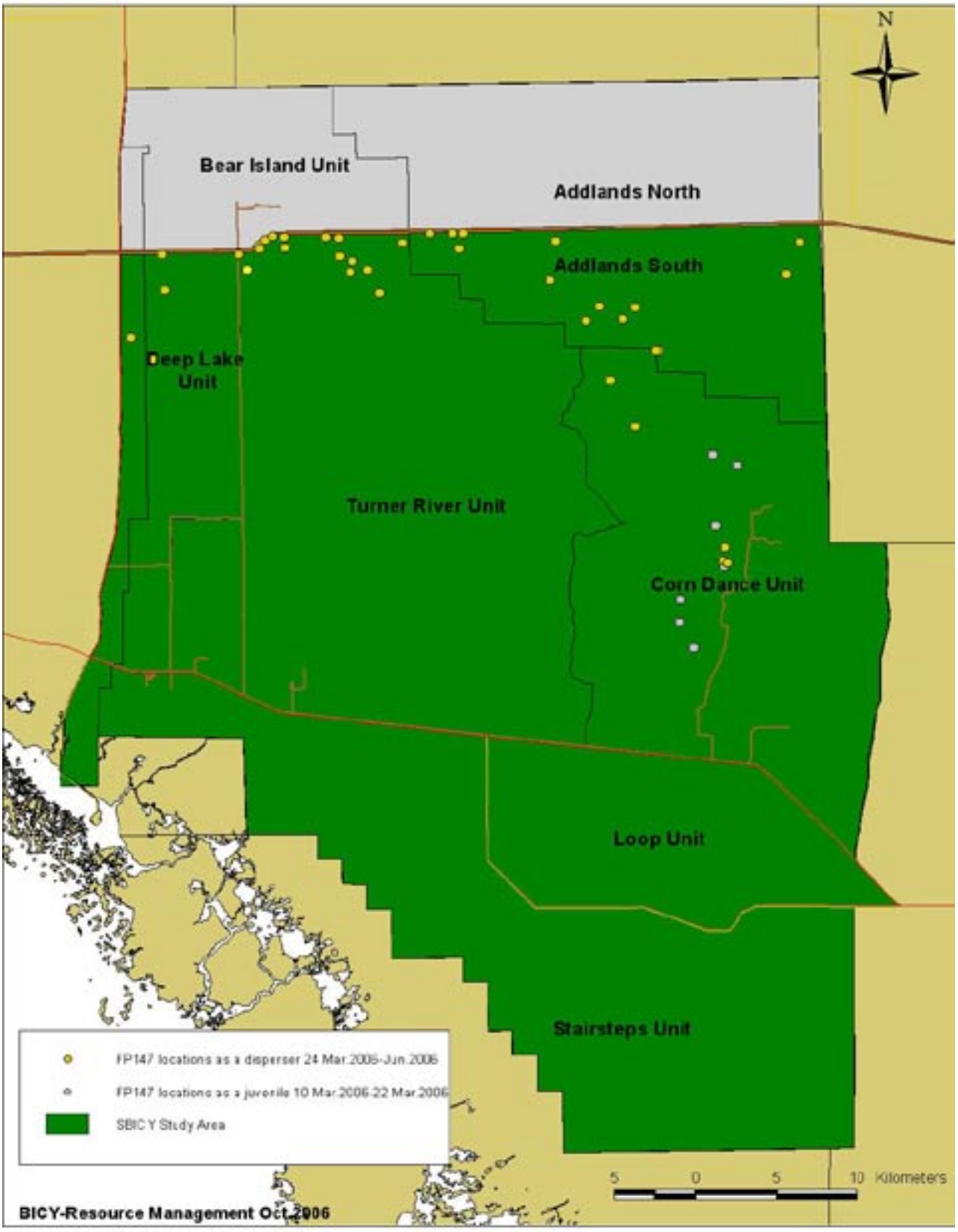


Figure 21. Area of use by male Florida panther #147 as a dependent kitten and as a disperser in the study area.

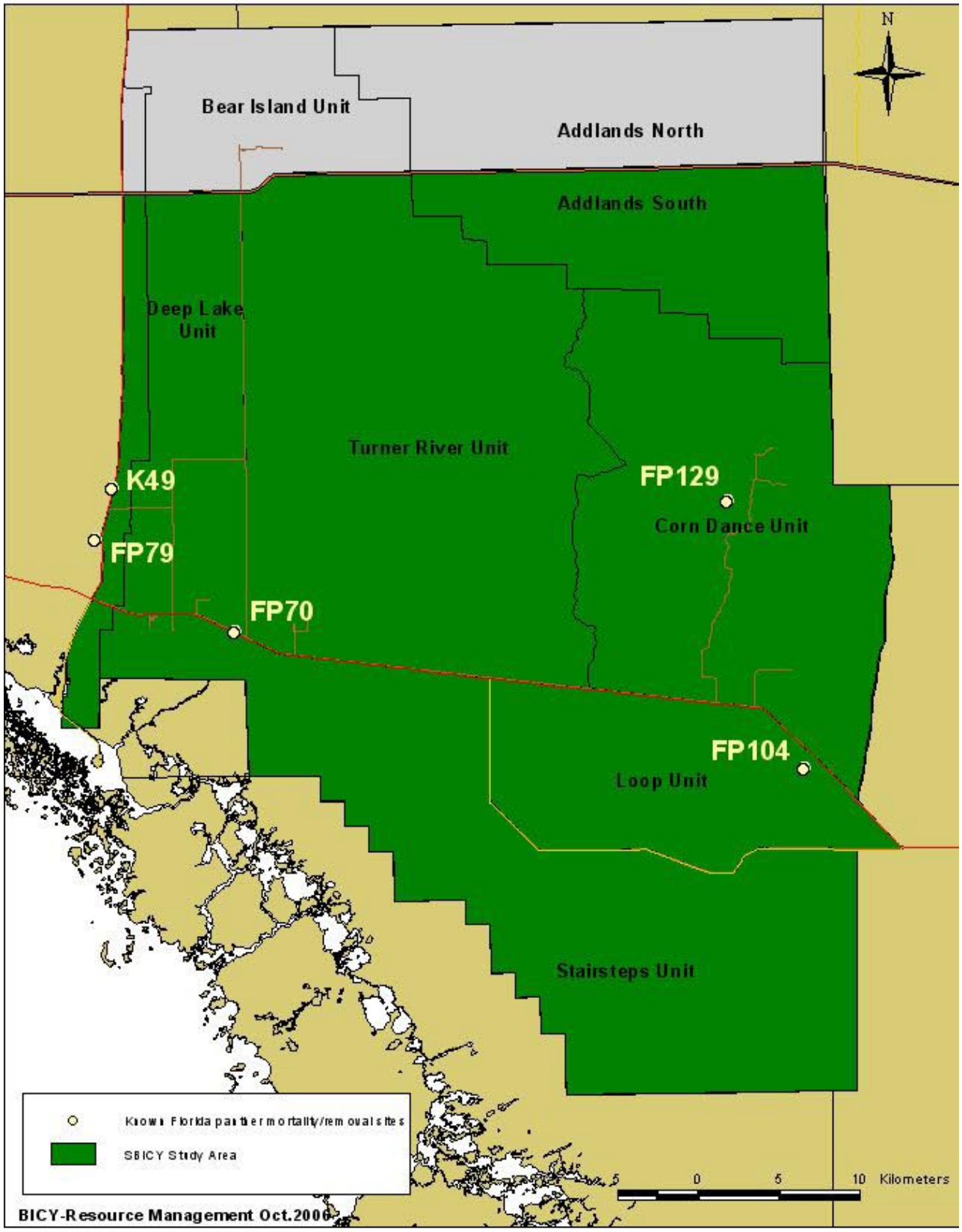


Figure 22. Distribution of known Florida panther deaths/removals in SBICY from July 2005-June 2006.