FLORIDA PANTHER (*Puma concolor coryi*) RESEARCH AND MONITORING IN BIG CYPRESS NATIONAL PRESERVE 2011-2012 ANNUAL REPORT

In memory of male panther 133 whose battle scars are shown in this 2009 photo by Ralph Arwood

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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 (SBICY) with which to guide management actions, assess responses to natural events and human-caused impacts, and enhance panther recovery. The reporting period is 1 July 2011 to 30 June 2012. We hunted for 29 days between January 28 and March 11 in 2012 in 9 of the 12 survey blocks. We spent 7 additional days in the Addlands hunting for FP175. We captured and collared 4 new panthers, changed the working collars on 1 panther, and recollared 2 panthers with failed collars.

We monitored 15 panthers, 2 resident males, 2 dispersing males, and 11 resident females, for at least a portion of the reporting period. The average home ranges (95% MCP) of the 2 resident males and 11 resident females located more than 50 times in the study area during the reporting period were 535 km^2 and 114 km^2, respectively. The presence of 4 uncollared adult males, 6 uncollared (or failed collar) adult females and 7 juveniles was verified in the study area. Eight of the 11 monitored breeding-age females denned during the reporting period. At 8 dens we marked 21 kittens, 14 males and 7 females, with transponders and sampled them for biomedical information. Three adult mortalities were documented in the study area, 1 from a collision with a vehicle and 2 from intraspecific aggression. Another adult panther was struck by a vehicle but fled into cover and was not found. A 12-day-old kitten, abandoned at his den, was found dead.

The efforts from the past 24 years of panther survey and monitoring work, 17 years of panther reproductive assessment, and 11 years of panther capture work conducted by National Park Service in Big Cypress have provided a significant amount of data with which management decisions have been influenced and panther ecology more thoroughly understood.

Report Background

This is the tenth annual report on National Park Service (NPS) panther work in Big Cypress National Preserve (Big Cypress). It covers capture and monitoring efforts between 1 July 2011 and 30 June 2012 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) monitor panthers in the remaining 75,340 ha of Big Cypress north of I-75 as well as areas outside Big Cypress. The SBICY study area also includes lands used by our monitored panthers infrequently such as the Miccosukee tribal lands south of I-75 and east of the L-28 canal and EVER northwest of Shark Valley Slough.

Information on all panthers known to inhabit SBICY between 1981 and 2003 can be found in the 2003 Big Cypress Annual Report (Jansen et al 2003). The 2004-2011 annual reports covered capture and monitoring work in SBICY between July 1 and June 30 of those years.

Statement of Purpose

The overall purpose of this ongoing project is to monitor 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

The proposal to renew the Federal permit to capture and handle Florida panthers included the following goals (Jansen 2006):

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. This is especially relevant in providing insight into the panther population in Big Cypress in relation to the development of a Hunting Management Plan/EA for the entire Preserve.

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 EVER and to provide baseline information on panther use in areas that may be affected by the Comprehensive Everglades Restoration Plan (CERP).

Goal 4. 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.

Goal 5. To monitor the prevalence of feline leukemia and other potentially harmful diseases through biomedical sample collection.

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

Goal 7. To identify crossing and mortality sites with which to recommend highway enhancements that lessen panther-vehicle collisions.

Goal 8. To 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 292,750-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 (Sobczak et al. 2011). From 1994 to 1997, the University of Georgia used remote sensing techniques to create vegetation classification maps of Big Cypress (Welch et al 1999). Burch (2011) further refined this work into 7 general habitat types comprised of 50% cypress, 24% prairie, 2% marsh, 15% pineland, 3% mixed hardwood swamp, 5% hardwood hammock, and 0.4% mangroves (Figure 2). Disturbed habitat, including exotic plants and areas of human influence such as roads, is found in 0.7% of SBICY.

Only 285 km of roads exist in SBICY. Two paved roads run east-west through Big Cypress from State Road 29 (S R 29) to Conservation Area 3A. Four-lane Interstate 75, completed in 1993 and formerly named Alligator Alley, lies approximately 20 miles north of 2-lane Highway 41 (Hwy. 41), completed in 1928. 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 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 years that cover the 2007-2011 deer and hog hunting seasons averaged 14,521 man-days of hunter pressure, with a mean harvest of 239 deer (bucks only) and 8 hogs harvested in the past 5 years (FWC 2008-2012 annual harvest reports). The agencies also monitor deer population trends through aerial surveys 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. Duever et al. (1986) examined 1953 and 1973 maps to obtain an estimate of trails in Big Cypress. They found that the extent of trails had increased from 250 km to over 1,100 km in that 20-year period. Welch et al (1999) used remote sensing techniques to identify linear features and found over 46,774 km of trails or trail remnants that were visible on aerial photos. The National Park Service (2000) developed a plan for off-road vehicle recreational use which limited vehicles to a designated trail system. Currently, approximately 680 km of primary and secondary trails have been designated in Big Cypress. Janis and Clark (2002) determined that panthers showed some avoidance of these trails during periods of increased vehicle activity, however, Fletcher and McCarthy (2011), using an updated dataset on panther locations, found only limited indication that hunting affected panther distribution and movements.

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 the 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 averages 20,747 ha. Although our objective is to randomly sample all areas for the presence of panthers, targeted goals identified annually may take precedent.

2012 Capture Season Plans

No interagency panther capture planning meeting was held this year, therefore, a SBICY capture plan was submitted the beginning of February.

The capture goals consisted of the following:

1. Retrieve the GPS store-on-board collar on FP175 (*accomplished, spent 7 days of our 29-day hunt season because she had a failed collar*)
2. Retrieve the GPS store-on-board collar on FP180 (*accomplished)*
3. Recollar FP161 (*not accomplished)*
4. Recollar FP162 (*not accomplished; treed twice but too high in tree)*
5. Collar adult male in the Corn Dance Unit. *(not accomplished*)
6. Retrieval of 5 failed GPS or satellite collars (on FP93, 124, 150, 153, 179) (*retrieved and replaced FP153's collar*)
7. Target two areas for panther capture that have been the least hunted areas in the 10 years of NPS capture work and have relevant management concerns in each area,
    - the Addlands south of I-75, under discussion for potential Wilderness designation and recreational use, (*spent only 1 day hunting there due to water levels*)
    - southeastern Stairsteps in which a significant deer die-off had occurred (*no hunting done in this area*)

Survey and Capture Protocols

Documentation of panthers was recorded during the capture work and augmented by the annual synoptic survey efforts by Rancher's Supply, Inc .using the protocol they developed to determine the presence of uncollared panthers (McBride et al. 2008, Rancher's Supply, Inc. 2011 and 2012). We conducted our capture work following the protocols outlined in Endangered Species Permit TE146761-2 from USFWS. Drug protocols and panther handling modifications were updated as new information became available. Biomedical procedures were similar to those outlined in Cunningham (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 usually between 0900-1200 hrs, using telemetry from a fixed-wing aircraft. 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 panthers 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 to generate a map showing SBICY locations in relation to the entire monitored population.

We displayed the home ranges of resident radio-collared panthers located in SBICY between 1 July 2011 and 30 June 2012 (Figures 9-23) 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" to show the home range during the reporting period (Seaman and Powell 1996). We determined these for panthers with 50 or more locations over at least a 4-month monitoring period. We generated home range maps using the ArcView 3.2 Spatial Analyst (Environmental Systems Research Institute, Inc.). For those panthers that died during the reporting period, we showed that year's locations as well as their lifetime home range as MCP and fixed kernels.

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, and handled the kittens when she was away from the den during the daytime. We processed the kittens following the protocol established by FWC (Cunningham 2002). Appendix II in Florida Fish and Wildlife Conservation Commission (2012) lists all panther kittens handled at dens from 7 April 1992 through 30 June 2012 and Appendix III lists all known dens of radio-collared female panthers from June 1985 through 30 June 2012.

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 accompanied 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 (2012) lists known panther injuries and mortalities through 30 June 2012.

Reporting

We used the reporting period of 1 July 2011 to 30 June 2012 to coincide with FWC reports completed in 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 **resident** panthers, i.e., those that had more than 5% of their locations in SBICY, had more than 50 locations during the reporting period (approximately one-third of all flight 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 male and female panthers as **adults**, although some may not have established a home range or had a breeding opportunity until older, whereas others, such as FP79, had successfully bred when less than 2 years of age (Benson et al. 2011) 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. Intraspecific aggression is abbreviated as **ISA**.

Results

Survey and Capture Efforts

We hunted for 29 days between January 28 and March 11 in 9 of the 12 survey blocks. We spent 7 of those days in the Addlands in pursuit of FP175. We captured and collared 4 new panthers, FP199, 211, 214, and 216. We changed the failed collars on FP153 and 175 and the working collar on FP180 (Table 1).

2012 Capture Season Summary:

29	total hunt days
4	newly collared panthers (FP199, 211, 214, and 216)
2	failed collar replacement (FP153 and 175)
1	working collar replacement (FP180)

0 not handled because was denning

4 treed but not handled due to unsafe handling conditions (FP162 twice, uncollared female in Deep Lake, uncollared male in Turner River Unit)

0 treed but not needing handling

Following is a summary of this year's findings per block. Figure 4 shows our capture effort per block for the past 10 years.

Block 1: Hunted 3 days

- 13 Feb: recollared FP180
- 23 Feb: found fresh male tracks on Turner River Road; treed an uncollared female

Block 2: Hunted 2 days

- 19 Feb: recollared FP153
- 11 Mar: collared FP216

Block 3: Hunted 3 days

- No sign found

Block 4: Hunted 1 day

- No sign found

Block 5: Hunted 1 day

- No sign found

Block 6: Hunted 8 days

- 22 Feb: collared FP214
- 1 Mar: treed an uncollared male; found sign of a second uncollared male and sign of an uncollared female:
- 8 Mar: hounds cold-trailed an uncollared female in Windmill Prairie

Block 7: Hunted 1 day

- 17 Feb: found sign of a small, uncollared female

Block 8: Hunted 2 days

- 18 Feb: found sign of an uncollared male and an uncollared female

Block 9: Hunted 1 day

- No sign found

Block 10: No hunting

Block 11: No hunting

Block 12: No hunting

Addition Lands: 7 days

- 9 Feb: collared new female FP199
- 10 Feb: collared new male FP211
- 3 Mar: recollared (failed collar) FP175

Within the study area, we documented the presence of 4 uncollared adult males, 5 uncollared (or failed collar) adult females, and 7 juvenile during our capture season. (Figure 5).

Synopsis of Monitored Panthers

We monitored 2 resident males, 2 juvenile males, and 11 resident female panthers in our study area between 1 July 2011 and 30 June 2012. Figure 6 shows the geographical distribution of this year's SBICY panthers in relation to the entire monitored population. The SBICY study area accounts for 43**%** of both agency's reporting period locations. Those obtained within Big Cypress boundaries (all units, including Bear Island and the Addition Lands) represent 59**%** of both agency's reporting period panther locations. Figure 7 depicts the home ranges and areas of use of the 2 resident and 2 juvenile males and Figure 8 depicts the home ranges of the 11 resident females inhabiting SBICY during the reporting period.

FP133

The FWC capture team caught this male panther, estimated at 4 to 5 years of age, on 18 November 2004 in the Bear Island Unit. We recollared him on 19 Feb 2008 and again on 11 February 2009. On 19 Feb 2010, we fitted him with a Globalstar tracking collar which ceased functioning on 5 October. He was recaptured on February 3, 2011 and fitted with a VHF collar. His collar emitted the mortality signal on March 2, 2012 in Fakahatchee Strand Preserve State Park. Based on the fact that only hide and bones remained, he likely died up to a week earlier and from ISA with FP183, another collared male panther in the area. His necropsy revealed that he had multiple healed injuries, including fractured ulnas, ribs, fibula, forepaw, vertebra, and punctures to the left orbit, likely caused by panther canines. FP133's lifetime home range during the 7 years of monitoring encompassed Bear Island, Deep Lake, and Turner River Units of Big Cypress and consisted of 665 km^2 (Figure 9).

FP145

This female was captured on 16 February 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 23 June 2006, we marked 3 female kittens at her den. This was the first panther den documented in the Deep Lake Unit. We recollared her on 25 February 2007. She was in excellent condition, weighing 32 kg. She denned in April of 2007, indicating that the kittens from her June 2006 den did not survive. We marked 3 kittens on 26 April 2007. Her collar failed on 23 June 2007 due to a programming error and she was not recaptured during the 2008 or 2009 panther capture work. Her collar began functioning again, as programmed, on 23 June 2009. She was recollared in February 2011, however, her collar failed in late May, 2012. Her home range during the 2011-2012 reporting period was 56 km^2 in the Deep Lake Unit. (Figure 10).

FP151

On 10 February 2007, we collared FP151 in the Turner River Unit. Her transponder confirmed that she was the offspring of FP93, born in April of 2002. She weighed 41 kg and was in excellent condition. In April of 2007 she denned, and on 21 April we marked 3 kittens. They evidently did not survive because in August of 2007 she denned again. . We went to mark the kittens on 27 August and found the remains of a male and a kitten of unknown sex. The kittens had been killed and partially eaten within the past few hours. Fresh bear scat found within 5 meters of the den suggested that a bear had killed them. FP151 denned again in late February 2008. We marked 2 kittens on 4 March.

FP151's collar failed on 7 June 2008. She was treed by Roy and Cougar McBride on October 28, 2010 and we recollared her. We marked 2 kittens at her May 2011 den. Her home range during the reporting period was 80 km^2 in the Deep Lake and Turner River Units (Figure 11).

FP153

On 19 February 2007, we collared FP153 in the Deep Lake Unit. She did not have a transponder, so was estimated to be 6 years of age. She weighed 40 kg. We also treed 2 kittens estimated at 10 to 11 months of age, but did not handle them. On 3 March 2008, we recollared FP153. She was in good condition at 39 kg. In early July, she started denning and on 20 July 2008 we handled 3kittens. She denned again in June of 2009, indicating that the kittens from the July 2008 den did not survive. We marked 2 kittens. We could not handle her during the 2009-10 capture work because her kittens were less than 12 months of age and her collar failed due to normal battery failure on August 22 2010. On February 19, 2012, Rocky treed her and found her den nearby. We recollared her and marked her 4 male kittens. We returned to the original den after she relocated her den 200 meters away and found the remains of one of the kittens (discussed in mortality section). We also found a living kitten and placed him near the den site FP153 was attending. FP153's home range during the 4 months she was monitored in this reporting period was 30 km^2 in the Turner River Unit (Figure 12).

FP161

On 10 February 2008, we first collared female FP161. Her transponder confirmed that she was K169, born on 25 May 2004 to female FP70 in a den only 1 km from this capture site. Although her progesterone and relaxin levels indicated pregnancy, she did not den that year. She was recollared on 31 January 2009, weighing 40 kg. She started denning 9 days later and on 25 February, we handled 3 kittens. One of them, female K279, was collared in March 2010 as FP182. One of her male siblings was documented with FP161 and FP182 on 22 March. In May 2010, FP161 denned again and on 26 May we handled 3 kittens. She had been observed on several occasions with 3 juveniles, the last date of which was June 6, therefore, she had successfully raised them to at least 13 months of age. In April 2012 she denned and we marked 4 kittens. Her home range during the reporting period was 136 km^2 in the Deep Lake, Turner River, and Stairsteps Units (Figure 13).

FP162

On 18 February 2008, the hounds began trailing male panther FP138 in the Turner River Unit. He was with an uncollared female that the hounds treed and we collared as FP162. She did not have a transponder, so we estimated her age at 3 years. She was assessed to be in good condition, weighing 33 kg. Her mammary glands indicated that she had not previously lactated and, although her progesterone levels were high, her relaxin was negative. She gave birth that May, 83 days post-capture, indicating that she was in the early stages of pregnancy when captured. We checked the den on 23 May and found the partially-eaten remains of 2 kittens, a male and a female, K268 and 269. Two collared males had recently been documented in the vicinity of the den. We recollared FP162 on 11 Feb 2009. She weighed 34 kg. She denned in April of 2009 and we handled 1 female kitten. In March 2010, FP162 denned again and we marked 3 kittens. In April 2011, FP162 denned again and we marked 4 kittens. On May 2, these kittens were killed in the Jarhead Fire. We monitored FP162's response to the loss of her kittens and documented through location flights and remote collar signal monitoring that she visited the den area for 23 days searching for her kittens. We attempted on 2 occasions to collar her, however, she was too high in the trees for a safe capture. In June 2012, she denned and

we marked 2 kittens. FP162's home range during the reporting period was 181 km^2 in the Turner River and Corn Dance Units (Figure 14).

FP175

FP175 had established residence in the Bear Island Unit and Addlands outside the SBICY study area in 2010, so has been monitored by FWC since then. Recollaring her was not in their study objectives, however, we wanted to retrieve the data from her GPS collar. We were unable to assemble our capture team when her collar began failing in December 2011. We, therefore, spent 7 days hunting for her and did retrieve the collar. Our success in finding her was mainly due to the cooperation of Roy McBride and Rebecca Sensor who were conducting a trail camera study in the area. They increased their monitoring of the cameras and notified us when and where she was caught on camera. Since FP175 resides in the FWC study area, she is not included in this report.

FP180

Female FP180 was collared for the first time on 21 February 2010 but was handled as a kitten, K264, at the den of FP151 in February 2008. She, therefore, was known to be 2 years of age when collared. At capture, we did not detect obvious signs of pregnancy or previous lactation. In March 2011 she denned, however, she was located in one location for only a few weeks, so we thought the kittens had died. On July 6, a young panther was treed by Roy McBride. He also documented FP180 and another juvenile in the vicinity. Later that month, Annette observed FP180 walking with 2 kittens during a panther location flight. We, therefore, missed that den. FP180 inhabited a 69-km^2 home range in the Deep Lake Unit during the 2011-2012 reporting period (Figure 15).

FP182

FP182 (K279) was born on February 10, 2009 to FP161. We captured her as a yearling on 1 March 2010. She remained with FP161 until 24 March. She denned for a first time in the Turner River Unit south of Lower Wagonwheel Road in April 2011 when she was 26 months of age. We marked 4 kittens on April 29. She likely lost those kittens, based

on the presence of adult male tracks near the den and her movements at the end of May. FP182 denned again in April 2012 but we were unsuccessful in marking the kittens since she rarely left the vicinity during the day and she apparently moved the kittens among the small islands of the area. (On September 12, 2012, Roy McBride documented her sign with 2 kittens.) FP182 inhabited a 34-km^2 home range in the Turner River Unit and occasionally crossed Hwy. 41 near Turner River into the westernmost Stairsteps Unit during the reporting period (Figure 16).

Post-script: On December 11, FP182 was found dead 60 meters south of Hwy. 41 within the Roadside Animal Detection System (RADS) zone. Efforts to document, through trail cameras, the presence of the kittens, then 9 months of age, were unsuccessful. Her necropsy indicated collision with a vehicle.

FP187

Male panther FP187 was first collared on February 5, 2011 in the Turner River Unit. He weighed 50 kgs and was estimated at 7 years of age. He inhabited a 405-km^2 home range within the Deep Lake, Turner River, Corn Dance Units and Addlands South during the reporting period (Figure 17).

FP190

Female panther FP190 was first collared on Feb. 14, 2011 in the Corn Dance Unit. She weighed 31 kgs and was estimated to be 5 years of age. An uncollared adult male was also treed nearby. FP190's examination at capture indicated that she had nursed but not recently. Annette saw her from the air with what appeared to be a yearling on 2 occasions, 7 and 8 months after her capture, so it is likely that she was traveling with kitten(s) when she was captured. She denned in April 2012 and 3 kittens were marked at the den. FP190 has inhabited the Turner River and Corn Dance Units in a 136-km^2 home range during the reporting period (Figure 18).

FP191

Female panther FP191 was first collared on February 26, 2011 in the northeastern Turner River Unit. She weighed 36 kgs and was known to be 12 years of age. She was marked with a transponder as a kitten at the den of Texas female 107 in February 1999. Two offspring, one male and one female, estimated to be dispersal age were also treed on February 26 and tracks suggested that there might have been 3 offspring with her. She denned in March 2012 and we marked one male kitten. She returned to the den but lack of den attendance indicated that the kitten had died. She denned again in June 2012 and we marked 1 female kitten. FP191 has inhabited the Turner River and Corn Dance Units in a 207-km^2 home range during the reporting period (Figure 19).

FP192

Female panther FP192 was first collared on February 28, 2011 in the Corn Dance Unit. She weighed 28 kgs and was known to be 1 year, 8 months of age because in July 2007, FWC had marked her with a transponder at the den of FP170 in the Picayune Strand State Preserve. Her capture site was a straight-line distance of 48 km from her birthplace. She denned in March 2012 and we marked 3 kittens. She has inhabited the Turner River and Corn Dance Units in a 275-km^2 home range during the reporting period (Figure 20).

FP194

K304 was one of 2 kittens marked at the May 2010 den of FP102. FP102 was killed by ISA on October 25, 2010 and K304 was captured at the site 5 days later. He was taken into captivity and raised at White Oak Conservation Center until he was 18 months old. He was released back into his mother's home range on November 29, 2011. Because he was fitted with a GlobalStar satellite tracking collar, his daily movements were known. It was documented that he killed and consumed adult deer and had traveled a straight-line distance of 24 km from his release site in the 6 weeks he was in the wild. On December 23, he was with collared adult female, FP192. He was 1 km from that location on Dec. 27 and 30. On January 3 he was located 1.2 km from the December 30 location. On January 6, he was 3.8 km from the January 3 location. These movements indicate that he had not been severely injured by a territorial male at the time he was with the adult

female. He remained, however, at the January 6 location. On January 12, Big Cypress staff found him alive but in very poor condition with signs of ISA. He was removed from the field, treated in Naples, and transported to Gainesville where he died of bacterial infection and severe inflammation of the lungs, results of his lacerations and puncture wounds. Figure 21 shows his area of use in the Turner River and Corn Dance Units during the 2 months he was in SBICY.

FP199

This female panther, estimated at 2-2.5 years of age, was collared in the Addlands north of I-75 on February 9, 2012, while hunting for FP175. Monitoring of this panther was undertaken by FWC since she was outside the SBICY study area.

FP211

This male panther, estimated at 2 years of age, was collared on February 10, 2012 on private lands adjacent to the Addlands while hunting for FP175. Monitoring of this panther was undertaken by FWC since he was outside the SBICY study area. This panther died of ISA on May 21, 2012.

FP214

The female panther, estimated between 3 and 4 years of age, was collared on February 22 in the Turner River Unit. She weighed 72 lbs and was in good condition. Her 47 km^2 home range during the 4 months of the reporting period has been in the Turner River Unit (Figure 22)

FP216

This male panther, estimated at 1 to 1.5 years of age, was collared on March 11, 2012 with a GlobalStar satellite collar. During the 4 months of the reporting period, his area of use encompassed the Turner River and Deep Lake Units (Figure 23).

The average home range (95% MCP) of the 2 resident males was 535 km^2 and that of the 11 resident females was 114 km^2.

Reproduction

Eleven breeding age female panthers were monitored during the reporting period and 8 of them denned. We checked 8 dens and marked 21 kittens, 14 males and 7 females, with transponders. We missed the den of FP182 because she rarely left the general vicinity and had moved the kittens among the area's small islands. Two kittens with her were later documented by tracks found by Roy McBride.

FP	Birthdate	Male	Female	Unit
145	24 Jan 2012	2	1	Deep Lake
153	10 Feb 2012	4	0	Turner River
182	12 Mar 2012	?	?	Turner River
191	15 Mar 2012	1	0	Turner River
192	26 Mar 2012	3	0	Corn Dance
161	12 Apr 2012	2	2	Turner River
190	25 Apr 2012	1	2	Corn Dance
162	7 June 2012	1	1	Turner River
191	28 June 2012	0	1	Turner River

Mortality/Injuries

Three adult panthers and one 12-day-old kitten were known to have died in the study area during the reporting period (Figure 23). One adult died of a collision with a vehicle and another confirmed panther was struck but fled into the woods. Two adult males died of ISA. The kitten was abandoned at its den and died of malnourishment.

FP194 (K304)

See above for details of the death of this juvenile male panther.

UCFP168

This uncollared male panther, estimated at 5 years of age, was struck and killed by a vehicle on Hwy. 41 in Ochopee on February 6. This is the first panther killed in the Roadside Animal Detection System (RADS) Zone since it became operative in January. The necropsy found #6 lead shot in his left leg, abdomen, and thorax. He was likely shot at close range from behind in a timeframe of months to years prior to the necropsy.

K351

This kitten was one of 4 marked at the den of FP153 on February 19, 2012. He was the smallest of the kittens and was in poor condition. FP153 moved the den 200 meters after handling, but apparently left K351 at the original den. Staff found K351 dead on February 23 and estimated that he had died on the 22nd.

FP133

See above for details of the death of this adult male panther.

Confirmed panther injury by motorcycle

On March 31, 2012 at 1030, a motorcycle struck a panther on Hwy. 41 in Ochopee. The animal briefly lay in the road but then ran into the woods on the south side of the road. The motorcycle driver was injured and received medical treatment at the hospital. Collier County Sheriff's Office responded to the accident and reported it to FWC dispatch, however, panther biologists were not notified until later that day. They responded by searching for the panther with hounds the following day. Any scent by that time had dissipated and no sign was found. Hair imbedded in the motorcycle confirmed that a panther had been struck.

Project Benefits

The efforts from the past 24 years of panther survey and monitoring work, 17 years of panther reproductive assessment, and 11 years of panther capture work conducted by National Park Service in Big Cypress have provided a significant amount of data with

which management decisions have been influenced and panther ecology more thoroughly understood.

Recommendations

Turner River Crossing

A recommendation was made 7 years ago in the 2004-2005 Big Cypress Annual Panther Report to initiate discussions regarding the need for a wildlife underpass on Hwy. 41 at Turner River due to the fact that this is a known panther corridor with a concentration of vehicle strikes. Defenders of Wildlife, along the USFWS, obtained funding for the planning stages of this project in 2006, however, public and tribal opposition resulted in project abandonment. Instead of a wildlife underpass, an experimental technology, a Roadside Animal Detection System (RADS), was installed in the area. We continued to document the crossing of 2 collared adult female panthers in addition to reports of other panthers crossing in this area. On December 11, the remains of one of these 2 collared panthers were retrieved and her necropsy indicated a collision with a vehicle. It is likely that her 9-month-old offspring will not survive. It is recommended, therefore, that, if further panther mortality occurs in this area, construction of a wildlife underpass there be vigorously pursued by the agencies as a solution to this site of chronic panther mortality.

State Road 29

State Road 29 is a heavily traveled north-south road that bisects large public land areas in south Florida. Since 1979, 38 panther deaths have been verified on this road, including 2 which occurred during this reporting period. Unlike the I-75 project, the inadequate number of underpasses and the absence of continuous fencing perpetuate the chronic problem of panther mortality on this road (Jansen et al 2010). We continue to recommend the development of a SR 29 Panther Protection Plan so that, as funds become available, this road is secured against further panther and other wildlife road mortality.

Acknowledgments

Although this report is authored by Big Cypress staff Deborah Jansen, John Kellam, and Annette Johnson who conduct panther research and monitoring throughout the year, its

contents are equally due to the efforts of Ralph Arwood, Dennis Giardina, Kevin Castle, and Rocky McBride, capture team members. This year we also acknowledge and appreciate the assistance of Rebecca Sensor, DVM Ray Ball from Lowry Park Zoo, Dr. Nick Kapustin from the Jacksonville Zoo, and John Lanier and Erik Madison, DVMs from Naples. Special thanks every year go to the Maintenance staff at Big Cypress, especially Dave Adams and Dave Putnam, who keep our buggy wheels turning.

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Table 1. Florida panthers captured and radio-collared in BICY in 2012.

FP#	K#	Capture Date	Gender	Age (yrs)	Type	Capture Location	
						Easting	Northing
199		February 9	F	~2-2.5	NBICY	483398	2903155
211		February 10	M	~2	NBICY	481728	2906735
180	K264	February 13	F	4	resident	465578	2885359
153		February 19	F	~11	resident	477167	2889318
214		February 22	F	~3-4	resident	482970	2874253
175	K254	March 3	F	4.5	NBICY	483239	2898081
216		March 11	M	~1-1.5	juvenile	477482	2880035

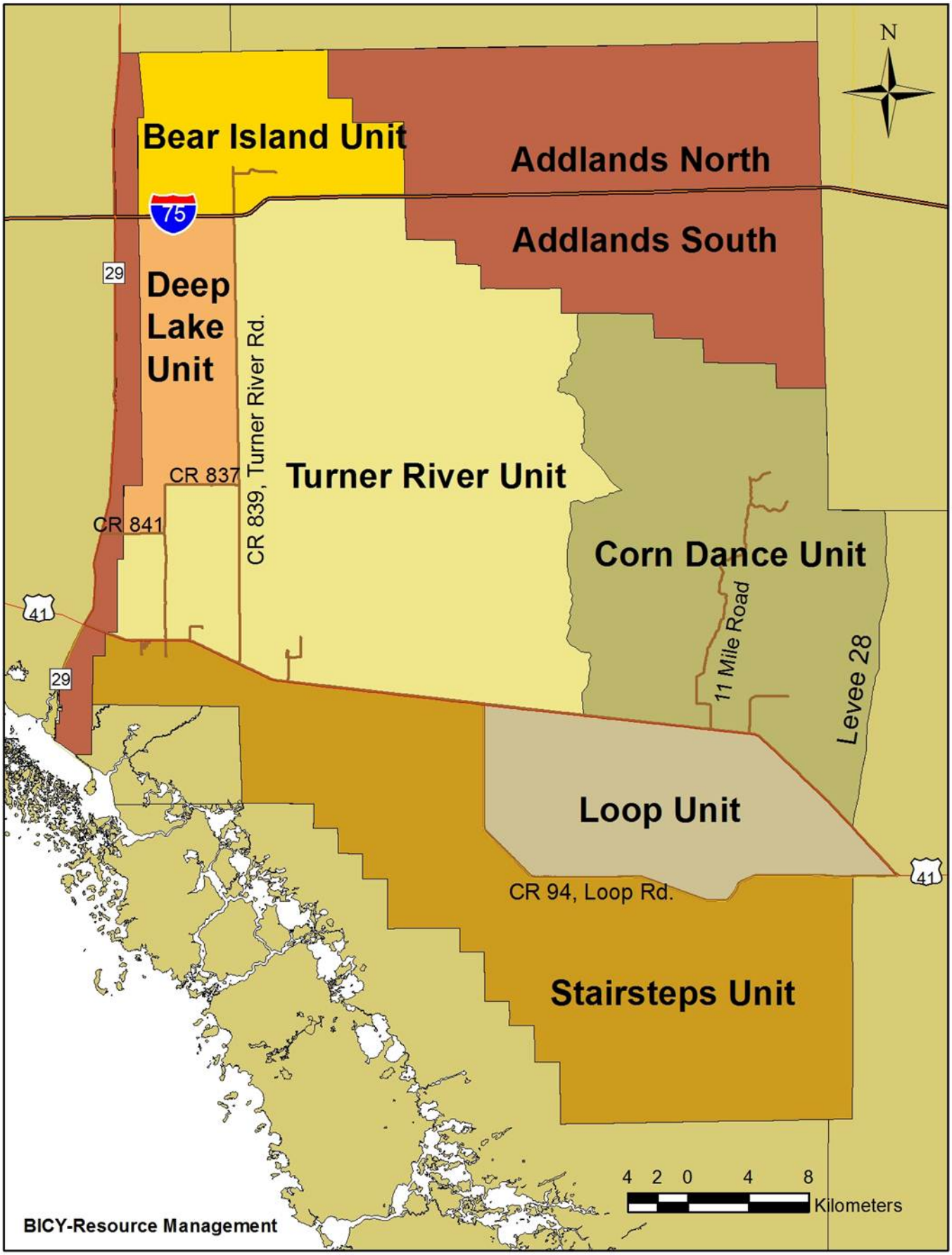

Figure 1. Management units and roads in Big Cypress National Preserve.

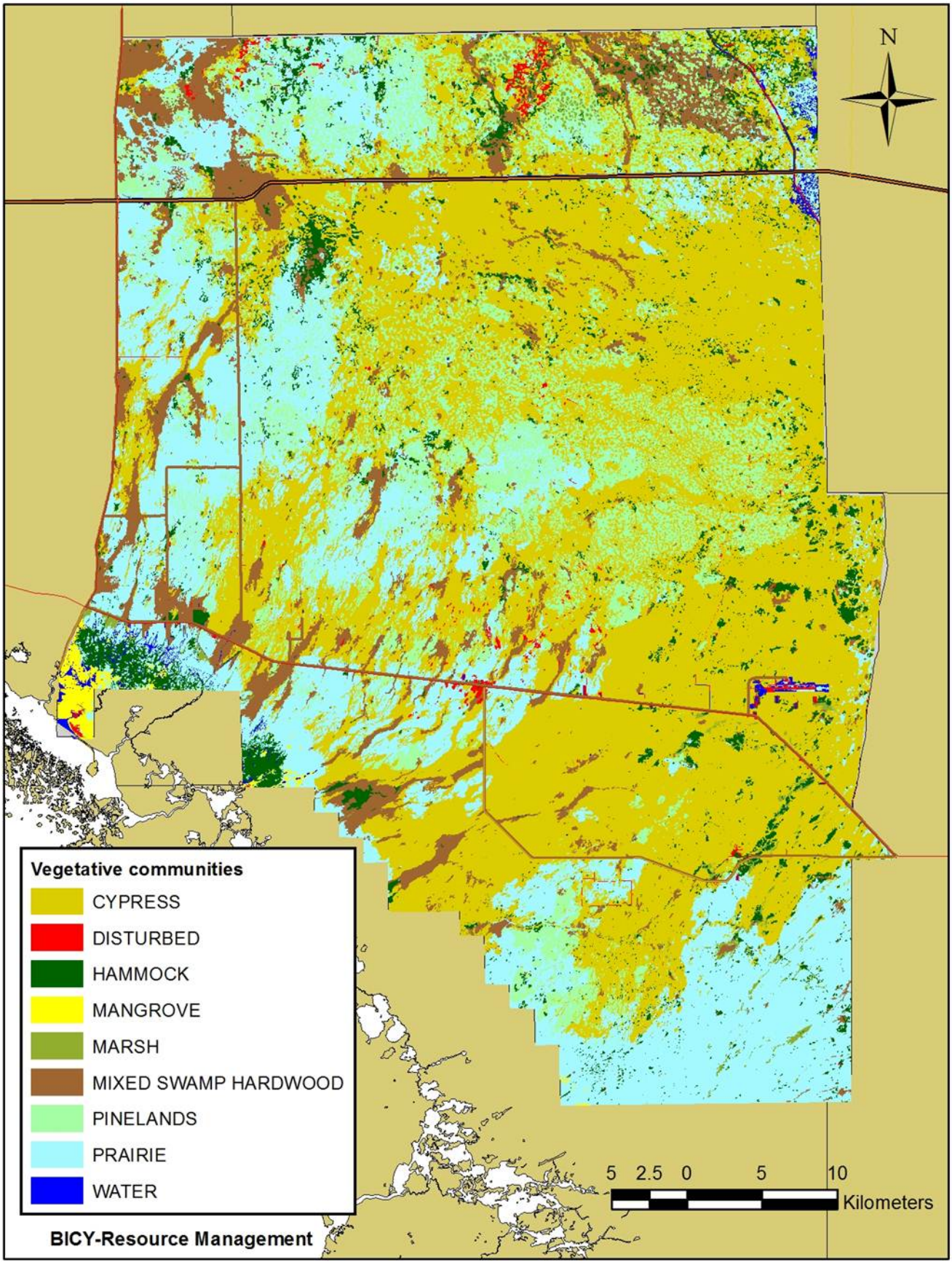

Figure 2. Vegetative communities in Big Cypress National Preserve.

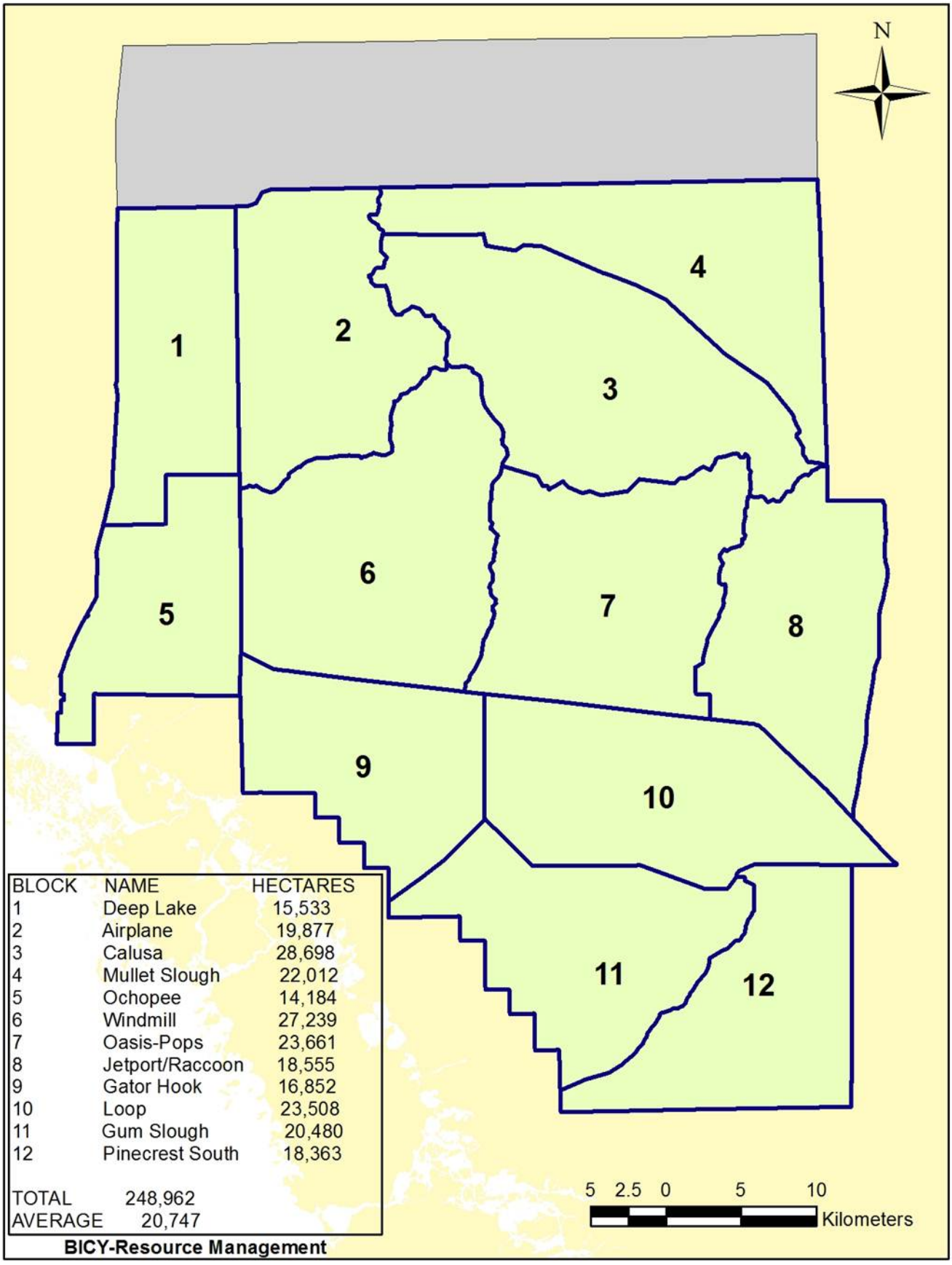

Figure 3. Panther survey blocks in SBICY.

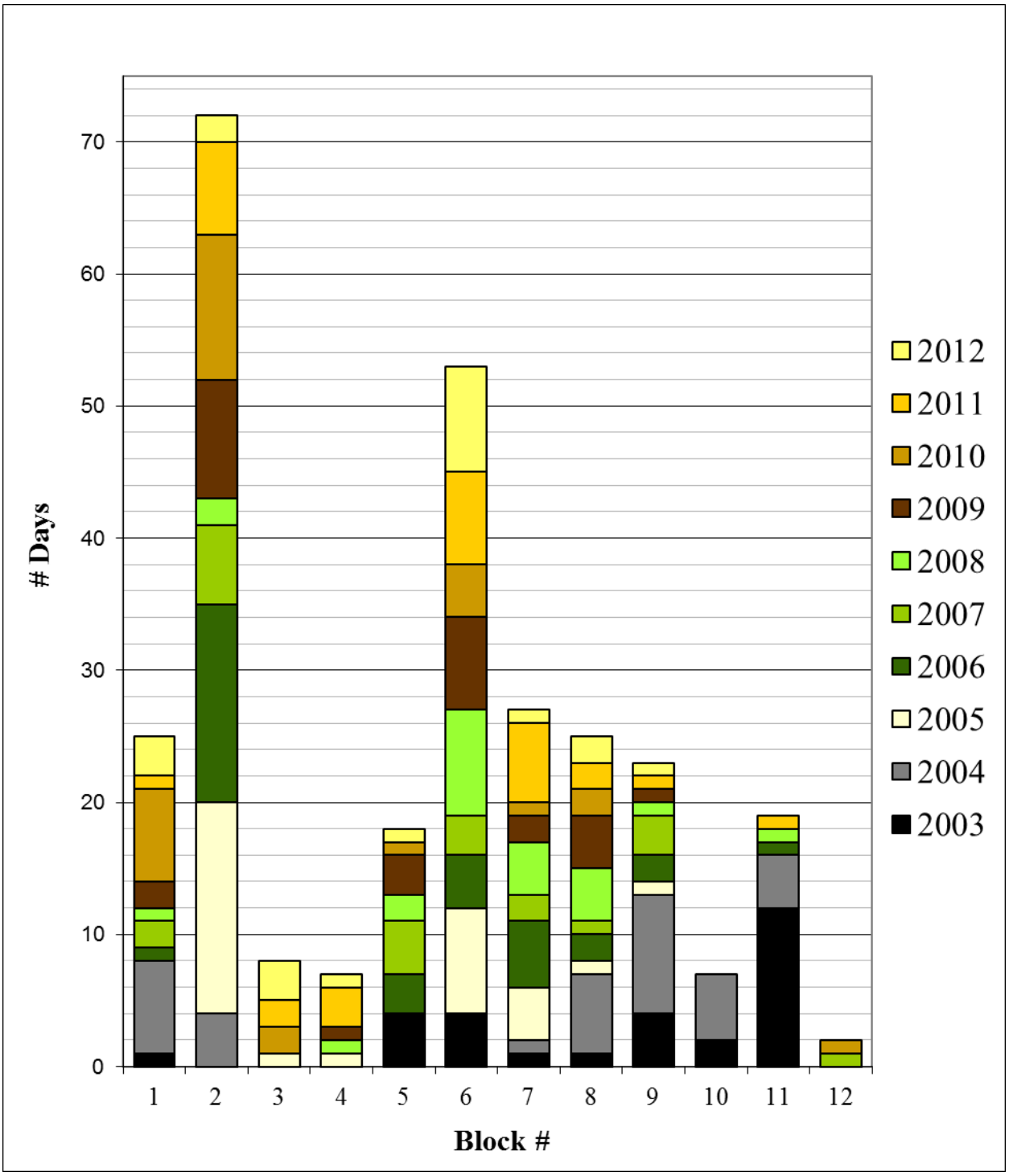

Figure 4. Panther capture effort per survey block: 2003 – 2012.

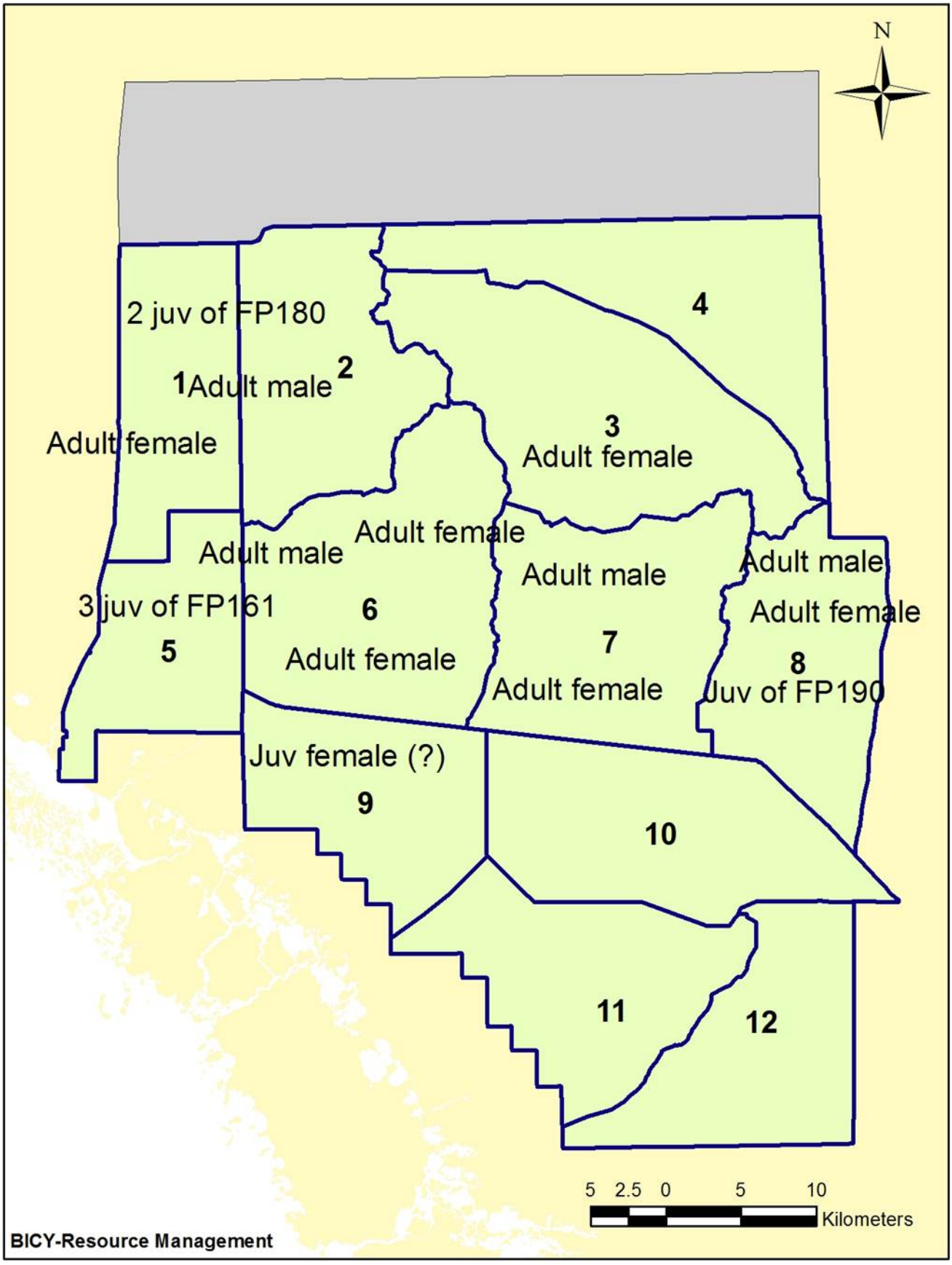

Figure 5. Documented presence of uncollared (or failed collar) panthers in SBICY from Jul. 2011 - Jun. 2012.

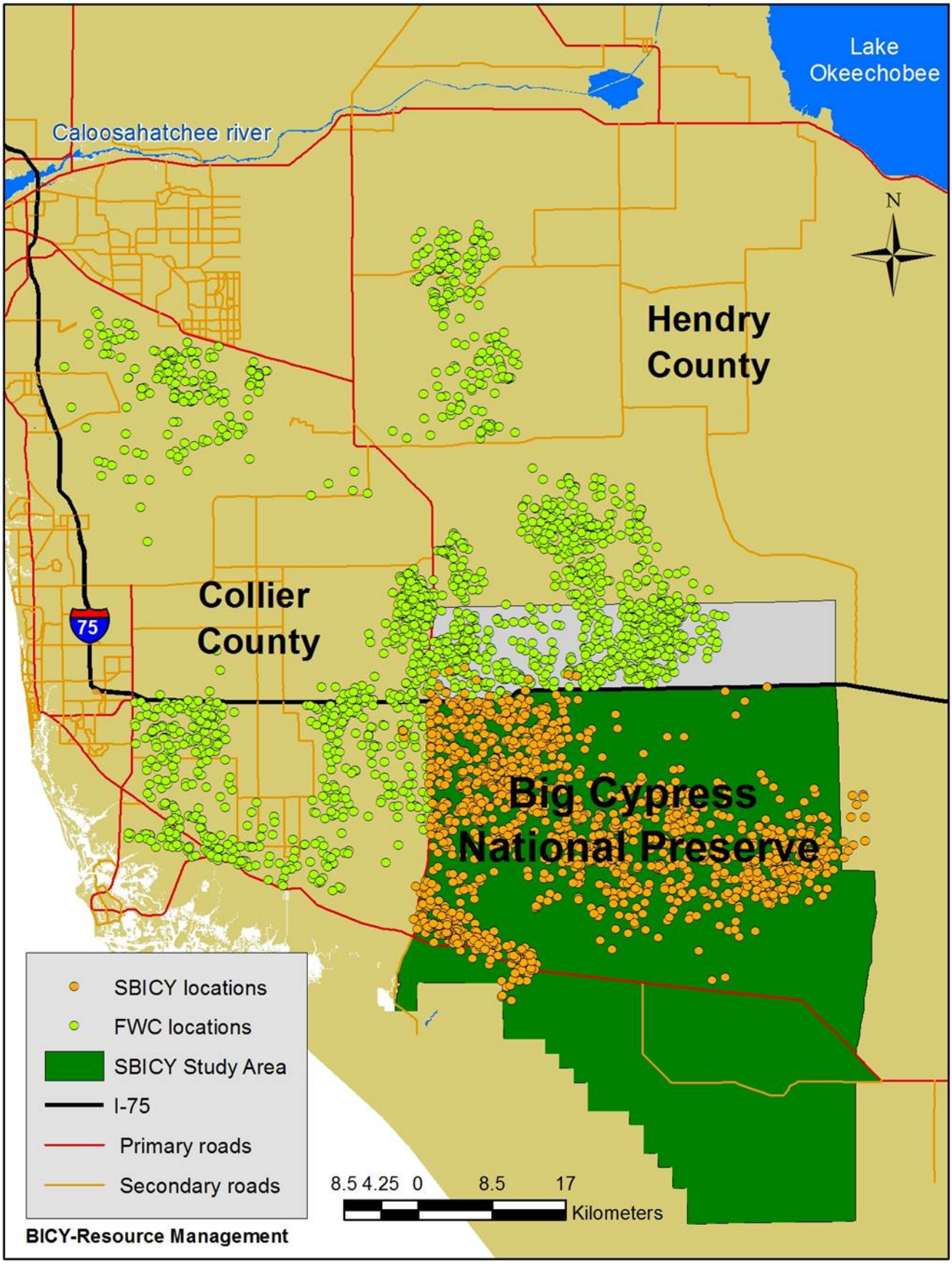

Figure 6. Geographical distribution of all Florida panther telemetry locations from July 2011 -June 2012.

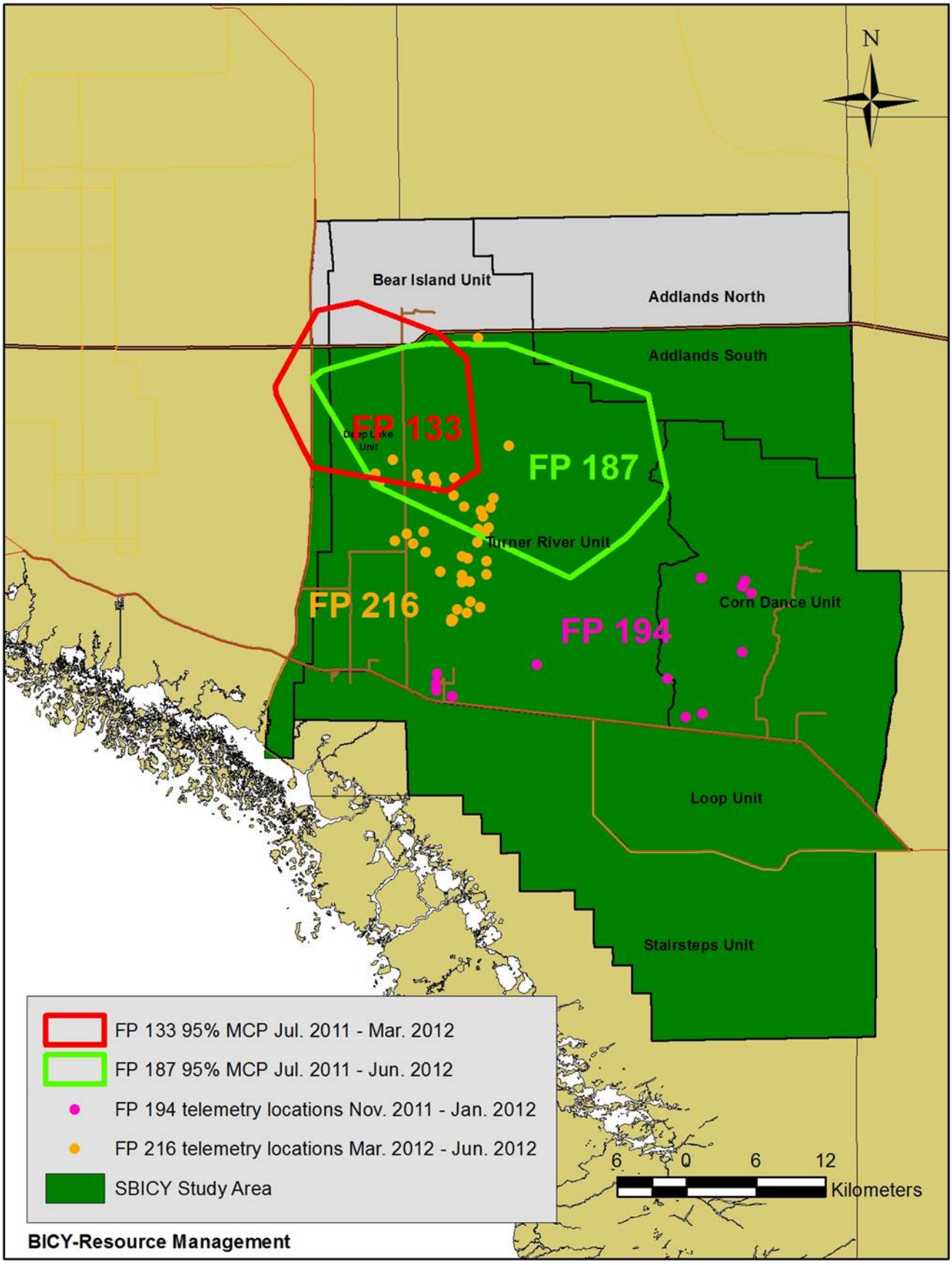

Figure 7. Home ranges of adult male Florida panthers monitored in SBICY from July 2011 - June 2012.

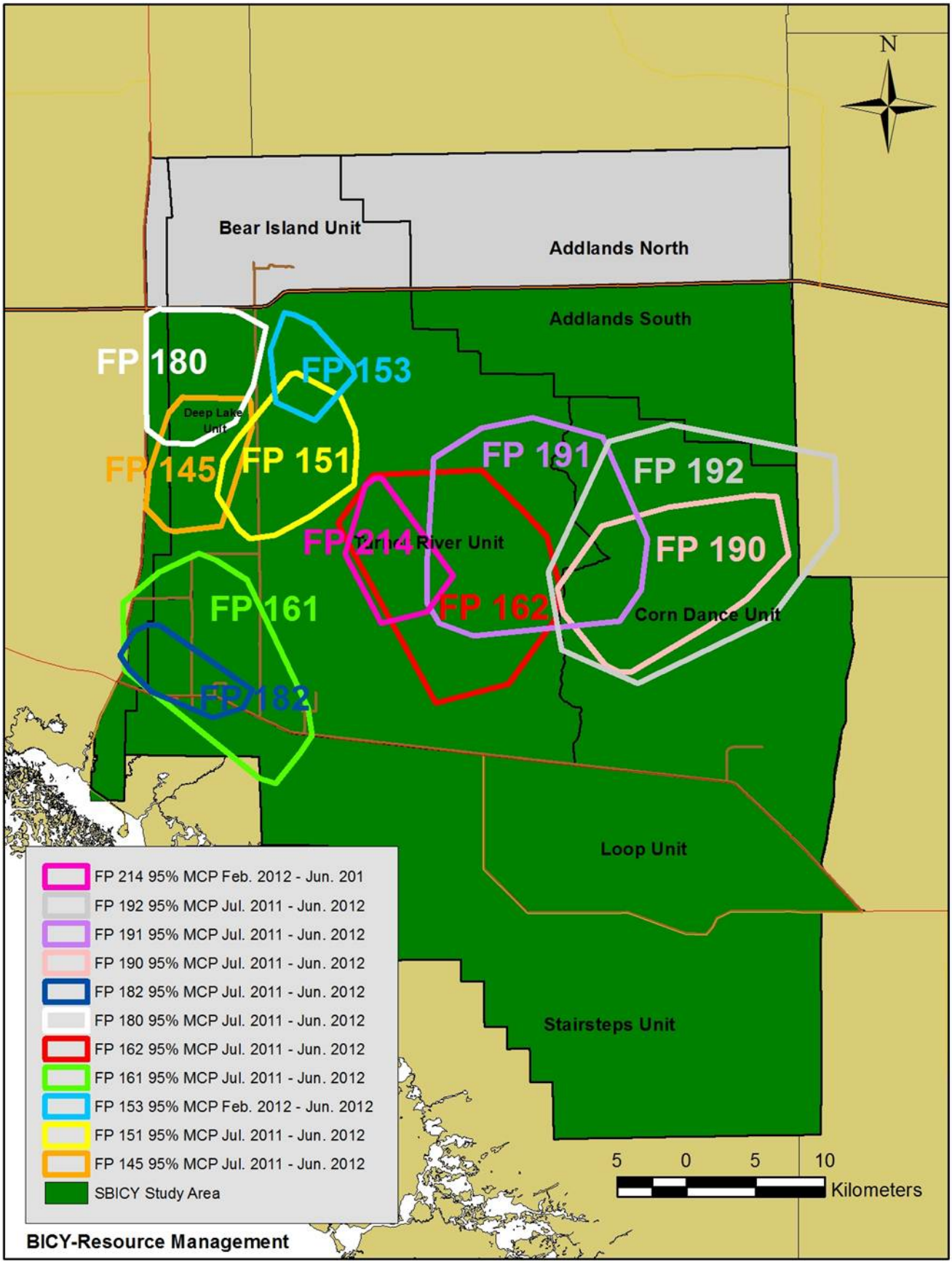

Figure 8. Home ranges of adult female Florida panthers monitored in SBICY from July 2011 - June 2012.

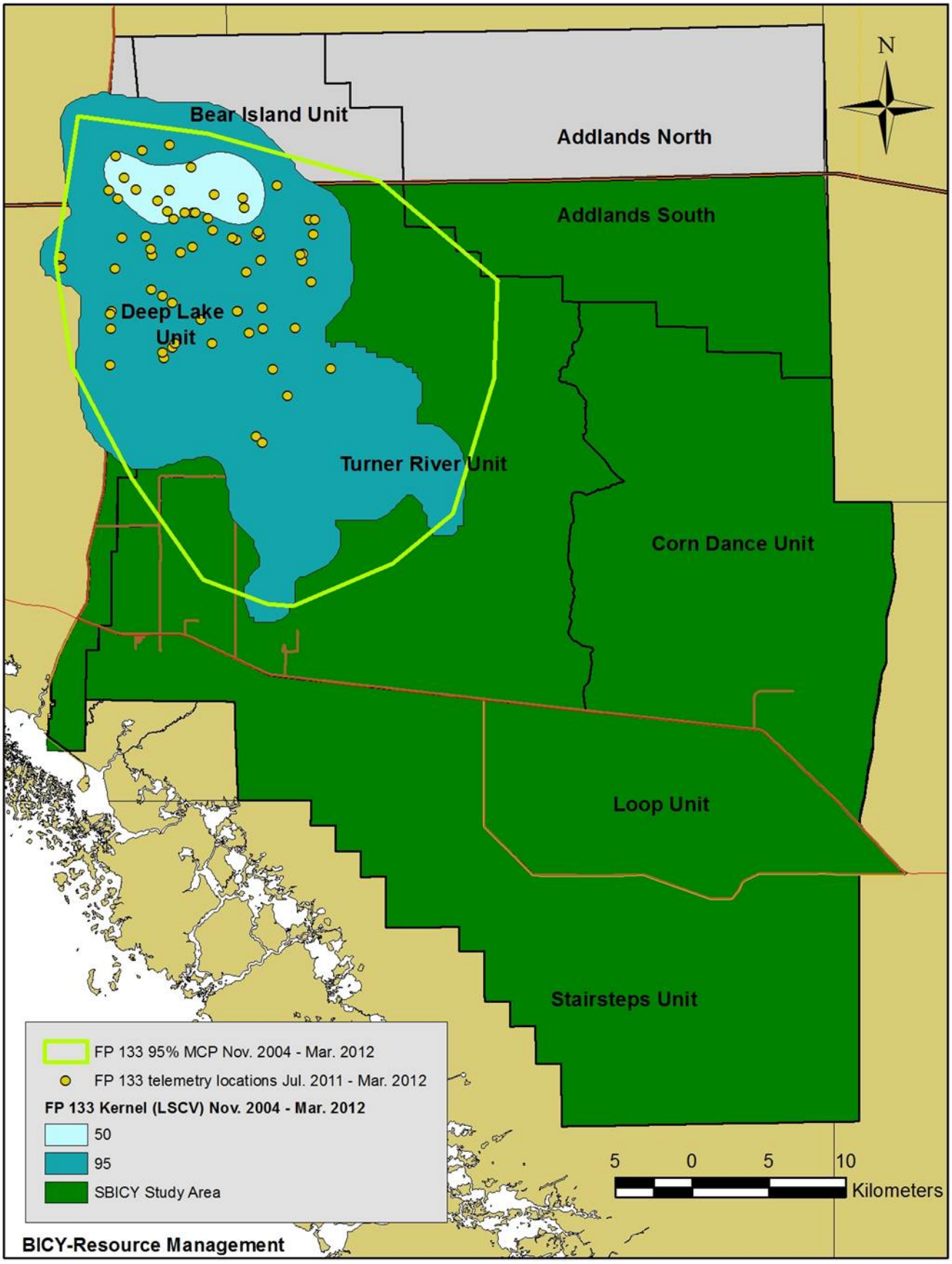

Figure 9. Lifetime home range of male Florida panther #133.

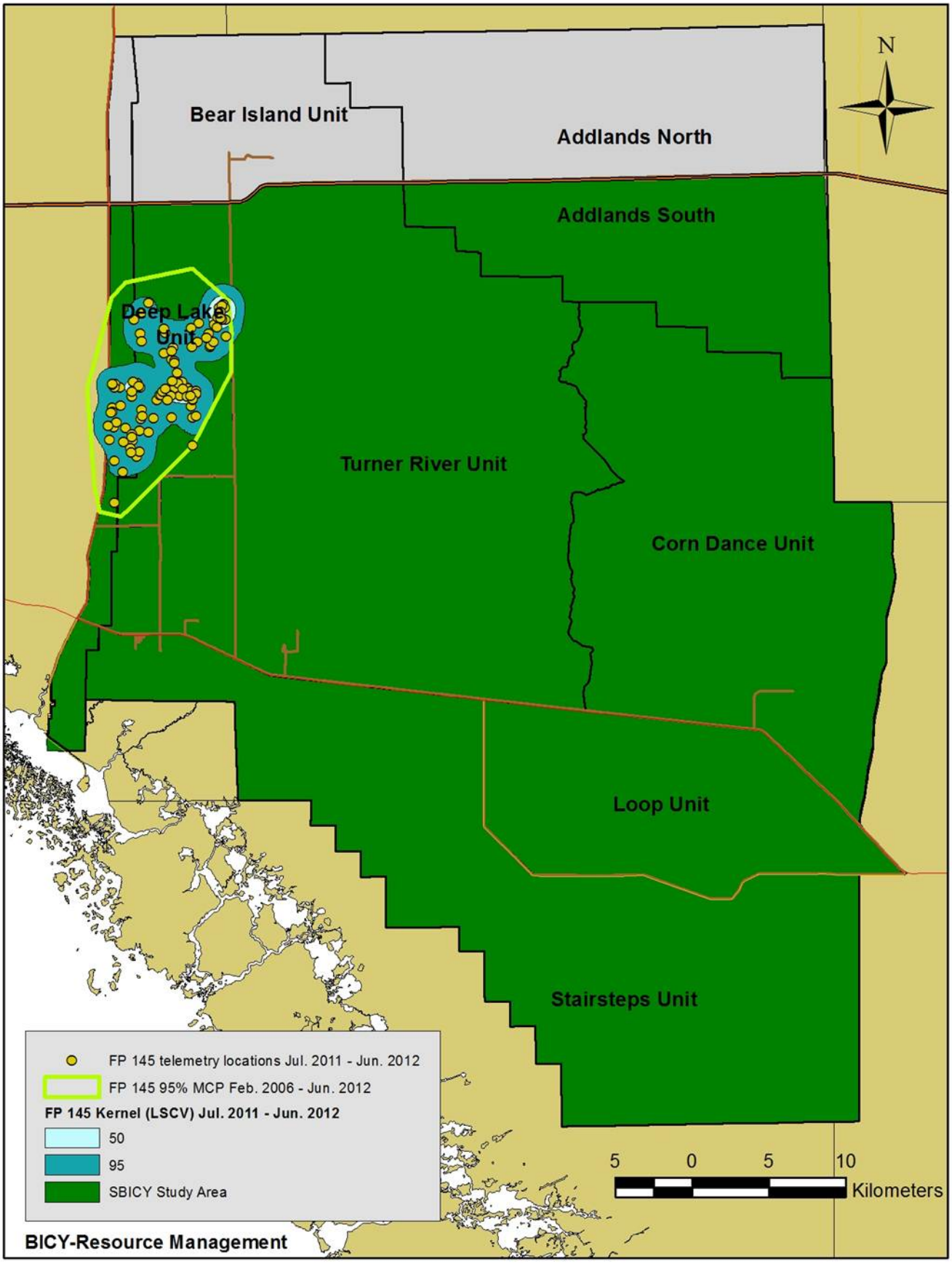

Figure 10. Home range of female Florida panther #145.

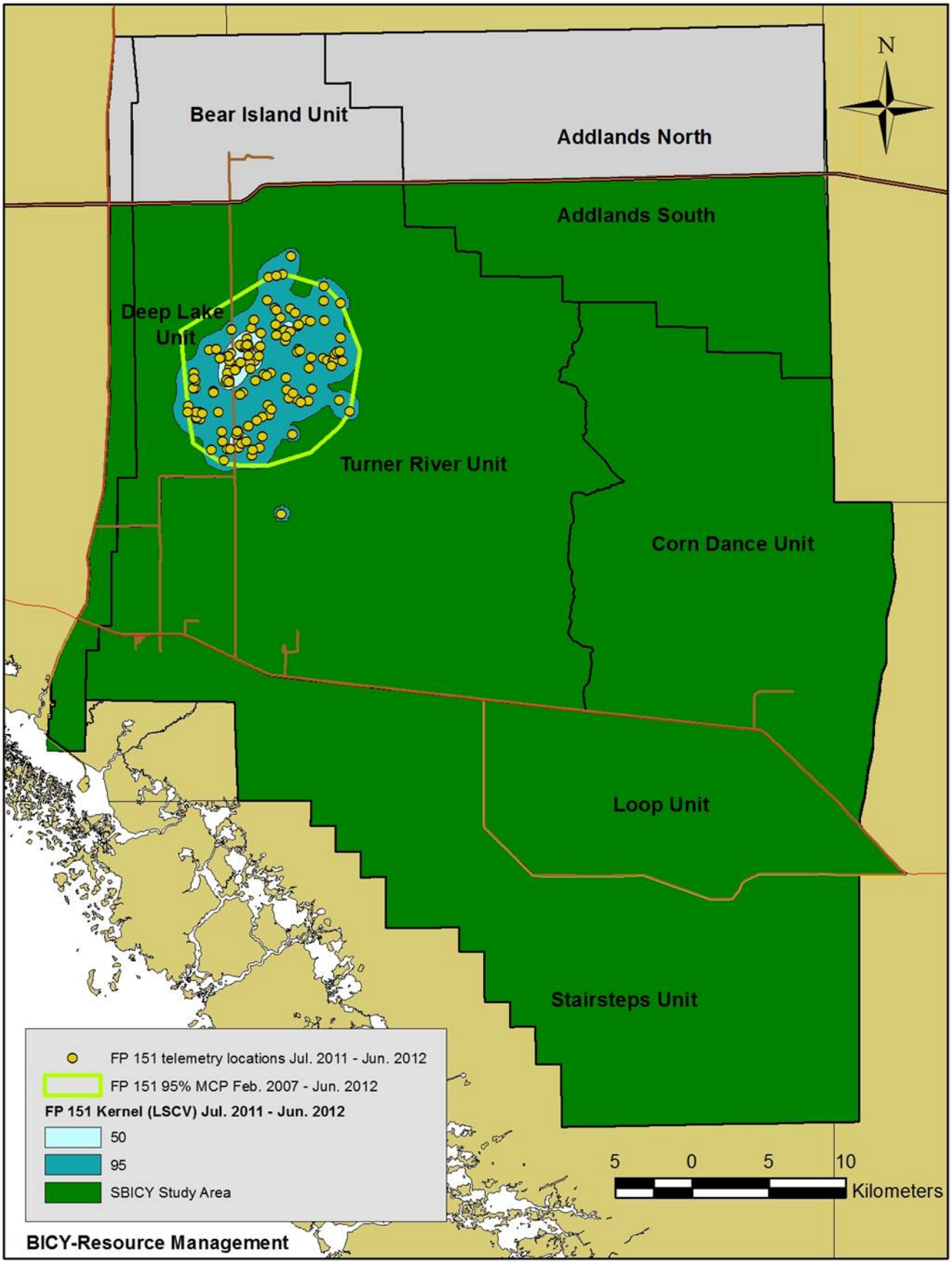

Figure 11. Home range of female Florida panther #151.

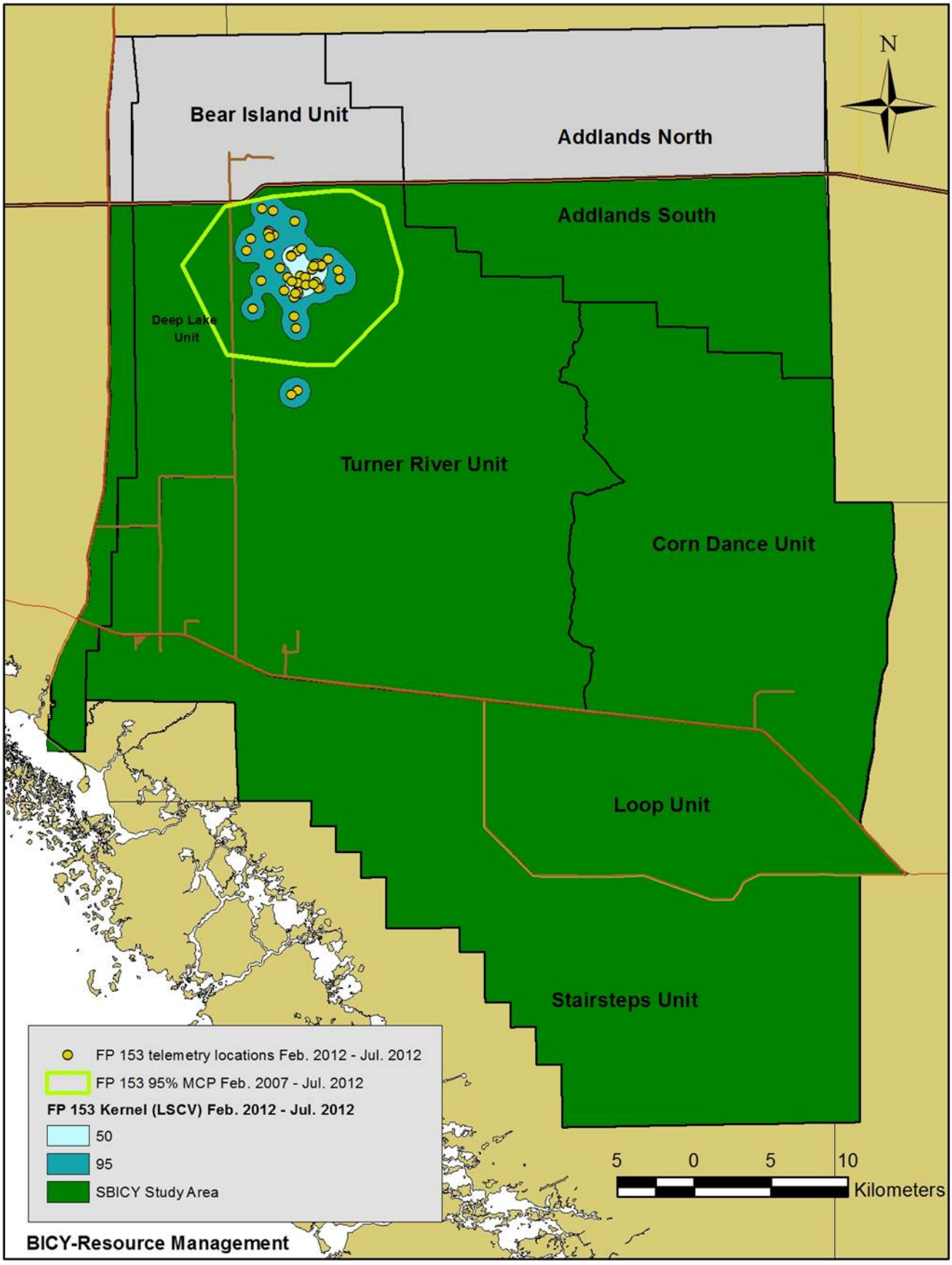

Figure 12. Home range of female Florida panther #153.

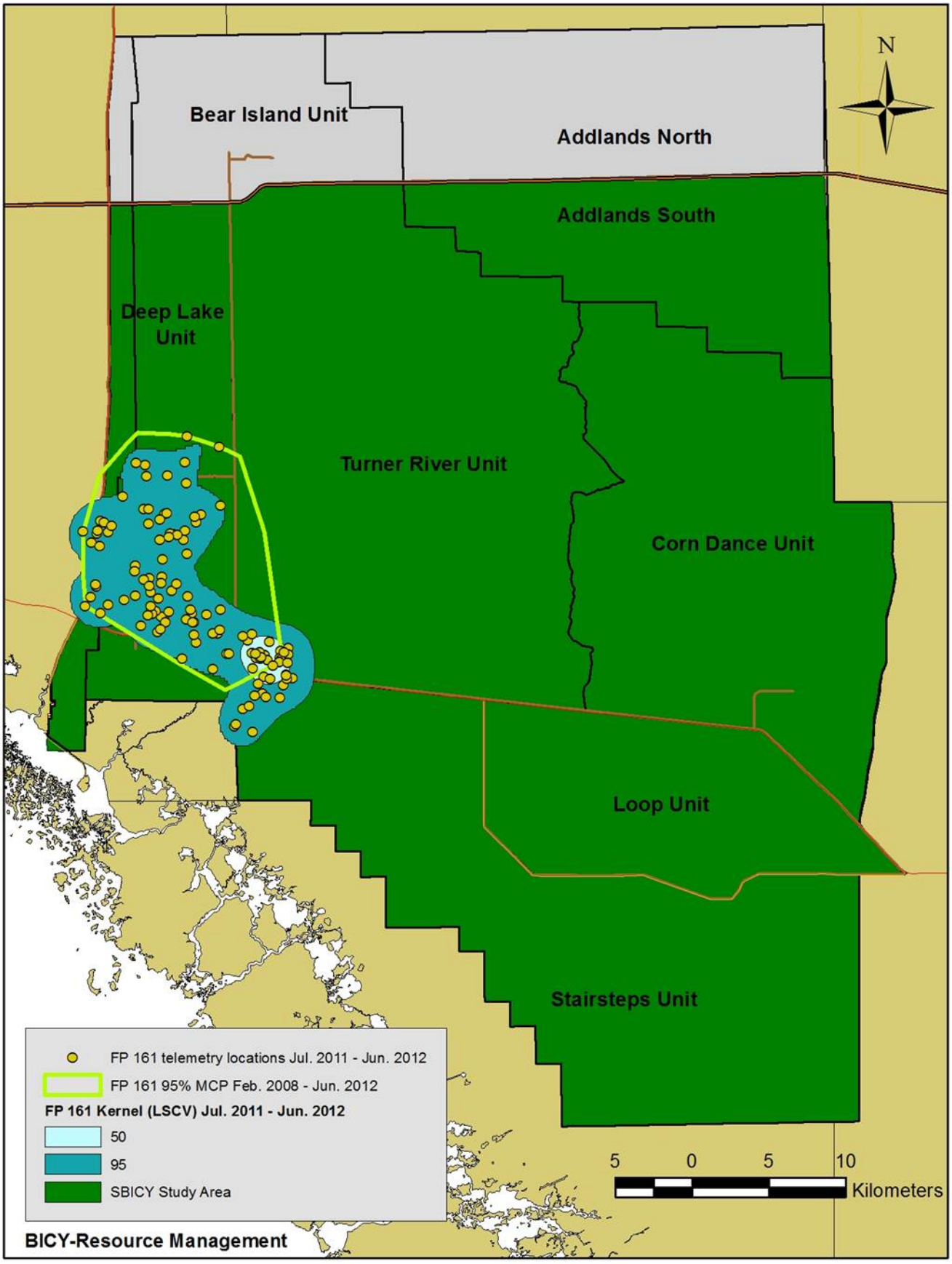

Figure 13. Home range of female Florida panther #161.

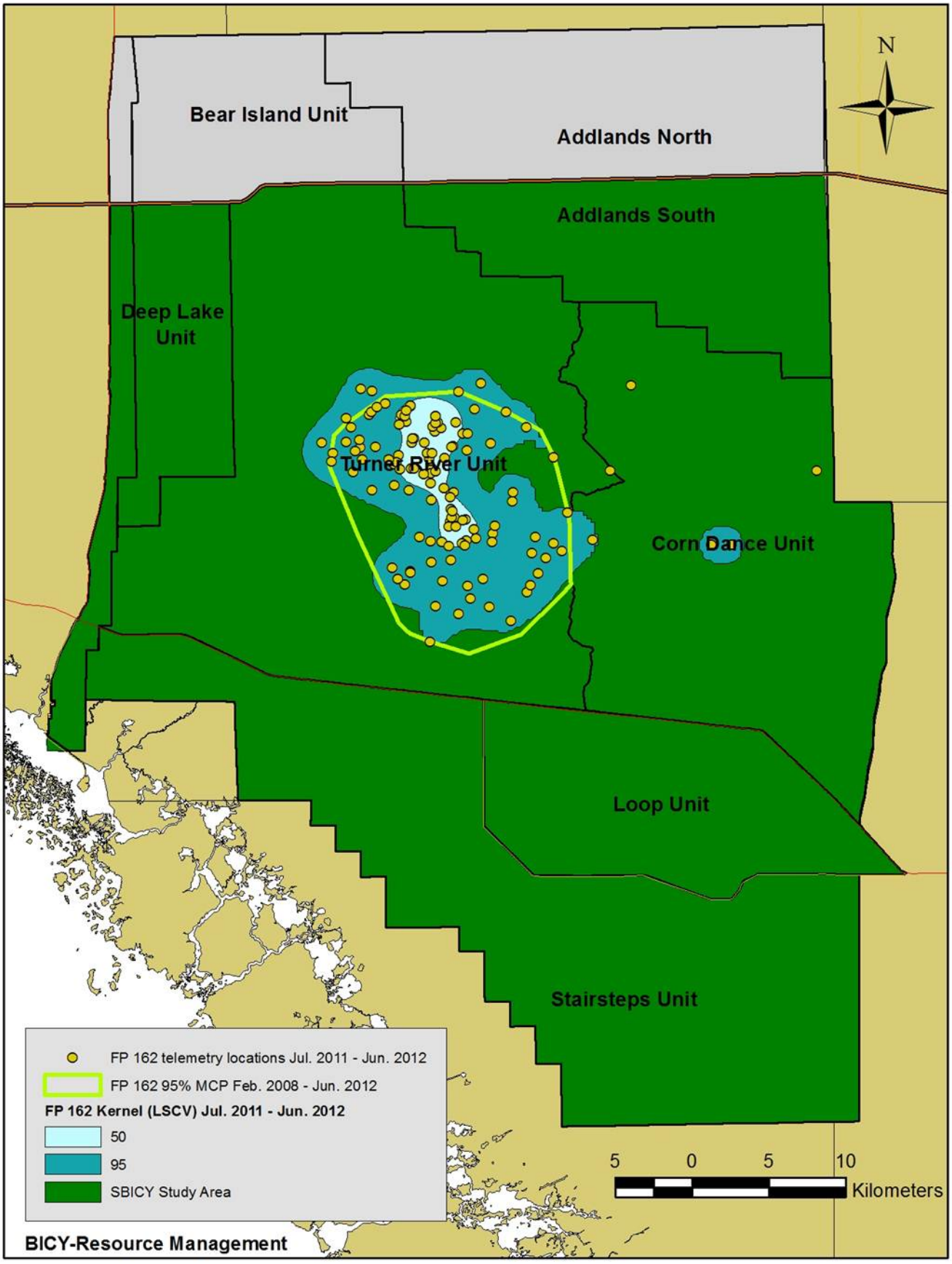

Figure 14. Home range of female Florida panther #162.

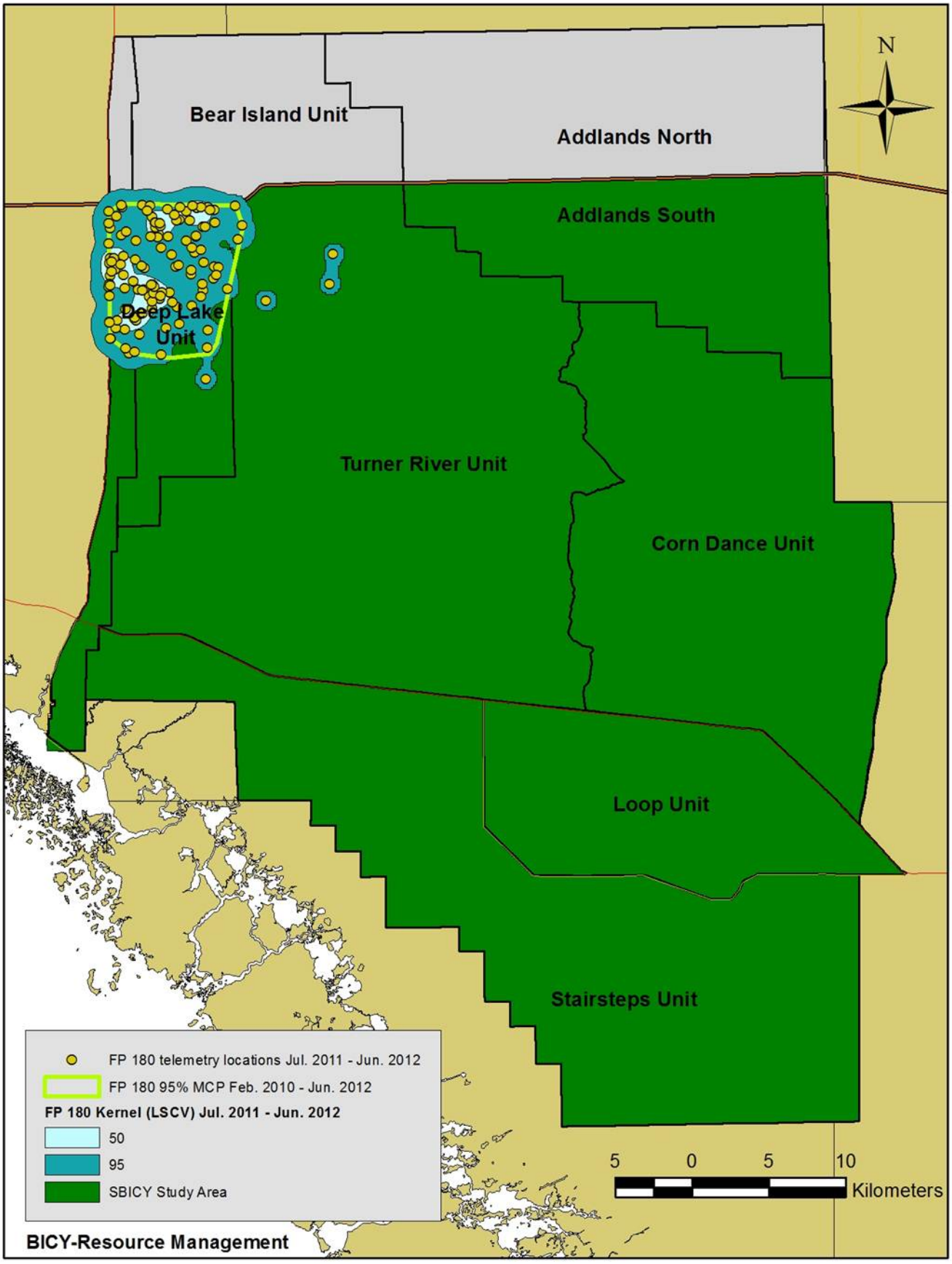

Figure 15. Home range of female Florida panther #180.

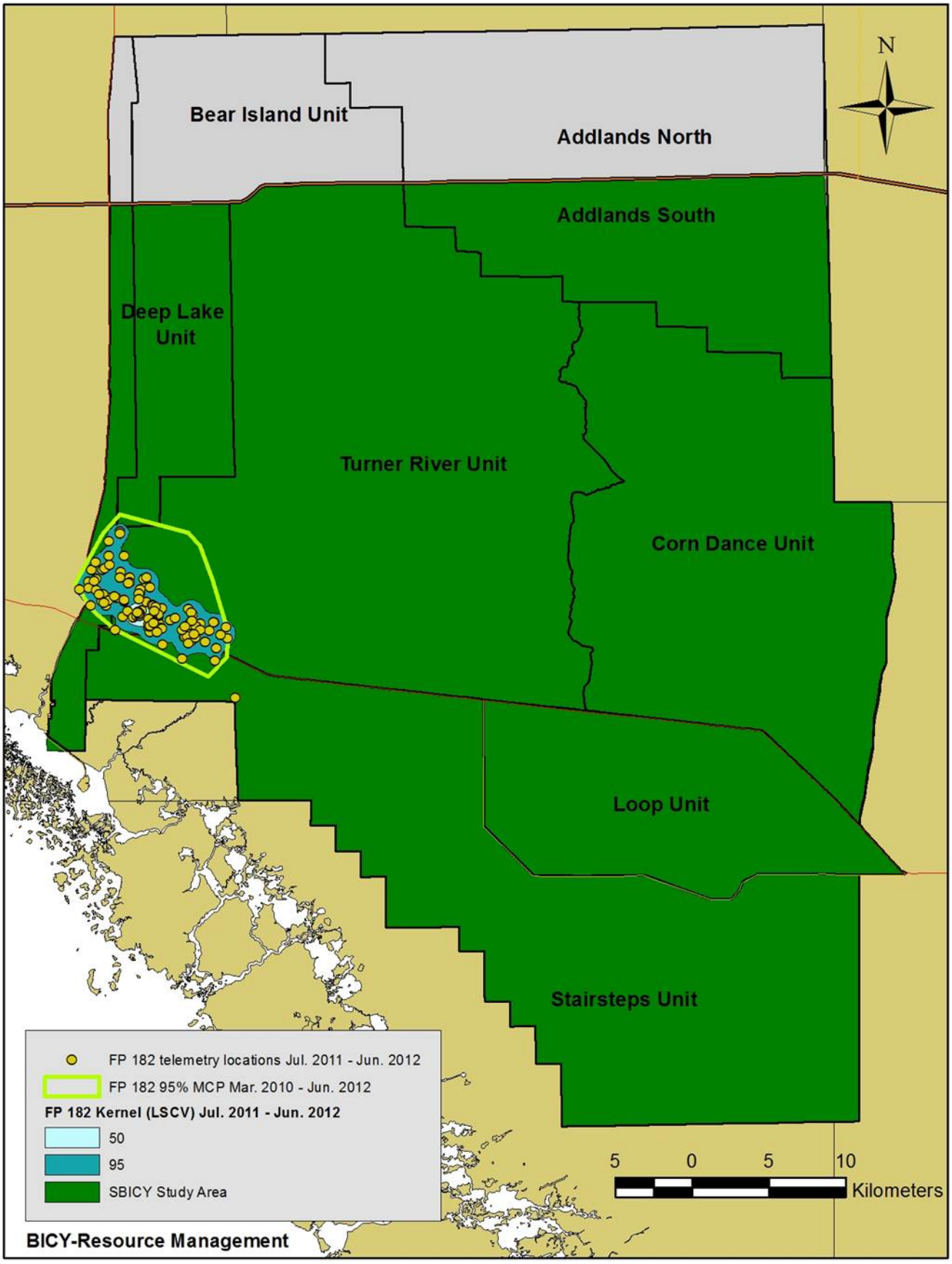

Figure 16. Home range of female Florida panther #182.

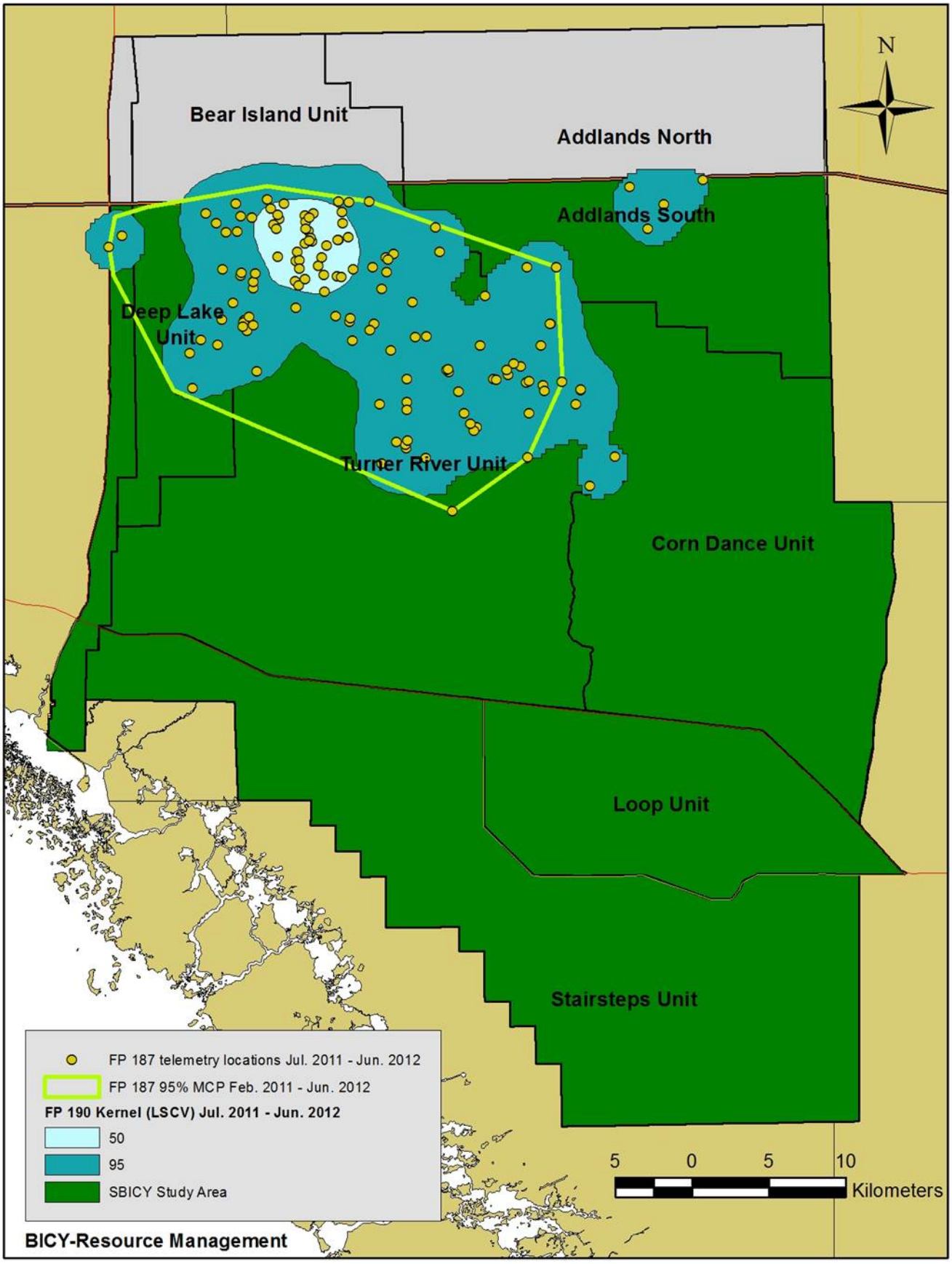

Figure 17. Home range of male Florida panther #187.

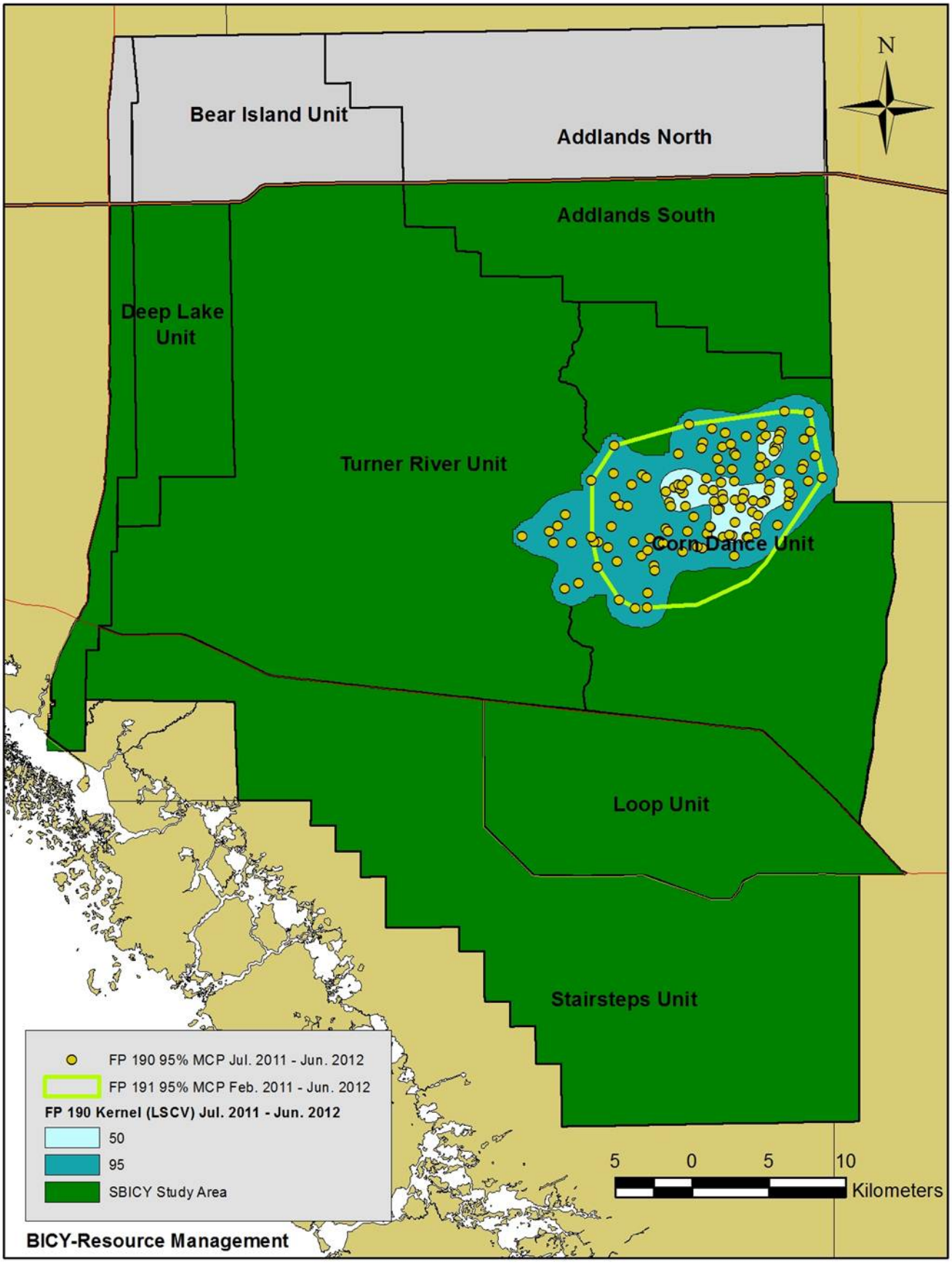

Figure 18. Home range of female Florida panther #190.

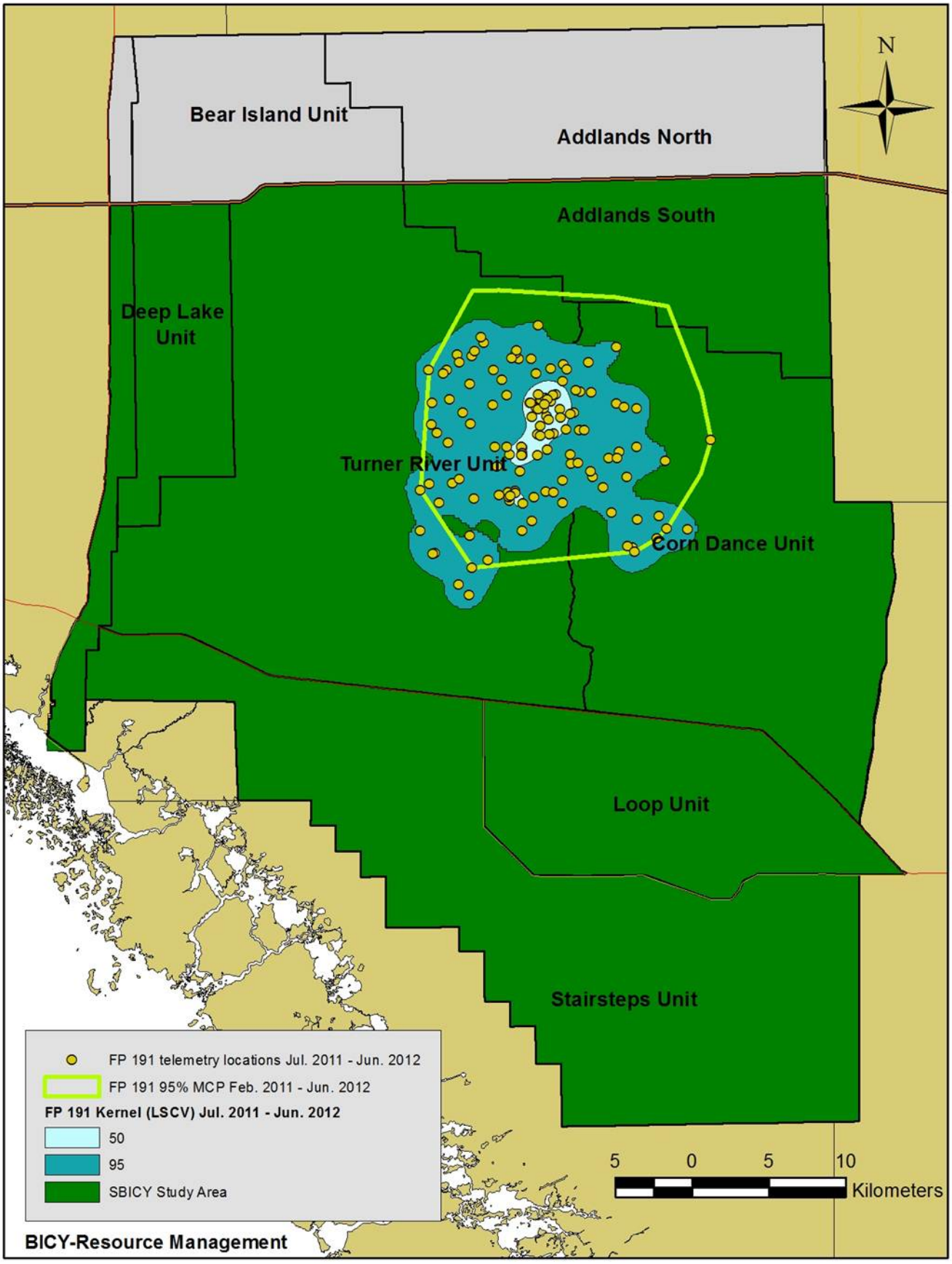

Figure 19. Home range of female Florida panther #191.

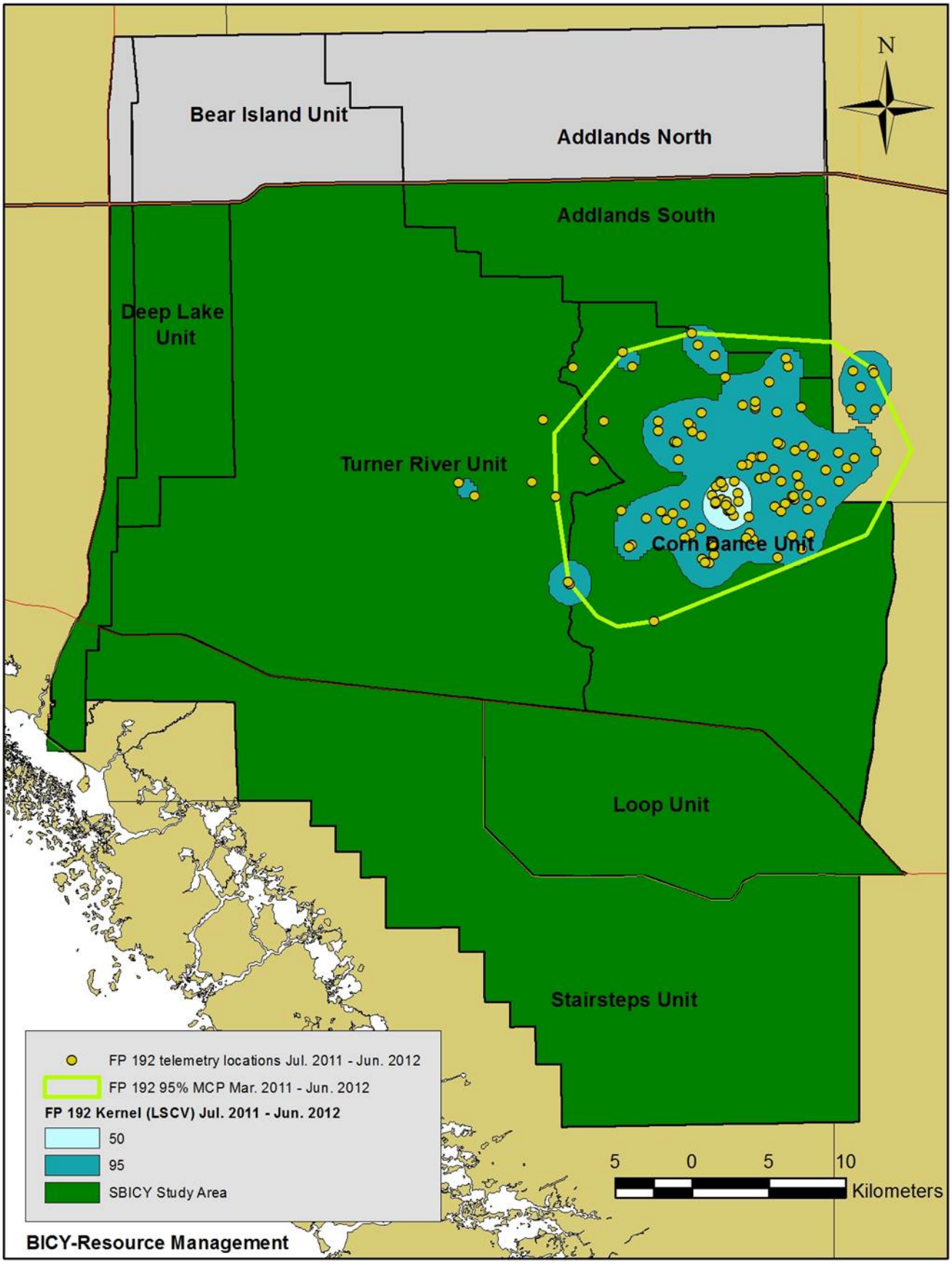

Figure 20. Home range of female Florida panther #192.

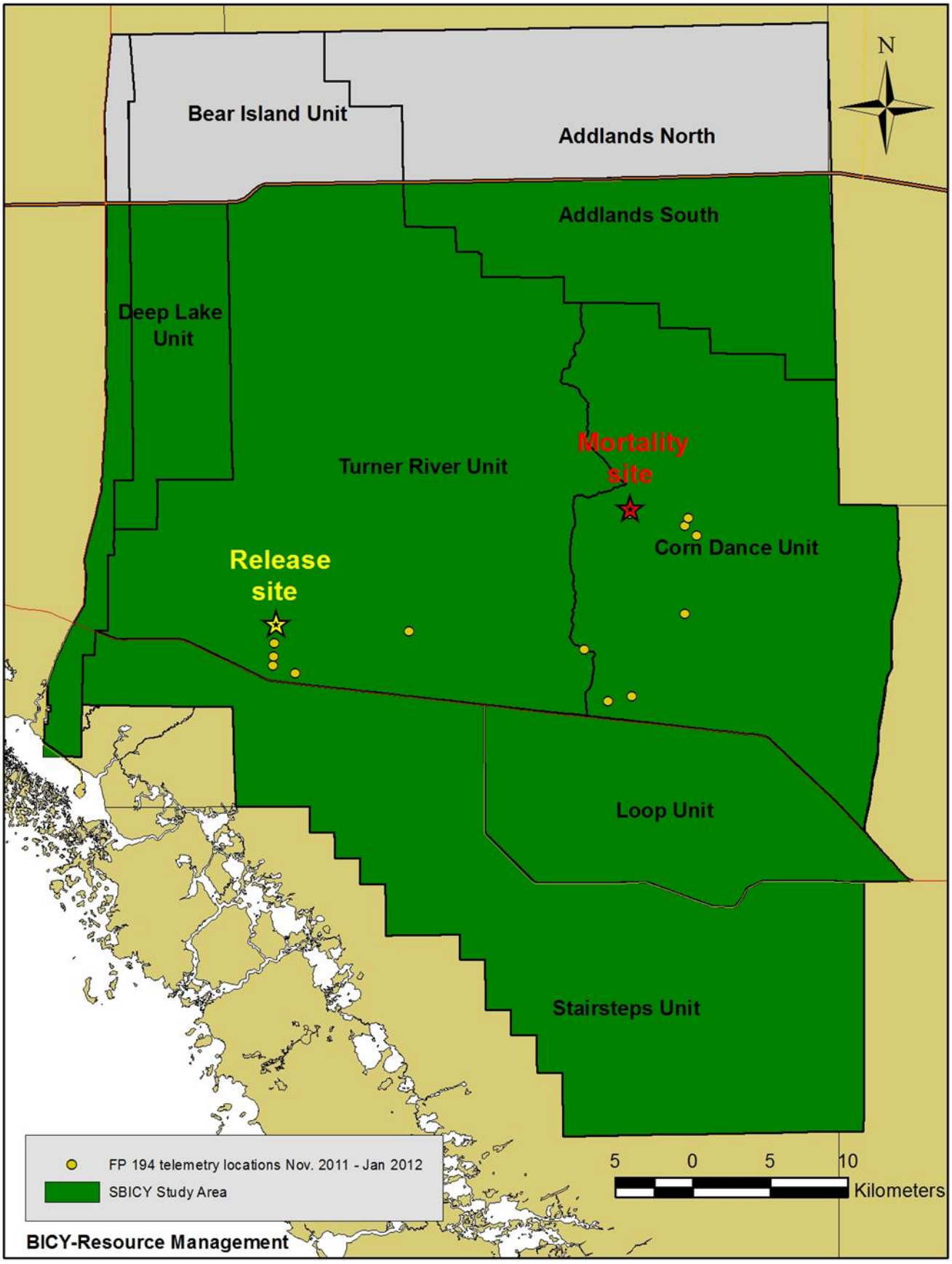

Figure 21. Release site, locations, and mortality site of male Florida panther #194.

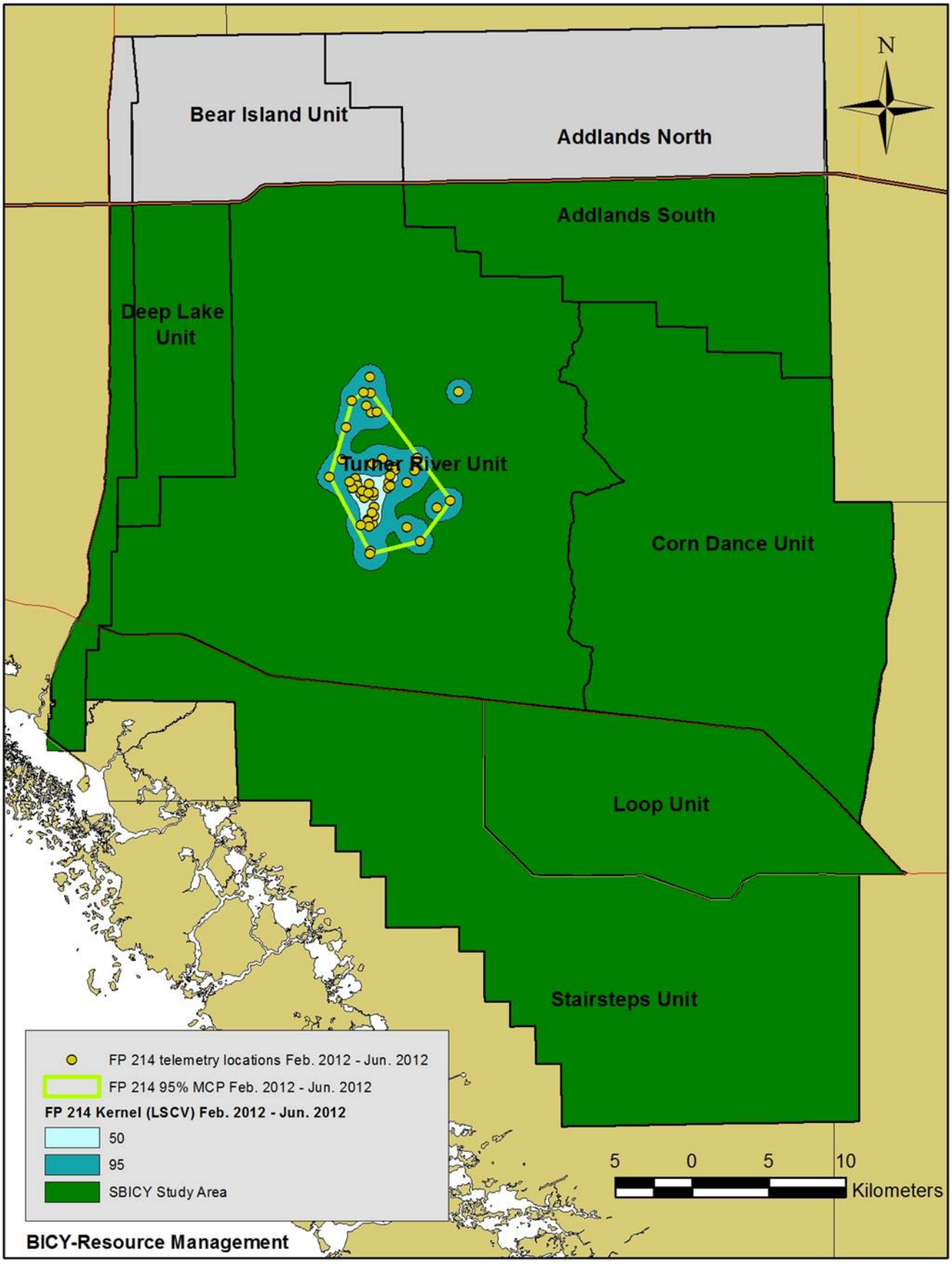

Figure 22. Home range of female Florida panther #214.

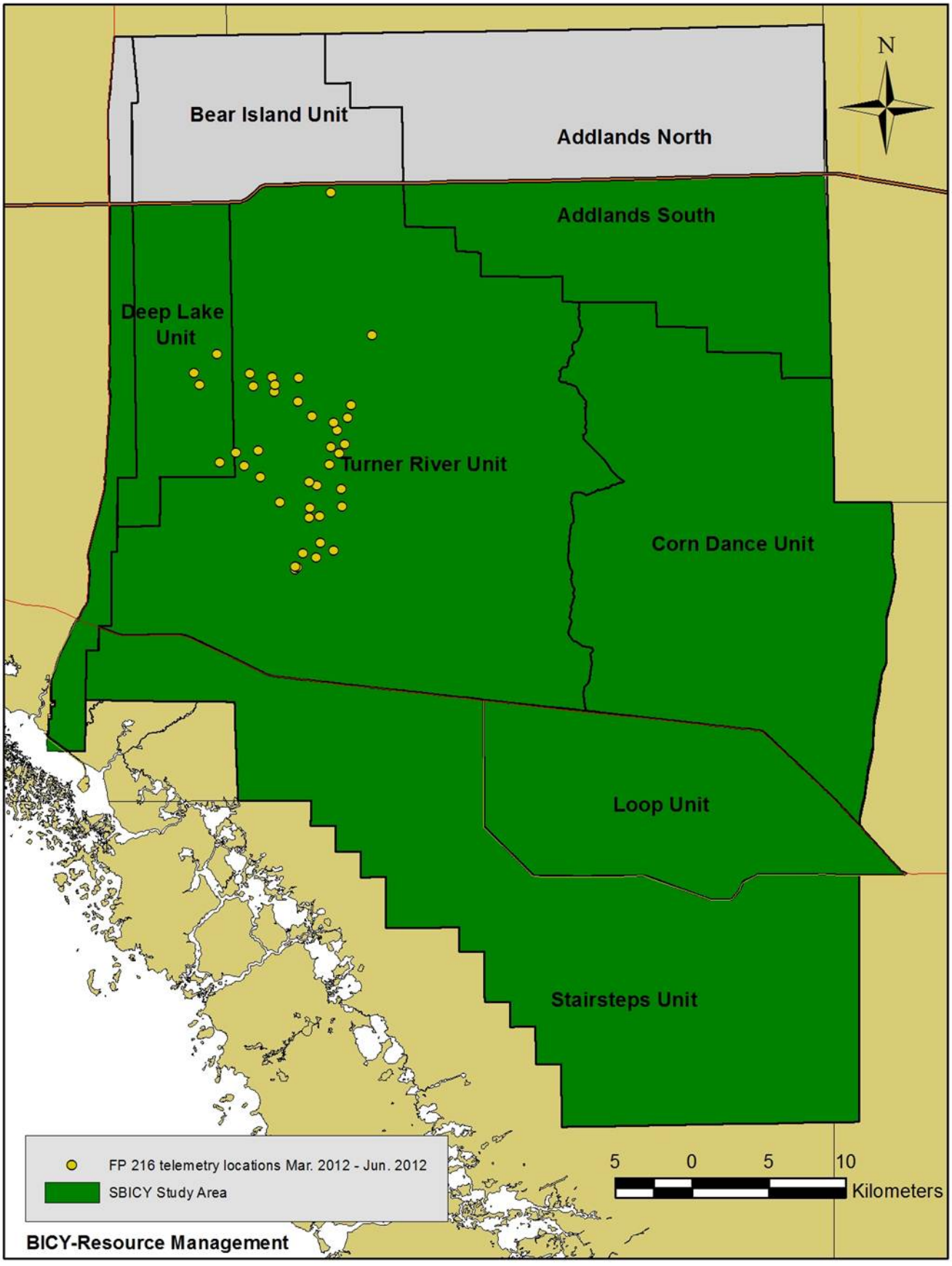

Figure 23. Home range of male Florida panther #216.

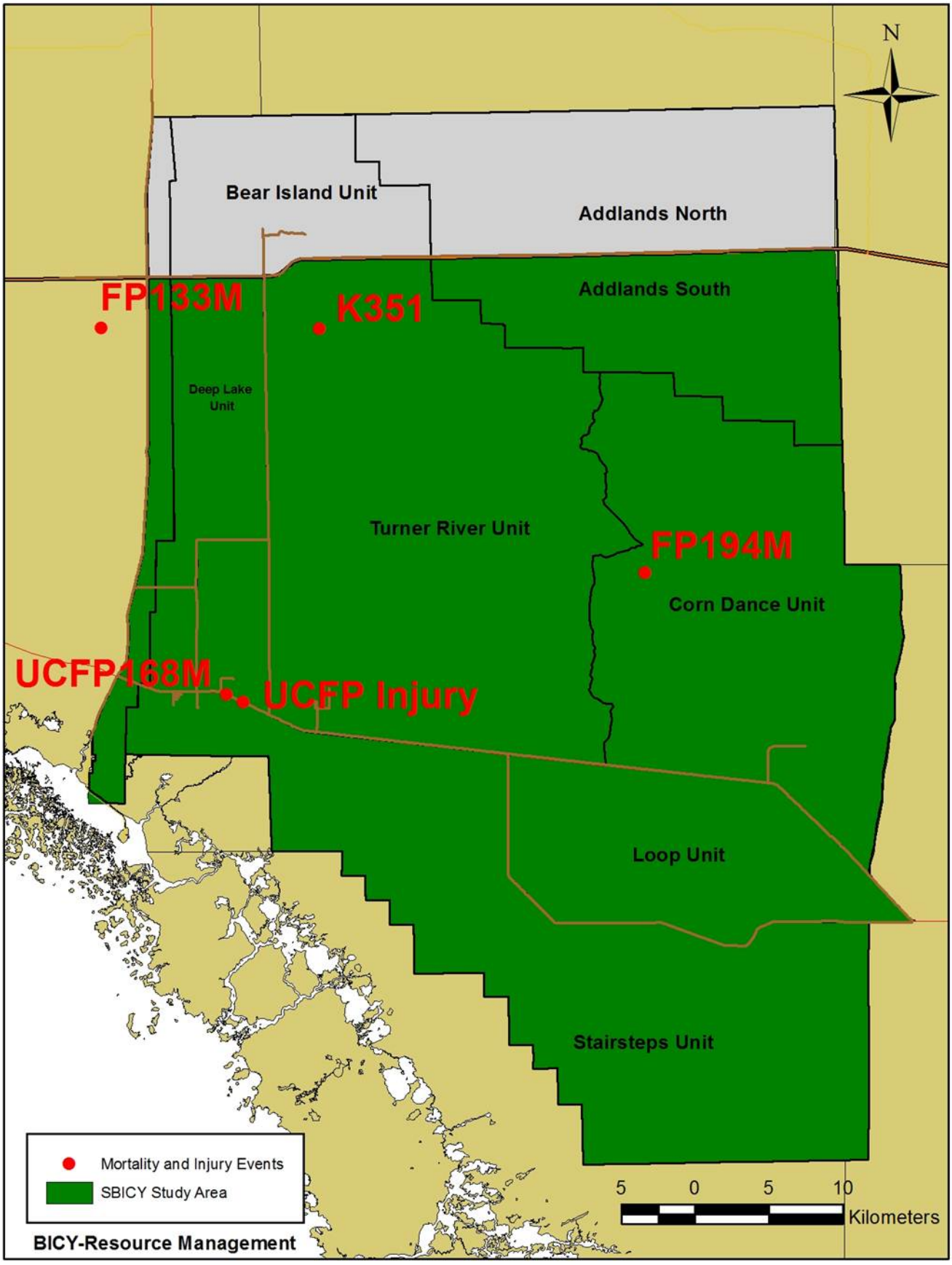

Figure 24. Distribution of known Florida panther deaths and injuries in SBICY from July 2011 - June 2012.