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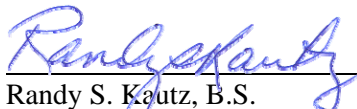
**ESTIMATED IMPACTS  
TO FLORIDA PANTHER HABITATS  
TURKEY POINT 6 & 7 PROJECT**

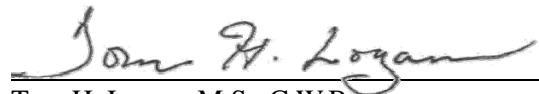
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## **Estimated Impacts to Florida Panther Habitats**

### **Turkey Point 6 & 7 Project**

#### **Introduction**

The Florida Power & Light Company (FPL) Turkey Point plant comprises approximately 11,000 acres in unincorporated southeast Miami-Dade County, Florida. The existing plant consists of two 400-megawatt (MW) natural gas/oil steam electric generating units (Units 1 and 2); two 700-MW nuclear units (Units 3 and 4); and a 1,150-MW natural gas-fired combined-cycle unit (Unit 5). FPL is proposing to construct two new 1,100-MW nuclear units (Units 6 & 7) and supporting buildings, facilities, and equipment south of Units 3 and 4 within the cooling canals of the industrial wastewater facility. Proposed associated facilities include a nuclear administration building, a training building and parking area; an FPL reclaimed water treatment facility and reclaimed water pipelines; radial collector wells and delivery pipelines; an equipment barge unloading area; an FPL-owned fill source; transmission lines and system improvements within eastern and western Miami-Dade County; access roads and bridges; and potable water pipelines.

Portions of the proposed project also are within the Florida Panther Focus Area (PFA) (U.S. Fish and Wildlife Service [USFWS] 2007) (Figure 1), an area known to have been occupied by or having the potential to be occupied by the Florida panther (*Puma concolor coryi*), a wide-ranging predator listed as endangered by the USFWS and the Florida Fish and Wildlife Conservation Commission (FWC). Because the project is expected to result in impacts to wetlands of the United States (U.S.) under the regulatory jurisdiction of the Department of the Army, Corps of Engineers (ACOE), the ACOE has agreed to seek formal consultation with USFWS under Section 7 of the Endangered Species Act, as amended in 1973, to evaluate potential impacts to Florida panthers and/or their habitats for projects that require federal wetlands permits and are within the PFA (USFWS 2007).

The Turkey Point Units 6 & 7 Site and the transmission line corridor connecting the Clear Sky substation to the Davis and Miami substations in urban areas of Miami-Dade County are outside of the PFA (Figure 1). Therefore, construction of new electric generating units at the Site and installation of the Clear Sky-Davis-Miami transmission lines would not be expected to affect Florida panthers or their habitats. However, the proposed Units 6 & 7 project includes two components (i.e., a transmission line corridor and improvements to roads that provide access to the Site) that occur within the PFA, and consultation with the USFWS will be necessary to address potential effects on Florida panthers for those project components.

FPL is proposing to construct one 230-kV and two 500-kV transmission lines within a 330-foot-wide right-of-way (ROW) from the Clear Sky substation to the Levee substation in northwest Miami-Dade County (Figure 1). The proposed transmission line corridor is approximately 43.60 miles in length, of which approximately 24.30 miles (56%) are in the PFA. The Clear Sky to Levee corridor includes two

alternative alignments. The secondary alternative would follow an existing FPL-owned ROW that includes a 7.42-mile segment through the Everglades National Park (ENP) expansion area and a 4.45-mile segment through the southeastern corner of Water Conservation Area 3B (WCA). However, activities are underway with federal and state agencies to obtain approval for a preferred corridor that would involve relocation of the ENP/WCA segments to an alignment immediately west of the South Florida Water Management District (SFWMD) L-30/31-N canal.

The project also includes a proposal to improve transportation access to the Site by upgrading approximately 10.30 miles of existing roads connecting to the plant, of which 5.75 miles of the proposed road improvements are within the PFA. The proposed road improvements include (1) widening approximately 3.30 miles of existing two-lane paved roads to four lanes, and (2) upgrading approximately 7.00 miles of existing unpaved roads to either three- or four-lane paved roads. The roadway improvements serve to accommodate traffic during the construction of the new electrical generating units. Roadway improvements on publicly owned ROWs will be returned to pre-construction configuration, and any privately owned roadway will be returned to two-lane status upon completion of construction of Turkey Point Units 6 & 7.

USFWS has designed a methodology for evaluating potential permanent impacts to Florida panther habitats within the PFA. The methodology provides a means for assessing impacts to panther habitat in terms of Panther Habitat Units (PHU), which are calculated as the sum of the products of land cover scores multiplied by acreages of land cover types that are impacted by a project. The USFWS recommends mitigation at a ratio of 2.5:1 for impacts that occur anywhere within the PFA south of the Caloosahatchee River. Therefore, the amount of mitigation recommended is calculated by multiplying the PHUs in the impact area by 2.5. The same methodology is used to calculate the PHU values of prospective mitigation sites to determine whether the quantity of PHUs available for mitigation is sufficient to offset project impacts. However, the final amount of mitigation recommended may increase or decrease based on whether impact and mitigation sites are located within the PFA Primary or Secondary Zones. For example, mitigation requirements for impacts occurring in the Secondary Zone may be reduced by a factor of 0.69 if the mitigation site is located within the Primary Zone.

The objectives of these analyses were to estimate the potential loss of Florida panther habitat that may occur within the PFA, estimate mitigation requirements for the proposed facilities that occur within the PFA, review available data representing panther occurrence in the project vicinity, and assess panther habitat values and use of existing power line ROWs and other linear landscape features. The plans for the proposed transmission line corridor and road improvements are conceptual at this point in time and have yet to be finalized. These analyses provide an assessment of the extent of potential loss of panther habitat based on the conceptual design for the project to inform further discussions and site planning. USFWS methodology and updated land use/land cover data in GIS format were used to calculate the potential loss of panther habitat that may occur. The number of PHUs of mitigation that may be recommended for the project was estimated by applying appropriate mitigation ratios. Florida panther radio-telemetry, mortality and den records that are available for the vicinity of project components were reviewed. Florida panther use of existing transmission line ROWs and other linear landscape features in south Florida was evaluated using radio-telemetry records from 1981 through June 2009 and telemetry results from animals outfitted with Global Positioning System (GPS) collars. A literature review was conducted to assess the

value of dirt roads, jeep trails, canal levees, old railroad grades, etc., as movement corridors and sources of prey.

Analyses of Florida panther occurrence and habitat use in the vicinity of existing transmission lines and other linear features led to the conclusion that construction of a new transmission line and associated structures, fill pads, and unimproved transmission line access roads within the PFA would not result in long-term effects on Florida panthers and their habitats. Available data indicate that Florida panthers do not avoid transmission line ROWs, but rather panthers do occur on linear features that include transmission line ROWs at a greater frequency than random and may use them as movement pathways or to access prey. The benefits of transmission line ROWs to panther conservation cannot be quantified, and they are not quantified or represented by the USFWS methodology. Although we estimated the number of PHUs of mitigation that the USFWS may recommend if construction of the transmission line ROWs was viewed as a direct loss of panther habitat, we believe that no mitigation should be required since the project will not result in a loss of habitat, only a conversion from one type of habitat to another. Conversely, the proposed road improvements that are needed to enhance access to the Turkey Point plant site during construction are expected to result in direct and temporary losses of panther habitats. The number of PHUs that the USFWS may require for mitigation for the direct and temporary losses of panther habitat due to improvements to roads accessing the Site was estimated. FPL will work with the USFWS, ACOE, and other appropriate agencies to determine mitigation recommendations for the loss of panther habitats after a final design for project features has been achieved consistent with the conditions of site certification.

## **Methods**

### ***Land Use/Land Cover Data***

Updated land use/land cover data for the proposed preferred and alternative secondary transmission line corridors and for a conceptual footprint of the proposed road improvements were obtained from Golder Associates Inc., an environmental consulting firm in Gainesville, Florida. These data were provided in GIS format as ArcView (ESRI Inc., Redlands, CA) shape files. Land use/land cover types had been classified according to the Florida Land Use, Cover and Forms Classification System (FLUCFCS) (Florida Department of Transportation 1999, as modified by the SFWMD). A new field was added to the land use/land cover database to correlate FLUCFCS codes to the more general land cover types adopted by USFWS for panther habitat impact assessments. Another field was added to the database, and it was populated with the land cover scores used by USFWS to calculate assumed Florida panther habitat impacts in terms of PHUs. Land use/land cover polygons for the transmission line corridor were cut along the boundaries of corridor segments as determined by FPL engineering staff (Figure 2), and a new field was added to the database to indicate the corridor segment in which each land use/land cover type polygon occurred. The modified land use/land cover data for the proposed transmission line corridor and road improvements footprint were clipped along the boundaries of the PFA Primary and Secondary Zone (Figure 3), and the acreage of each polygon in the clipped data set was recalculated. These steps produced updated land use/land cover databases for the two alternative transmission line corridors and for the conceptual footprint of the proposed plant access roads. Each polygon in the databases contained information on USFWS cover type, score, acreage, corridor segment label, and panther zone. All GIS analyses were performed using ArcMap 9.3 (ESRI Inc., Redlands, CA).

### ***Estimates of Acreages of Potential Habitat Loss within the Transmission Line Corridor***

Precise calculations of project effects that may occur on panther habitats associated with construction of transmission lines were not possible because the exact footprints for proposed fill pads for transmission line structures and associated access road improvements have not been finalized. However, the total acreage of each corridor segment can be determined from the modified land use/land cover database; and the numbers of transmission line structures, acreages of associated fill pads, lengths of transmission line access roads, and acreages of fill associated with access road improvements have been estimated by FPL engineering staff for each segment of the preferred transmission line corridor (Table 1). This information was used to estimate gross acreages of habitat that may be affected within the Primary and Secondary Zones by calculating the percentage of each segment occurring in each panther Zone, and then multiplying those percentages by the anticipated footprint acreage within each corridor segment as determined by FPL engineers (Table 2). Calculations of potential impact within segments of 1B and 1C of the transmission line corridor were based only on estimated acreages for structure fill pads. Access to structures within these corridor segments will be via the road improvements implemented in conjunction with improving transportation access to the Site, and these effects are accounted for in the section dealing specifically with road improvements.

Potential losses of panther habitats were evaluated within two alternative transmission line corridors. The preferred corridor includes segments 3A, 3B, and 3C located immediately west of the L-30/31-N canal (Figure 2). The secondary alternative corridor would follow the alignment of an existing FPL-owned ROW through ENP and WCA (Figure 2). Although land cover data are available for the ENP/WCA segment, a direct assessment of potential effects on Florida panther habitat within the ENP/WCA segment was not possible because FPL engineering staff had not provided an estimate of the acreages that will be directly affected by construction of the new transmission line within this segment. Therefore, gross acreages of potential effects associated with the ENP/WCA corridor alternative were estimated based on the lengths of the ENP and WCA alignments and based on the acreage of fill required for structures and roads in preferred transmission line corridor segments 3B and 3C, where habitat conditions appear similar to those in the ENP and WCA ROW.

### ***Calculation of Panther Habitat Units***

The percentage of each transmission line corridor segment potentially subject to filling was determined by dividing the estimated acreage of fill by the total area of each segment. The resulting percentage was multiplied by the acreage of each land cover type within each segment to obtain an estimate of acreage of impact by cover type within each segment. Potential losses of panther habitats were calculated in terms of PHUs by multiplying the acreage of each land cover type in each corridor or road segment by its corresponding USFWS land cover score, and then summing the products. Estimates of PHUs were calculated separately for the following: (1) the preferred transmission line corridor alternative that includes segments 3A, 3B, and 3C immediately west of the L-30/31-N canal, (2) the alternative secondary transmission line corridor traversing the existing FPL-owned ENP/WCA ROW, and (3) Turkey Point plant access road improvements. The total number of PHUs of mitigation that may be recommended for each project component was calculated by multiplying the sum of all PHUs associated with the project footprint by 2.5, the mitigation ratio prescribed by USFWS. However, some segments of the transmission

line corridors will occur within the Secondary Zone (Figure 3), and USFWS allows for a reduction of mitigation requirements by a factor of 0.69 for Secondary Zone impacts that are mitigated in the Primary Zone. Therefore, a second estimate of mitigation that may be recommended was calculated assuming that all mitigation would be provided in the Primary Zone. USFWS also allows mitigation credit for vegetation restoration and management within project boundaries in some cases, but credit is valued at half the score of the target land cover type due to the lag time involved in establishing restored vegetation communities. Mitigation credits associated with restoration and management of vegetation along the shoulders of access roads within the transmission line corridor were calculated.

### ***Florida Panther Occurrence in the Vicinity of Project Components***

Florida panther radio-telemetry records collected between February 1981 and June 2009 were obtained from the FWC. Florida panther mortality records collected between February 13, 1972, and October 10, 2009, and location records of known panther dens between March 1992 and July 2008 were also obtained from FWC. These data were reviewed to document the history of panther use of habitats within 5.00 miles of the proposed roadway improvements and within 5.00 miles of the proposed transmission line corridor. A distance of 5.00 miles was selected for this analysis because average daily movements of male and female panthers are <5.00 miles (McBride et al. 2008; Darrell Land, unpublished data), and this distance was presumed to be indicative of those panthers that have had the potential to occur within areas of the PFA affected by the proposed project even though their presence has not been formally documented by telemetry, mortality, or den records.

### ***Florida Panther Use of Transmission Line ROWs and Linear Landscape Features***

Florida panther movement patterns and habitat use in relation to existing transmission line ROWs and canal levees were assessed using available Florida panther telemetry records, GIS data depicting the locations of existing linear features, 2004 digital aerial photography, and a review of the scientific literature. GIS data for the locations of major power lines in Florida as of 2006 were downloaded from the University of Florida GeoPlan Center's Florida Geographic Data Library web site. GIS data for the alignments of existing levees in south Florida were downloaded from the SFWMD web site. Radio-telemetry records for Florida panthers were obtained from FWC based on the monitoring efforts of FWC, Big Cypress National Preserve, and Everglades National Park researchers for the period from February 1981 through June 2008. GPS-collar telemetry records for 12 Florida panthers subject to FWC research and monitoring studies between 2002 and 2006 were obtained from FWC. GPS collars for most of these animals were programmed to collect records two to eight times daily, but the collar for FP139 was programmed to collect location records hourly (see Land et al. 2008 for detailed information on GPS-collar data collection parameters).

Two of the 12 panthers fitted with GPS collars, males FP117 and FP139, maintained home ranges in the vicinity of an existing power line in Collier and Hendry County. The Convert Locations to Paths feature of Hawth's Analysis Tools (Version 3.27; Beyer 2004) was used to convert time-series GPS-collar telemetry records into linear paths followed by these two males, and these paths were overlaid on the locations of major power lines to assess panther use of existing power line ROWs. The Fixed Kernel Density Estimator feature of Hawth's Analysis Tools also was used to model fixed kernel home ranges using GPS-collar records for these two males, and 95% contours for these animals were plotted in relation

to telemetry records, movement patterns, and existing transmission lines. Florida panther radio-telemetry records for the period from February 23, 1981, through June 30, 2009, were obtained from FWC. Home ranges for females ( $n=75$ ) and adult males ( $n=50$ ) were modeled using the Animal Movement SA (version 2.4; Hooze and Eichenlaub 1997) extension for ArcView 3.3 (ESRI, Redlands, CA) to create fixed kernel home ranges as defined by 95% contours. Fixed kernel home range models were overlaid to rank the landscape according to panther use based on numbers of overlapping home ranges. Existing power lines were overlaid on the home range models and displayed in the context of radio telemetry records.

GPS-collar telemetry records for the 12 Florida panthers occurring south of the Caloosahatchee River were used to assess panther use of linear landscape features in south Florida (i.e., dirt roads, jeep trails, paved roads, farm field and drainage ditch berms, hedgerows, old railroad grades, trams, power line ROWs). GPS-telemetry data for FP139 were collected at hourly intervals, but only those records collected between 1800 and 0500 hours, at 0900 hours, and at 1300 hours were used in the analysis because these collection times matched those for the other 11 panthers subject to monitoring with GPS technology. The Fixed Kernel Density Estimator feature of Hawth's Analysis Tools was used to generate ArcView shape files depicting 95% home range contours using GPS-collar telemetry records for each animal. The Generate Random Points feature of Hawth's Analysis Tools was used to generate random point locations within each 95% home range contour in a number equal to the number of GPS-telemetry records available for each individual panther. GPS-collar and random locations were reviewed by zooming in on 2004 digital aerial photography, and records falling on a linear landscape feature were coded to feature type. Minitab 15 (2007) was used to assess data normality using the Kolmogorov-Smirnov test, and statistical differences between GPS-collar records and random locations were tested with a one-way analysis of variance (ANOVA).

## Results

### *Calculations of Panther Habitat Units*

**Transmission Lines:** Construction of a new transmission line along the preferred corridor would affect approximately 157.52 acres with a panther habitat value of 969 PHUs (Table 3). Construction along the preferred corridor would occur within an estimated 106.71 acres of Primary Zone habitat containing 670 PHUs (Table 4) and an estimated 50.81 acres of Secondary Zone habitat containing 299 PHUs (Table 5). The shoulders along an estimated 30.83 acres of unimproved transmission line access roads would be expected to quickly revegetate to shrub and brush cover types, which have a USFWS cover type score of 5 (Table 6). Therefore, calculated panther habitat value that may occur within the preferred transmission line corridor after project completion would be an estimated 154 PHUs. The result is an estimated net potential loss of 815 PHUs (i.e., 969 PHUs in areas affected by the project minus 154 PHUs of revegetated road shoulders = 815 PHUs). The loss of PHUs would likely result in a USFWS recommendation that 2,037 PHUs of mitigation be provided based on the mitigation ratio of 2.5:1. However, the USFWS methodology allows for use of a reduction factor of 0.69 for calculated losses that occur in the Secondary Zone but are mitigated in the Primary Zone. Therefore, should all mitigation be provided within the Florida panther Primary Zone, the amount of mitigation the USFWS may recommend for the preferred alternative was estimated to be 1,844 PHUs.

Construction of a new transmission line along the alternative secondary corridor that follows an existing FPL-owned ROW through ENP and WCA would affect approximately 219.96 acres with a panther habitat value of 1,823 PHUs (Table 3). This alternative corridor would occur within an estimated 157.11 acres of Primary Zone habitat containing 1,271 PHUs (Table 7) and an estimated 62.85 acres of Secondary Zone habitat containing 551 PHUs (Table 8). The shoulders along an estimated 46.04 acres of unimproved transmission line access roads would be expected to quickly revegetate to shrub and brush cover types, which have a USFWS cover type score of 5 (Table 6). Therefore, the calculated panther habitat value that may occur within this alternative secondary corridor after project completion would be an estimated 230 PHUs. The result is an estimated net loss of 1,593 PHUs (i.e., 1,823 PHUs in areas affected by the project minus 230 PHUs of revegetated road shoulders = 1,593 PHUs). This loss of PHUs would likely result in a USFWS recommendation that 3,980 PHUs of mitigation be provided based on the mitigation ratio of 2.5:1. However, the USFWS methodology allows for use of a reduction factor of 0.69 for calculated losses that occur in the Secondary Zone but are mitigated in the Primary Zone. Therefore, should all mitigation be provided within the Florida panther Primary Zone, the amount of mitigation the USFWS may recommend for the alternative secondary corridor was estimated to be 3,603 PHUs.

This analysis indicates that construction of a new transmission line along the preferred corridor that includes segments 3A, 3B, and 3C immediately west of the L-30/31-N canal would potentially affect fewer acres of panther habitat and require less mitigation than the FPL-owned ENP/WCA ROW in the alternative secondary corridor (Table 3). Construction within the ENP/WCA alternative secondary corridor would affect approximately 62.44 more acres of panther habitat than construction within preferred corridor west of the L-30/31-N canal, corresponding to approximately 1,759 additional PHUs of mitigation that the USFWS may recommend.

**Turkey Point Plant Access Road Improvements:** The proposal to improve road access to the Turkey Point plant includes 10.30 miles of roadway with a total footprint of approximately 129.20 acres. However, not all of these road miles and footprint acres are within the Florida panther Primary Zone (Figures 3 and 4). The conceptual footprint for proposed road improvements would affect approximately 69.08 acres of Primary Zone habitat with an estimated panther habitat value of 412 PHUs (Tables 3 and 9). This estimate assumes that a direct loss of panther habitats would occur within the roadway footprints and that the USFWS would not allow credit for revegetation of road shoulders. This potential loss of habitat may result in a USFWS recommendation that 1,030 PHUs of mitigation be provided based on the mitigation ratio of 2.5:1. No portion of the proposed road improvements occur in the Florida panther Secondary Zone; therefore, no reduction in mitigation requirements would be available for providing mitigation for Secondary Zone impacts within the Primary Zone.

### ***Panther Occurrences near Project Components***

The FWC panther radio-telemetry database from February 1981 through June 2009 ( $N=87,850$  records) contains 275 records of panther occurrence within 5.00 miles of the proposed improvements to roads accessing the Turkey Point plant. These records are all from FP21, a female panther that was originally captured for monitoring by ENP researchers in March 1987. FP21 was injured in a collision with a motor vehicle on July 23, 1988. The injury occurred approximately 1.00 mile east of U.S. Highway 1 (US 1) on Palm Drive (SW 344th Street) approximately 2.70 miles west of the proposed road improvements. FP21 was removed from the wild for medical reasons and was relocated to White Oak Plantation in Nassau



County, Florida. FP21 remained in captivity until she was euthanized in December 1997. The FWC panther mortality database through October 10, 2009, contains one record of panther mortality within 5.00 miles of the proposed road improvements. An uncollared three-year old female died in a collision with a motor vehicle on US 1 approximately 0.50 mile south of the intersection with Card Sound Road on May 9, 2007. The FWC panther den database contains no records of panther dens within 5.00 miles of the proposed road improvements. This information demonstrates that radio-collared Florida panthers have not been recorded in the vicinity of the proposed road improvements since 1988, but at least one uncollared female panther has occurred in the vicinity as recently at May 2007 based on roadkill mortality records.

The FWC panther radio-telemetry database through June 2009 ( $N=87,850$  records) contains 1,770 telemetry records representing the occurrence of 12 Florida panthers and one Texas female puma (*Puma concolor stanleyana*) within 5.00 miles of the proposed transmission line corridor. These records are summarized as follows:

- 47 records for female FP14 between December 18, 1986, and July 24, 1990;
- 463 records for male FP16 between January 26, 1987, and January 7, 2000;
- 375 records for female FP21 between April 5, 1987, and July 23, 1988;
- 4 records for female FP22 between January 29, 1988, and January 12, 1989;
- 59 records for female FP23 between November 18, 1989, and February 27, 1990;
- 97 records for female FP27 between May 14, 1998, and July 26, 1989;
- 125 records for male FP42 between March 24, 1990, and April 29, 1991;
- 334 records for female FP61 between November 10, 1997, and June 4, 2003;
- 116 records for male FP85 between March 6, 2000, and February 17, 2004;
- 1 record for female FP94 on March 7, 2001;
- 117 records for female FP95 between March 2, 2001, and January 9, 2008;
- 24 records for male FP125 between July 27, 2004, and September 28, 2004; and
- 8 records for Texas female TX108 between May 1, 1996, and March 2, 2001.

The FWC panther mortality database through October 10, 2009, contains one record of vehicle-related injury and five records of mortality within 5.00 miles of the transmission line corridor. The vehicle-related injury occurred in 1988, and it involved female FP21, who was removed permanently from the wild. Two vehicle-related mortalities occurred in 2007, one vehicle-related mortality occurred in 2008, and one record of panther mortality due to unknown causes occurred in 1989 and in 2000. The FWC database of panther dens contains one record of a panther den within 5.00 miles of the transmission line corridor. The den record was dated September 27, 2002.

### ***Panther Use of Transmission Line ROWs and Linear Landscape Features***

Adult male FP139 maintained a 42,776-acre home range east of Immokalee between March 31 and August 30, 2005, based on the 95% contour of the kernel home range model for this animal (Figure 5). This panther's GPS collar was programmed to collect location records hourly, and his home range included a 5.20-mile segment of an existing electric transmission line ROW. The ROW is approximately 150 feet wide; structures are spaced at intervals of approximately 1,300 feet; and an unimproved one-lane

transmission line access road is present within the ROW. Vegetation within the ROW is maintained in an early successional stage with species of ground cover and shrubs typical of upland and wetland plant communities in south Florida. The segment of the ROW that traverses FP139's home range is in an area of relatively undisturbed natural habitats in private ownership. FP139 moved north and south across the existing power line ROW through this area on multiple occasions. Hourly GPS-collar records show no evidence that FP139 traveled along the access road or lingered in the ROW, but there is no evidence that the transmission line ROW interfered with this panther's movements perpendicular to the ROW.

Sub-adult male FP117 was outfitted with a GPS collar programmed to collect telemetry locations at intervals of 8, 16, and 24 hours between December 3, 2003, and July 28, 2004. FP117 maintained a series of temporary home ranges of varying size based on the 95% contour of the kernel home range model for this animal (Figure 6). Temporary home ranges extended along an arc of approximately 48 miles from the northeast corner of Big Cypress National Preserve to an area of private lands east of Okaloacoochee Slough State Forest, and the total area within all home range patches was 80,605 acres. A 12.90-mile segment of the same power line ROW described above bisected the largest of FP117's temporary home ranges (Figure 7). FP117 crossed the power line ROW on at least 39 occasions. One GPS telemetry record was located within the ROW, and two records were along the edge of the ROW. The telemetry data for this animal show no evidence that FP117 traveled along the unimproved access road within the ROW, but there is no indication that the transmission line ROW or facilities interfered with this panther's movements nor did it form a boundary to FP117's home range.

The transmission line ROW described above traverses a landscape of occupied panther habitats based on 28 years of radio-telemetry records (Figure 8). The number of overlapping female and adult male panther home ranges transected by the power line ranges between one and eight, with the highest number of overlapping home ranges affected by the power line occurring on private lands between Florida Panther Conservation Bank and Dinner Island Ranch Wildlife Management Area (Figure 8). This information indicates that the transmission line ROW has been integrated into the home ranges of several Florida panthers over the last 28 years. Home range and telemetry data appear to indicate that the transmission line ROW does not impede panther movements, nor does it form any type of boundary to areas used by panthers.

One adult male Florida panther (FP26) and three sub-adult males (FP29, FP43, and FP90) have used habitats along and adjacent to existing levees and transmission line ROWs that traverse the northern Everglades (Figure 9). Actual movements of these animals are difficult to pinpoint because radio-telemetry records were generally collected at intervals of every two to three days. However, despite the long intervals between data collection, many of these telemetry locations were recorded on existing levees or in herbaceous wetland habitats immediately adjacent to the levees. These data appear to indicate that Florida panthers do occur on elevated levees with access roads, existing transmission lines, and associated structures in this area, and they may use them as travel corridors and to access habitat and prey in extensive regions of herbaceous wetlands habitats, such as the Everglades.

Linear landscape features within the home ranges of 12 Florida panthers outfitted with GPS collars in south Florida included jeep trails, dirt roads, paved roads, farm field berms, drainage ditch berms, hedgerows, power line ROWs, old railroad grades, and trams. A total of 14.0% of GPS-collar telemetry locations for these 12 animals occurred on one of these linear features compared to the 6.3% of randomly

distributed points that occurred on these features (Table 10). There was a significant difference ( $P<0.001$ ) between the occurrence of Florida panthers on linear landscape features compared to the random occurrence of these features in the landscape. These results indicate that Florida panthers occurred on linear landscape features approximately 14.0% of the time, and Florida panthers occur on these features 2.22 times more frequently than their random distributions within panther home ranges would indicate.

## **Discussion**

### ***Applicability of the USFWS Methodology***

The USFWS methodology is the standard tool used in south and south-central Florida for calculating potential impacts to Florida panther habitats and for developing recommendations for mitigation, and it was used as an initial method for evaluating the potential effects of the proposed project on panther habitats. However, the data analyses completed for this project suggest that the USFWS methodology should be applied only to the roadway improvements designed to improve transportation access to the Turkey Point plant but not to construction of a new transmission line. The proposed roadway improvements will result in both direct and temporary losses of Florida panther habitat, and the amount of mitigation that may be recommended will be resolved in discussions with USFWS, ACOE, and other agencies once a final project design has been determined.

Conversely, the proposed transmission line fill pads, structures, and unimproved transmission line access roads will result only in a temporary disruption of panther use of the area during construction. Although construction of a new transmission line will alter habitat conditions along the corridor, the new transmission line is not expected to have long-term adverse effects on the functionality of panther habitats within or in the vicinity of the corridor regardless of which corridor alternative is ultimately permitted for this project. The USFWS methodology for calculating potential impacts to panther habitats in terms of PHUs provides a means for comparing pre- and post-project effects on cover types that are assumed to reflect the direct loss of habitat. However, no direct loss of panther habitat is expected to occur as a result of construction of new transmission lines. Available data indicate that panthers do not avoid transmission line ROWs; rather, conservation benefits may result from the presence of transmission line ROWs within panther home ranges. The USFWS methodology produces PHU values that do not measure or reflect the positive habitat benefits that transmission line ROWs and other similar created landscape features (e.g., wood roads, trams, berms, etc.) may provide that may accommodate panther movements and provide habitat for and access to prey. These habitat benefits appear to be especially important in areas of predominantly herbaceous wetlands habitats where white-tailed deer benefit from elevated embankments during periods of high water.

### ***Turkey Point Plant Access Road Improvements***

Proposed road improvements in the Primary Zone include (1) widening 1.57 miles of existing two-lane paved roads to four lanes, (2) upgrading 2.93 miles of existing unpaved roads to three-lane paved roads, and (3) upgrading 1.25 miles of existing unpaved roads to four-lane paved roads. These improvements may result in the temporary avoidance of the area by panthers during construction and in the direct loss of 69.08 acres of Primary Zone habitat with an estimated value of 412 PHUs (Table 9). Application of the

USFWS 2.5:1 mitigation ratio to the loss of these PHUs results in a recommendation for 1,030 PHUs of mitigation (Table 3). These impacts ideally would be mitigated within the panther Primary Zone to achieve maximum conservation benefit to panthers.

The proposed roadway improvements are intended to accommodate traffic during the construction of Turkey Point Units 6 and 7. All roadway improvements on publicly owned ROWs will be returned to the configuration in which the roadways existed prior to the commencement of construction, and any privately owned roadways will be returned to two-lane status upon completion of construction. The roadways are not intended to be used as or to become major public thoroughfares comparable to heavily traveled highways passing through occupied panther habitats, such as Interstate 75 in Collier County. Instead, the roadway improvements would occur in an area that is at the urban fringe of the panther Primary Zone, and there are very few acres of habitat that could be accessed in the future by panthers moving north or east of the proposed roadways. Moreover, radio-collared panthers have not been observed within 5.00 miles of the project site in over 20 years, and the only other documented record of panthers within 5.00 miles of the proposed road improvements was that of a female that died in a collision with a motor vehicle in May, 2007, on US 1 approximately 4.00 miles west of the site. This information suggests that there is low likelihood that panthers will occur in the area in the future. Therefore, wildlife crossings designed to accommodate future movements of panthers are not warranted. Rather, the roadways should be designed with wide shoulders that are mowed on a regular basis, thus eliminating vegetative cover adjacent to the road that could be used for concealment by panthers and other species of wildlife. Wide shoulders with improved visibility for panthers, other wildlife, and motorists will reduce the likelihood of vehicle mortality for those animals that do attempt to cross the road and will also improve motorist safety. Panther crossing signs should be installed and reduced speed limits should be established to minimize the likelihood of future panther collisions with motor vehicles in the event that panthers do occasionally occur in this area at some time in the future. Florida panthers are capable of crossing multi-lane roadways without the need for underpasses as long as visibility and speed limits are satisfactory and traffic volume is low. Moreover, FPL should train project personnel to be aware of and avoid Florida panthers as well as other listed species of wildlife.

#### ***Transmission Line Corridor Structures, Fill Pads, and Access Roads***

Florida panthers have used habitats in the vicinity of the proposed transmission line corridor for many years. FWC telemetry records indicate that 12 radio-collared Florida panthers and one Texas female occurred within 5.00 miles of the 43.60-mile long transmission line corridor between December 1986, and January 2008, and three vehicle mortalities were recorded within 5.00 miles of the corridor in 2007 and 2008. Activities associated with construction of a new transmission line and associated structure pads and access roads may be expected to cause panthers to temporarily avoid using habitats in the vicinity of the corridor. However, panthers should also be expected to adjust to the presence of the new ROW and maintenance activities, and they are likely to reoccupy areas affected by the power line once construction is complete. Existing transmission lines, structure pads, and unimproved transmission line access roads within occupied panther habitats on privately owned lands between Panther Island Conservation Bank and Dinner Island Ranch Wildlife Management Area appear to have had no discernable effects on panther habitat use or movement patterns based on 28 years of population monitoring.

Telemetry records also indicate that four males appear to have used levees as corridors for movement and to access prey in the herbaceous wetlands of the northern Everglades in areas where construction of canals, levees, unimproved roads, and power lines has occurred. The unimproved roads proposed to provide access to the structures within the portions of the transmission line corridor planned for lands within the PFA may also provide new travel corridors for Florida panthers in affected areas, and they are likely to facilitate panther access to prey in the herbaceous wetlands habitats adjacent to the roads. Florida panthers have been documented to travel and disperse along trails, trams and abandoned railroad grades (Maehr et al. 2002), and woods roads, especially where cover is dense. Dickson et al. (2005) concluded that dirt roads do not inhibit, and may even promote, movements of pumas in California. Population counts of Florida panthers are based in part on documentation of Florida panthers crossing dirt roads and jeep trails in south Florida (McBride et al. 2008). An analysis performed for this project demonstrated that 14.0% of GPS-collar telemetry records for 12 Florida panthers occurred on linear landscape features, including dirt roads, jeep trails, canal levees, and power line corridors, and panther occurrence on these features was significantly greater ( $P < 0.001$ ) than the random occurrence of these features in panther home ranges.

The higher elevations and shrubby vegetation along the shoulders of new roads and structure pads within ENP may improve foraging opportunities for panthers due to increased use of these areas by white-tailed deer (*Odocoileus virginianus*), the principal prey species of the panther in ENP (Dalrymple and Bass 1996). Highest densities of white-tailed deer in the Florida Everglades occur during periods of high water when deer concentrate in areas of higher elevation, including tree islands (Fleming et al. 1994, Labisky 1994, Labisky et al. 1995). Management techniques suggested for white-tailed deer in the Florida Everglades include maintaining water levels at depths less than two feet and creation or maintenance of elevated sites (e.g., tree islands, canal banks) to allow deer to survive periods of excessively deep water (Loveless 1959).

This information leads to the conclusion that the effects on panther habitat resulting from construction of access road improvements, fill pads, and structures associated with the proposed transmission line will be temporary and occur only during the period of construction. These new landscape features will likely have no long-term adverse effects on panthers within the area based on observations of panther activities within similar habitats in other areas of south Florida where panthers and existing transmission line ROWs co-exist. Moreover, these new features have the potential to benefit panther conservation by providing new movement corridors; by providing elevated habitat features likely to provide refuges during periods of high water; and by enhancing white-tailed deer populations, the principal prey species of panthers, in the herbaceous wetland habitats adjacent to the transmission line access roads. Public access to the new transmission line access roads should be minimized or prohibited to limit the potential for panther-human interaction.

## **Summary and Conclusions**

The Turkey Point plant site and the Clear Sky-Davis-Miami transmission line corridor are outside of the PFA. Therefore, construction activities occurring on the plant site and along the eastern transmission line corridor are not expected to affect Florida panthers or their habitats, and no mitigation for impacts to panthers should be recommended for these project components.

The conceptual footprint for the proposed roadway improvements would result in the direct loss of panther habitat with a value of 412 PHUs, requiring an estimated 1,030 PHUs of mitigation. However, loss of panther habitat is expected to be minimized in some areas and temporary in others as FPL intends to restore publicly owned ROWs to pre-project configurations, and privately owned roads will be returned to two-lane status upon completion of construction. FPL will work with the USFWS, ACOE, and other appropriate agencies to determine actual mitigation recommendations for the direct and temporary loss of panther habitats after a final design for project features has been achieved, consistent with the conditions of site certification. Mitigation for the loss of PHUs resulting from road improvements should be provided at an acceptable location within the Florida panther Primary Zone to achieve maximum conservation benefit. The roadway improvements are proposed in an area at the urban fringe of the Primary Zone where telemetry and mortality records indicate that panthers have occurred infrequently during the last 20 years. Installation of wildlife crossings to accommodate future movements of Florida panthers are not warranted in this area due to the small area of potentially suitable habitats north and east of the roadways. If panthers do frequent the area, they are likely to safely cross the new roads if wide road shoulders are maintained to eliminate concealment cover and promote visibility, traffic volumes remain as anticipated, panther crossing signs are installed, and low speed limits are established. Moreover, training should be provided to project personnel to increase their awareness of and need to avoid Florida panthers and other listed species of wildlife.

The USFWS methodology was used initially for estimating potential effects of the proposed transmission line on Florida panthers and their habitats. However, the proposed transmission line, associated structures, fill pads, and unimproved access roads are expected to only temporarily affect Florida panther habitat during the construction phase. Available data demonstrate that Florida panthers co-exist with transmission line ROWs, jeep trails, dirt roads, and canal levees in other areas of their range, and panthers occur on these features at a frequency greater than their random occurrence within panther home ranges. Elevated fill areas may be expected to improve foraging and high-water refuge opportunities for white-tailed deer, the principal prey species of panthers. The long-term functionality of panther habitats within and adjacent to the new transmission line corridor will be maintained without adverse effect. The USFWS methodology for calculating potential loss of Florida panther habitats is not appropriate for evaluation of the transmission line components of this project. The methodology only compares the relative values of land cover types under pre- and post-project conditions and assumes a direct loss of habitat. However, the methodology does not have the ability to reflect the habitat values and benefits provided by the features occurring within and likely to result from the proposed transmission line ROWs. Therefore, no mitigation should be required for construction of the proposed transmission lines regardless of whether the preferred or secondary corridor is selected for this project.

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## **TABLES**



**Table 1      Data Provided by FPL for the Preferred Transmission Line Corridor - Road dimensions, number of structure pads, and estimated total acreage of dredge and fill impact for those segments of the preferred transmission line corridor that occur in whole or in part within the Florida Panther Focus Area.**

<b>Segment</b>	<b>Road Depth of Fill (Feet)</b>	<b>Road Length (Feet)</b>	<b>Road Width (Feet)</b>	<b>Road Area (Acres)</b>	<b>Number of Pads</b>	<b>Total Pad Area (Acres)</b>	<b>Other Dredge &amp; Fill (Acres)</b>	<b>Total Impact (Acres)</b>
1B	5	9,741	48	15.21	22	8.44	0	23.65
1C	5	10,734	36	10.84	28	9.05	0	19.89
1D	5	21,854	18	19.07	59	25.69	0	44.76
2	1	0	0	0	5	2.7	0	2.70
3A	1-4	4,593	18	2.37	23	12.96	0	15.33
3B	1-6	39,840	18	35.88	108	66.75	0	102.63
3C	6	20,352	18	19.62	54	36.33	0	55.95
4	5	14,066	18	12.27	41	15.42	0	27.69
Access 1	0	0	0	0	0	0	1.63	1.63
Access 2	0	0	0	0	0	0	0.20	0.20

Table 2

**TRANSMISSION LINE CORRIDORS:** Total acreage of each transmission line corridor segment; acreage and percent of each segment within the Florida panther Primary and Secondary Zones; acreage of impact due to dredging and filling for pads and access roads as estimated by FPL engineering staff for each corridor segment; and estimated acreage of potential dredge and fill impact within the Primary and Secondary Zones.

Segment	Segment Total Acres	Area in Panther Zones		Percent by Zone		Segment Impact Acres*	Estimated Impact	
		Primary Acres	Secondary Acres	Primary Zone	Secondary Zone		Primary Acres	Secondary Acres
1B	112.14	20.16	0	18.0%	0.0%	8.44	1.52	0.00
1C	81.48	81.48	0	100.0%	0.0%	9.05	9.05	0.00
1D	219.73	191.14	0	87.0%	0.0%	44.76	38.94	0.00
2	706.54	0.55	0	0.1%	0.0%	2.70	0.002	0.00
3A	126.94	72.66	0	57.2%	0.0%	15.33	8.77	0.00
3B	858.44	405.08	9.53	47.2%	1.1%	102.63	48.43	1.14
3C	433.35	0	371.02	0.0%	85.6%	55.95	0.00	47.90
4	235.93	0	2.91	0.0%	1.2%	27.69	0.00	0.34
Access 1	364.74	0	274.66	0.0%	75.3%	1.63	0.00	1.23
Access 2	10.5	0	10.5	0.0%	100.0%	0.20	0.00	0.20
ENP/WCA	498.71	317.76	180.95	63.7%	36.3%	168.88	107.60	61.28
<b>Total</b>	<b>3,648.50</b>	<b>1,088.83</b>	<b>849.57</b>	—	—	—	—	—

\* See Table 1.

**Table 3**      **Summary of potential pre- and post-project impacts to Florida panther habitats in terms of Panther Habitat Units (PHU) for the preferred transmission line corridor alternative involving relocation of segments to the west side of the L-30/31-N canal; the corridor alternative that utilizes the existing right-of-way through Everglades National Park (ENP) and Water Conservation Area 3B (WCA); and associated with road improvements to upgrade access to Turkey Point power plant. Post-project PHU calculations assume that the shoulders of unimproved transmission line access roads will revegetate to shrub and brush cover types in a short period of time.**

Project Feature	FWS Cover Type	FWS Score	Pre-Project		Post-Project	
			Acres	PHU	Acres	PHU
<b>Preferred Transmission Line Corridor</b>	Freshwater Marsh	9	84.17	758	0	0
	Hardwood Swamp	9	9.84	89	0	0
	Grassland/Pasture	7	1.46	10	0	0
	Cropland	4	12.16	49	0	0
	Shrub and Brush	5	0.00	0	30.83	154
	Exotic Plants	3	21.48	64	0	0
	Urban and Barren	0	14.78	0	126.69	0
	Water	0	13.64	0	0	0
	<b>Total</b>		<b>157.52</b>	<b>969</b>	<b>157.52</b>	<b>154</b>
<b>Secondary Alternative Transmission Line Corridor (including ENP/WCA ROW)</b>	Freshwater Marsh	9	182.45	1,642	0	0
	Hardwood Swamp	9	11.58	104	0	0
	Grassland/Pasture	7	0.08	1	0	0
	Shrub and Brush	5	0.00	0	46.04	230
	Cropland	4	7.89	32	0	0
	Exotic Plants	3	14.80	44	0	0
	Urban and Barren	0	2.22	0	173.92	0
	Water	0	0.95	0	0	0
	<b>Total</b>		<b>219.96</b>	<b>1,823</b>	<b>219.96</b>	<b>230</b>
<b>Power Plant Access Roads</b>	Freshwater Marsh	9	28.43	256	0	0
	Hardwood Swamp	9	13.89	125	0	0
	Cropland	4	4.61	18	0	0
	Orchards/Groves	4	1.59	6	0	0
	Exotic Plants	3	2.1	6	0	0
	Urban and Barren	0	15.49	0	69.08	0
	Water	0	2.97	0	0	0
	<b>Total</b>		<b>69.08</b>	<b>412</b>	<b>69.08</b>	<b>0</b>

**Table 4      PREFERRED CORRIDOR – PANTHER PRIMARY ZONE: Acreages and Panther Habitat Units (PHU) for each cover type potentially affected by dredging and filling within each segment of the preferred transmission line corridor (i.e., includes segments along the L-30/31-N canal) that occurs within the Florida panther Primary Zone.**

Primary Zone - Transmission Line Corridor Segments Preferred Corridor (L-30/31-N)					
Segment	FWS Cover Type	FWS Score	Corridor Segment Total Acres	Estimated Segment Impact Acres	PHU
<b>1B</b>	Freshwater Marsh	9	19.71	1.49	13
	Urban	0	0.45	0.03	0
<b>Subtotal</b>			20.16	1.52	13
<b>1C</b>	Freshwater Marsh	9	58.71	6.52	59
	Hardwood Swamp	9	19.21	2.13	19
	Urban	0	3.39	0.38	0
	Water	0	0.17	0.02	0
<b>Subtotal</b>			81.48	9.05	78
<b>1D</b>	Freshwater Marsh	9	56.35	11.48	103
	Hardwood Swamp	9	31.76	6.47	58
	Grassland/Pasture	7	0.38	0.08	1
	Cropland	4	38.71	7.89	32
	Exotic Plants	3	56.47	11.50	35
	Urban	0	6.15	1.25	0
	Water	0	1.32	0.27	0
<b>Subtotal</b>			191.14	38.94	228
<b>2</b>	Grassland/Pasture	7	2.70	0.0021	0.0147
<b>Subtotal</b>			2.70	0.0021	0.0147

**Table 4      Continued.**

<b>Primary Zone - Transmission Line Corridor Segments</b> <b>Preferred Corridor (L-30/31-N)</b>					
<b>Segment</b>	<b>FWS Cover Type</b>	<b>FWS Score</b>	<b>Corridor Segment Total Acres</b>	<b>Estimated Segment Impact Acres</b>	<b>PHU</b>
<b>3A</b>	Freshwater Marsh	9	55.73	6.73	61
	Cropland	4	0.13	0.02	0
	Exotic Plants	3	9.98	1.20	4
	Urban	0	6.82	0.82	0
<b>Subtotal</b>			<b>72.66</b>	<b>8.77</b>	<b>64</b>
<b>3B</b>	Freshwater Marsh	9	228.60	27.33	246
	Hardwood Swamp	9	0.21	0.03	0
	Grassland/Pasture	7	11.58	1.38	10
	Cropland	4	35.61	4.26	17
	Exotic Plants	3	37.83	4.52	14
	Urban	0	47.68	5.70	0
	Water	0	43.57	5.21	0
<b>Subtotal</b>			<b>405.08</b>	<b>48.43</b>	<b>286</b>
<b>Summary</b>	Freshwater Marsh	9	419.10	53.54	482
	Hardwood Swamp	9	51.18	8.63	78
	Grassland/Pasture	7	11.96	1.46	10
	Cropland	4	74.45	12.16	49
	Exotic Plants	3	104.28	17.23	52
	Urban	0	64.49	8.19	0
	Water	0	45.06	5.50	0
<b>Total</b>			<b>770.52</b>	<b>106.71</b>	<b>670</b>

**Table 5      PREFERRED CORRIDOR – SECONDARY ZONE: Acreages and Panther Habitat Units (PHU) for each cover type potentially affected by dredging and filling within each segment of the preferred transmission line corridor (i.e., includes segments along the L-30/31-N canal) and that occurs within the Florida panther Secondary Zone.**

Secondary Zone - Transmission Line Corridor Segments Preferred Corridor (L-30/31-N)					
Segment	FWS Cover Type	FWS Score	Corridor Segment Total Acres	Estimated Segment Impact Acres	PHU
<b>3B</b>	Freshwater Marsh	9	7.83	0.94	8
	Exotic Plants	3	0.05	0.01	0
	Urban	0	1.35	0.16	0
	Water	0	0.30	0.04	0
<b>Subtotal</b>			9.53	1.14	8
<b>3C</b>	Freshwater Marsh	9	225.9	29.16	262
	Hardwood Swamp	9	9.36	1.21	11
	Exotic Plants	3	28.74	3.71	11
	Urban	0	47.21	6.09	0
	Water	0	59.81	7.72	0
<b>Subtotal</b>			371.02	47.90	284
<b>4</b>	Exotic Plants	3	2.91	0.34	1
<b>Subtotal</b>			2.91	0.34	1
<b>Access 1</b>	Freshwater Marsh	9	103.88	0.47	4
	Exotic Plants	3	43.17	0.19	1
	Urban	0	54.06	0.24	0
	Water	0	73.55	0.33	0
<b>Subtotal</b>			274.66	1.23	5
<b>Access 2</b>	Freshwater Marsh	9	3.06	0.06	1
	Urban	0	4.70	0.09	0
	Water	0	2.74	0.05	0
<b>Subtotal</b>			10.50	0.20	1

**Table 5      Continued.**

<b>Secondary Zone - Transmission Line Corridor Segments</b> <b>Preferred Corridor (L-30/31-N)</b>					
<b>Segment</b>	<b>FWS Cover Type</b>	<b>FWS Score</b>	<b>Corridor Segment Total Acres</b>	<b>Estimated Segment Impact Acres</b>	<b>PHU</b>
<b>Summary</b>	Freshwater Marsh	9	340.67	30.62	276
	Hardwood Swamp	9	9.36	1.21	11
	Exotic Plants	3	74.87	4.25	13
	Urban	0	107.32	6.59	0
	Water	0	136.40	8.14	0
<b>Total</b>			<b>668.62</b>	<b>50.81</b>	<b>299</b>

**Table 6**      **Estimated acreages and associated Panther Habitat Units (PHU) along revegetated shoulders of transmission line access roads proposed for the preferred and secondary transmission line corridors. Shoulders would quickly revegetate to a shrub and brush successional stage with a USFWS land cover score of 5, and the PHU calculation assumes no reduction in credit would be required due to the short time lag involved in achieving restoration.**

<b>Segment</b>	<b>Shoulder Fill (Acres)</b>	<b>Percent Impact</b>	<b>Total Impact (Acres)</b>	<b>Restoration Credit (PHU)</b>
1B	4.48	18.0%	0.80	4
1C	1.97	100.0%	1.97	10
1D	10.04	87.0%	8.73	44
2	0.00	0.1%	0.00	0
3A	0.47	57.2%	0.27	1
3B	19.42	48.3%	9.38	47
3C	11.21	85.6%	9.60	48
4	6.46	1.2%	0.08	0
Access 1	0.00	75.3%	0.00	0
Access 2	0.00	100.0%	0.00	0
ENP/WCA	34.53	100.0%	34.53	173
<b>ROW</b>				
Preferred			30.83	154
Secondary			46.04	230



**Table 7      SECONDARY CORRIDOR – PANTHER PRIMARY ZONE: Acreages and Panther Habitat Units (PHU) for each cover type potentially affected by dredging and filling within each segment of the secondary transmission line corridor (i.e., includes segments along the existing FPL-owned right-of-way (ROW) in Everglades National Park and Water Conservation Area 3B [ENP/WCA]) and that occurs within the Florida panther Primary Zone.**

Primary Zone - Transmission Line Corridor Segments Secondary Corridor (ENP/WCA ROW)					
Segment	FWS Cover Type	FWS Score	Corridor Segment Total Acres	Estimated Segment Impact Acres	PHU
<b>1B</b>	Freshwater Marsh	9	19.71	1.49	13
	Urban	0	0.45	0.03	0
<b>Subtotal</b>			20.16	1.52	13
<b>1C</b>	Freshwater Marsh	9	58.71	6.52	59
	Hardwood Swamp	9	19.21	2.13	19
	Urban	0	3.39	0.38	0
	Water	0	0.17	0.02	0
<b>Subtotal</b>			81.48	9.05	78
<b>1D</b>	Freshwater Marsh	9	56.35	11.48	103
	Hardwood Swamp	9	31.76	6.47	58
	Grassland/Pasture	7	0.38	0.08	1
	Cropland	4	38.71	7.89	32
	Exotic Plants	3	56.47	11.50	35
	Urban	0	6.15	1.25	0
	Water	0	1.32	0.27	0
<b>Subtotal</b>			191.14	38.94	228
<b>2</b>	Grassland/Pasture	7	2.70	0.0021	0.0147
<b>Subtotal</b>			2.70	0.0021	0.0147
<b>ENP/WCA</b>	Freshwater Marsh	9	302.37	102.39	921
	Hardwood Swamp	9	7.23	2.45	22
	Exotic Plants	3	8.16	2.76	8
<b>Subtotal</b>			317.76	107.60	952

**Table 7      Continued.**

<b>Primary Zone - Transmission Line Corridor Segments</b> <b>Secondary Corridor (ENP/WCA ROW)</b>					
<b>Segment</b>	<b>FWS Cover Type</b>	<b>FWS Score</b>	<b>Corridor Segment Total Acres</b>	<b>Estimated Segment Impact Acres</b>	<b>PHU</b>
<b>Summary</b>	Freshwater Marsh	9	437.14	121.88	1,097
	Hardwood Swamp	9	58.20	11.05	99
	Grassland/Pasture	7	0.38	0.08	1
	Cropland	4	38.71	7.89	32
	Exotic Plants	3	64.63	14.27	43
	Urban	0	9.99	1.66	0
	Water	0	1.49	0.29	0
<b>Total</b>			<b>610.54</b>	<b>157.11</b>	<b>1,271</b>

**Table 8      SECONDARY CORRIDOR – PANTHER SECONDARY ZONE: Acreages and Panther Habitat Units (PHU) for each cover type potentially affected by dredging and filling within each segment of the secondary transmission line corridor (i.e., includes segments along the existing FPL-owned right-of-way (ROW) in Everglades National Park and Water Conservation Area 3B [ENP/WCA]) and that occurs within the Florida panther Secondary Zone.**

Secondary Zone - Transmission Line Corridor Segments					
Secondary Corridor (ENP/WCA ROW)					
Segment	FWS Cover Type	FWS Score	Corridor Segment Total Acres	Estimated Segment Impact Acres	PHU
<b>ENP/WCA</b>	Freshwater Marsh	9	177.48	60.10	541
	Hardwood Swamp	9	1.56	0.53	5
	Urban	0	0.92	0.31	0
	Water	0	0.99	0.34	0
<b>Subtotal</b>			180.95	61.28	546
<b>4</b>	Exotic Plants	3	2.91	0.34	1
<b>Subtotal</b>			2.91	0.34	1
<b>Access 1</b>	Freshwater Marsh	9	103.88	0.47	4
	Exotic Plants	3	43.17	0.19	1
	Urban	0	54.06	0.24	0
	Water	0	73.55	0.33	0
<b>Subtotal</b>			274.66	1.23	5
<b>Summary</b>	Freshwater Marsh	9	281.36	60.57	545
	Hardwood Swamp	9	1.56	0.53	5
	Exotic Plants	3	46.08	0.53	2
	Urban	0	54.98	0.55	0
	Water	0	74.54	0.66	0
<b>Total</b>			<b>458.52</b>	<b>62.85</b>	<b>551</b>

**Table 9**      **Summary of acreage and habitat impacts for those portions the proposed access road improvements that occur within the Florida panther Primary Zone.**

Primary Zone –Road Improvements				
Road	FWS Cover Type	FWS Score	Road Impact Acres	PHU
SW 117th Ave (North)	Urban	0	0.28	0
	Water	0	0.03	0
Subtotal			0.31	0
SW 117th Ave (South)	Freshwater Marsh	9	2.62	24
	Hardwood Swamp	9	3.89	35
	Urban	0	1.16	0
Subtotal			7.67	59
SW 137th Ave	Hardwood Swamp	9	3.53	32
	Urban	0	2.18	0
	Water	0	1.67	0
Subtotal			7.38	32
SW 328th St	Cropland	4	4.61	18
	Orchards/Groves	4	1.59	6
	Exotic Plants	3	2.1	6
	Urban	0	6.7	0
	Water	0	1.2	0
Subtotal			16.20	31
SW 344th St	Urban	0	1.66	0
Subtotal			1.66	0
SW 359th Ave (East)	Freshwater Marsh	9	4.46	40
	Urban	0	0.42	0
Subtotal			4.88	40

**Table 9      Continued.**

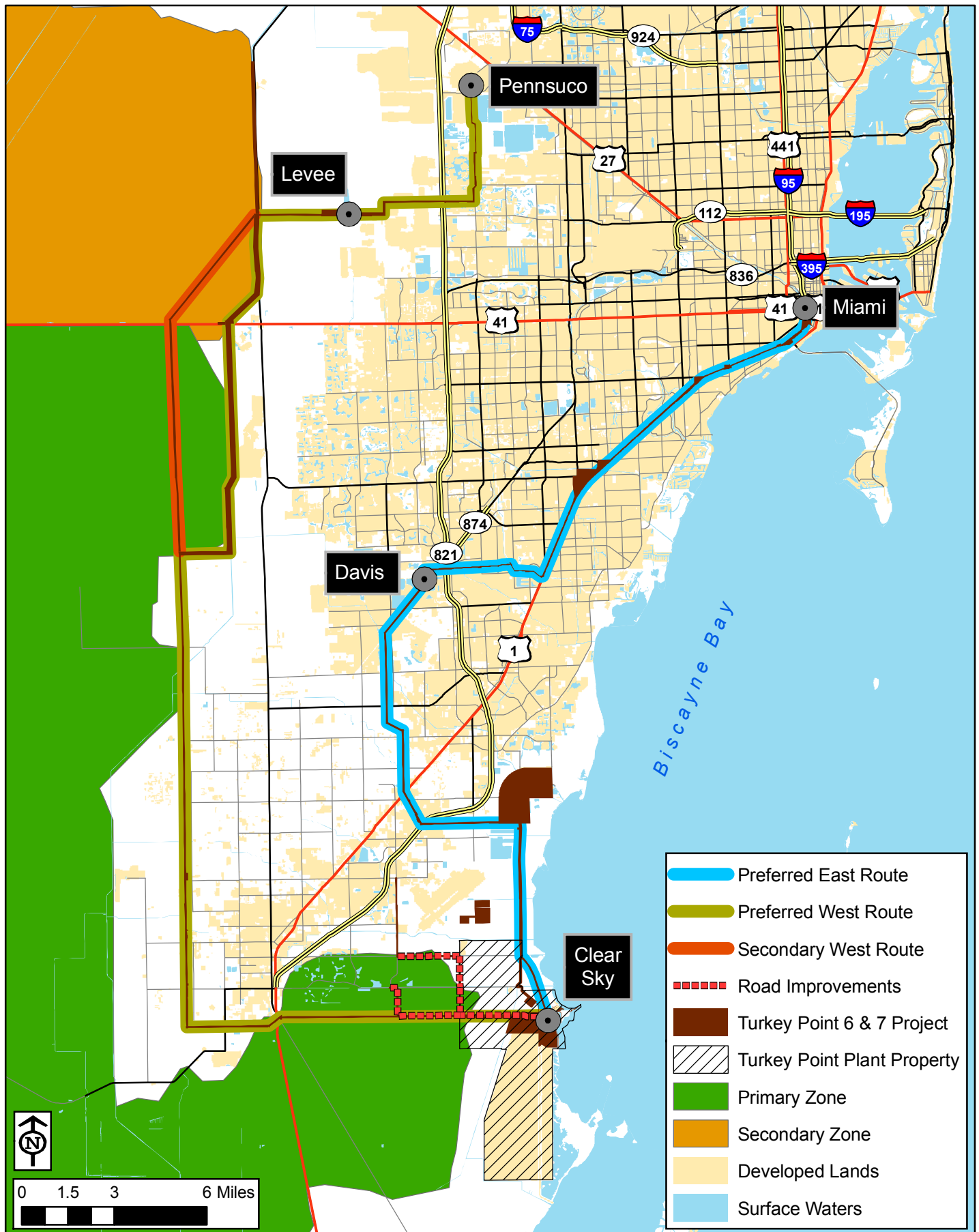
<b>Primary Zone –Road Improvements</b>				
<b>Road</b>	<b>FWS Cover Type</b>	<b>FWS Score</b>	<b>Road Impact Acres</b>	<b>PHU</b>
<b>SW 359th Ave (West)</b>	Freshwater Marsh	9	21.35	192
	Hardwood Swamp	9	6.47	58
	Urban	0	3.09	0
	Water	0	0.07	0
<b>Subtotal</b>			<b>30.98</b>	<b>250</b>
<b>All Roads Summary</b>	Freshwater Marsh	9	28.43	255.87
	Hardwood Swamp	9	13.89	125.01
	Cropland	4	4.61	18.44
	Orchards/Groves	4	1.59	6.36
	Exotic Plants	3	2.1	6.3
	Urban	0	15.49	0.00
	Water	0	2.97	0
<b>Total</b>			<b>69.08</b>	<b>412</b>

Table 10

Numbers and percentages of GPS-collar and random location records occurring on linear landscape features within the home ranges of 11 Florida panthers. Features include dirt roads, jeep trails, paved roads, farm field berms, drainage ditch berms, hedgerows, power line corridors, old railroad grades, and tramways.

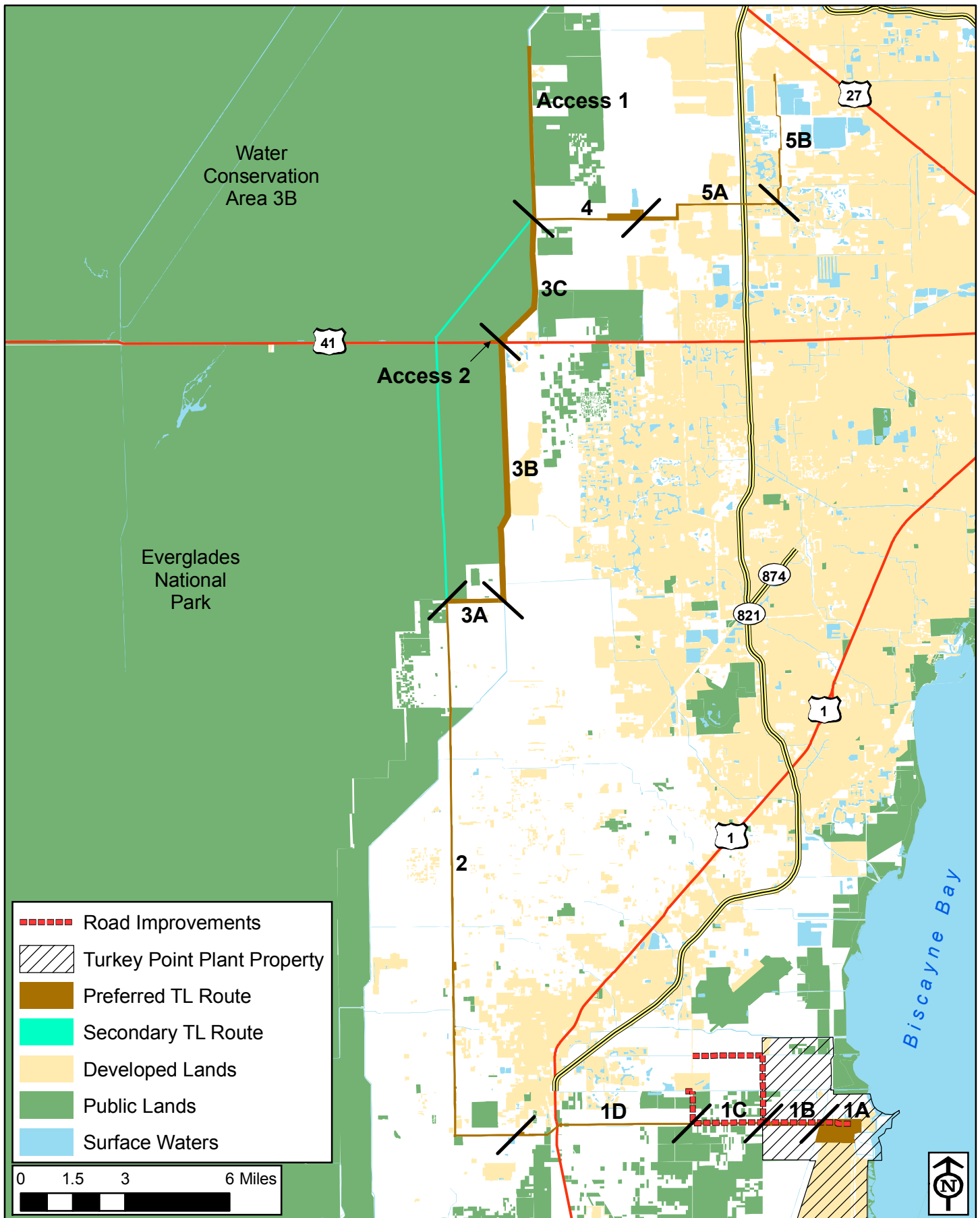
Panther	Sex	Total GPS and Random Points (Number)	GPS Records on Linear Features (Number)	Random Points on Linear Features (Number)	GPS Records on Linear Features (Percent)	Random Points on Linear Features (Percent)
FP059	M	121	21	5	17.4%	4.1%
FP083	F	423	61	26	14.4%	6.1%
FP100	M	528	128	46	24.2%	8.7%
FP109	M	530	90	32	17.0%	6.0%
FP110	F	827	77	60	9.3%	7.3%
FP111	M	1,174	134	85	11.4%	7.2%
FP112	F	1,078	45	32	4.2%	3.0%
FP117	M	350	44	29	12.6%	8.3%
FP121	F	1,080	55	50	5.1%	4.6%
FP128	F	367	88	22	24.0%	6.0%
FP131	M	813	157	63	19.3%	7.7%
FP139	M	1,481	133	95	9.0%	6.4%
Mean		731	86	45	14.0%	6.3%
Range		121–1,481	21–157	5–95	4.2–24.2%	3.0–8.7%
SD		409.34	43.35	26.56	6.6%	1.7%

## **FIGURES**

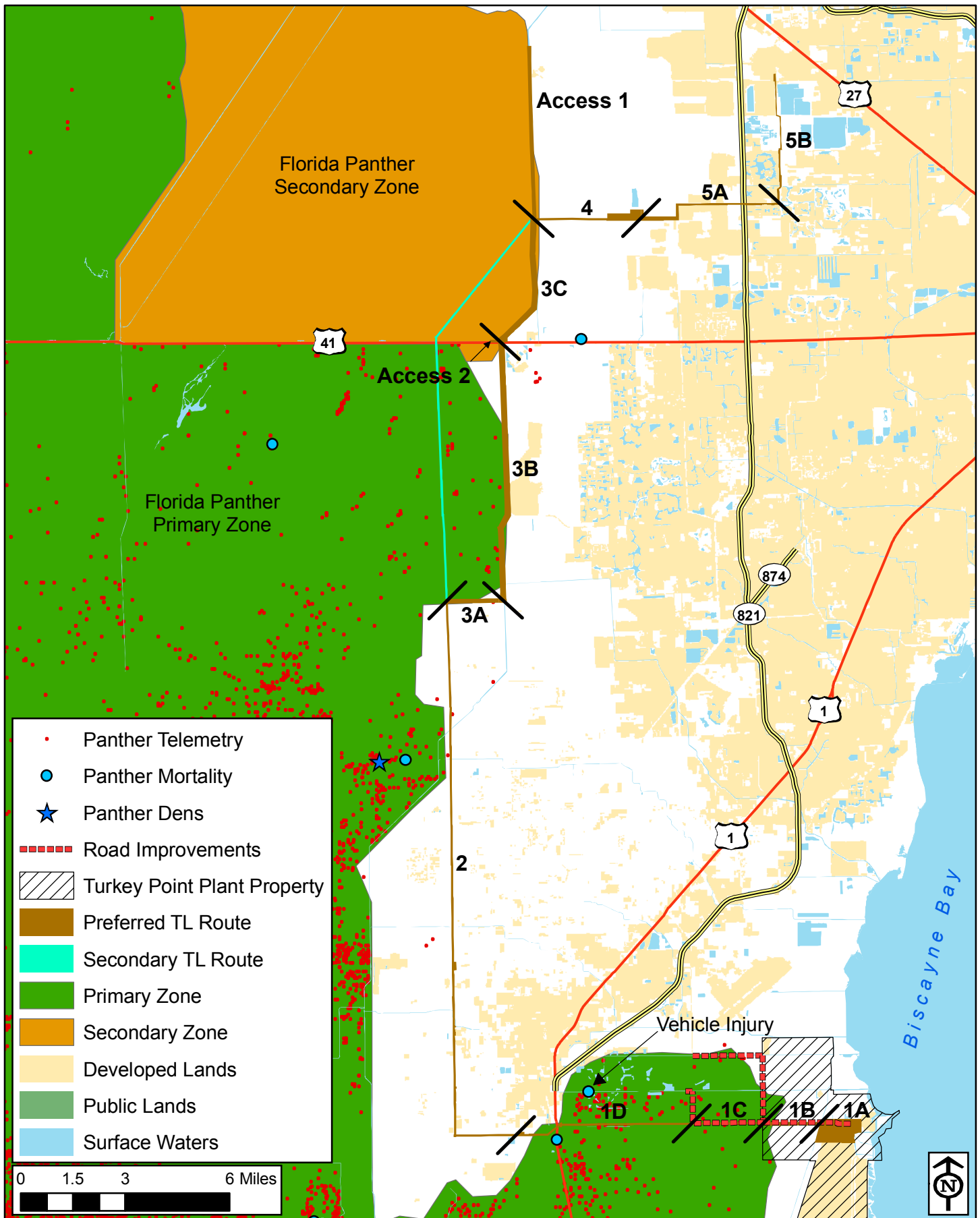


**Figure 1.** Turkey Point Units 6 & 7 project, including preferred and secondary routes for transmission line corridors and proposed access road improvements, in relation to Florida Panther Focus Area Primary and Secondary Zones.

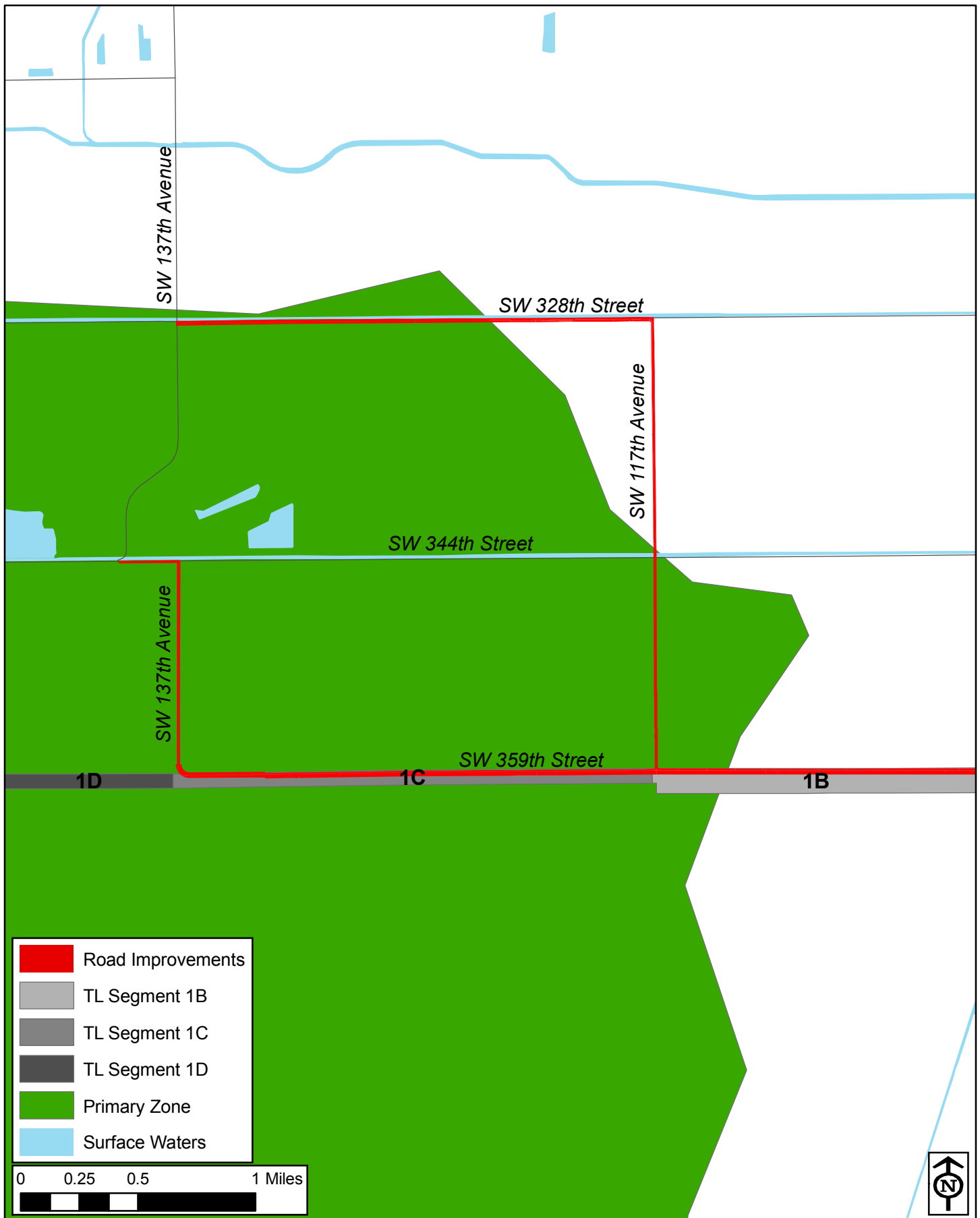




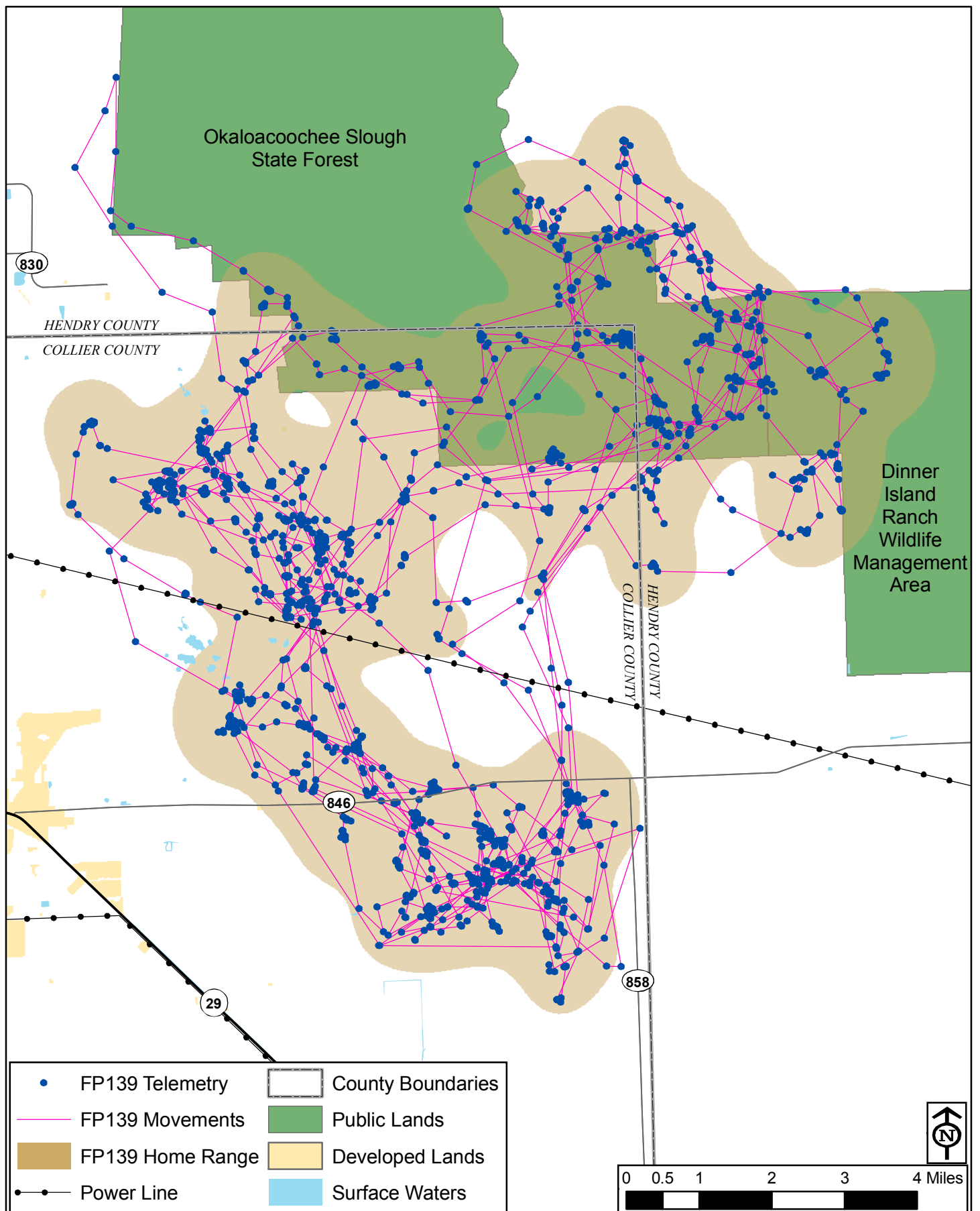
**Figure 2.** Designated segments of the preferred and secondary west transmission line (TL) corridors and locations of proposed road improvements in relation to public lands and developed areas in Miami-Dade County, Florida.



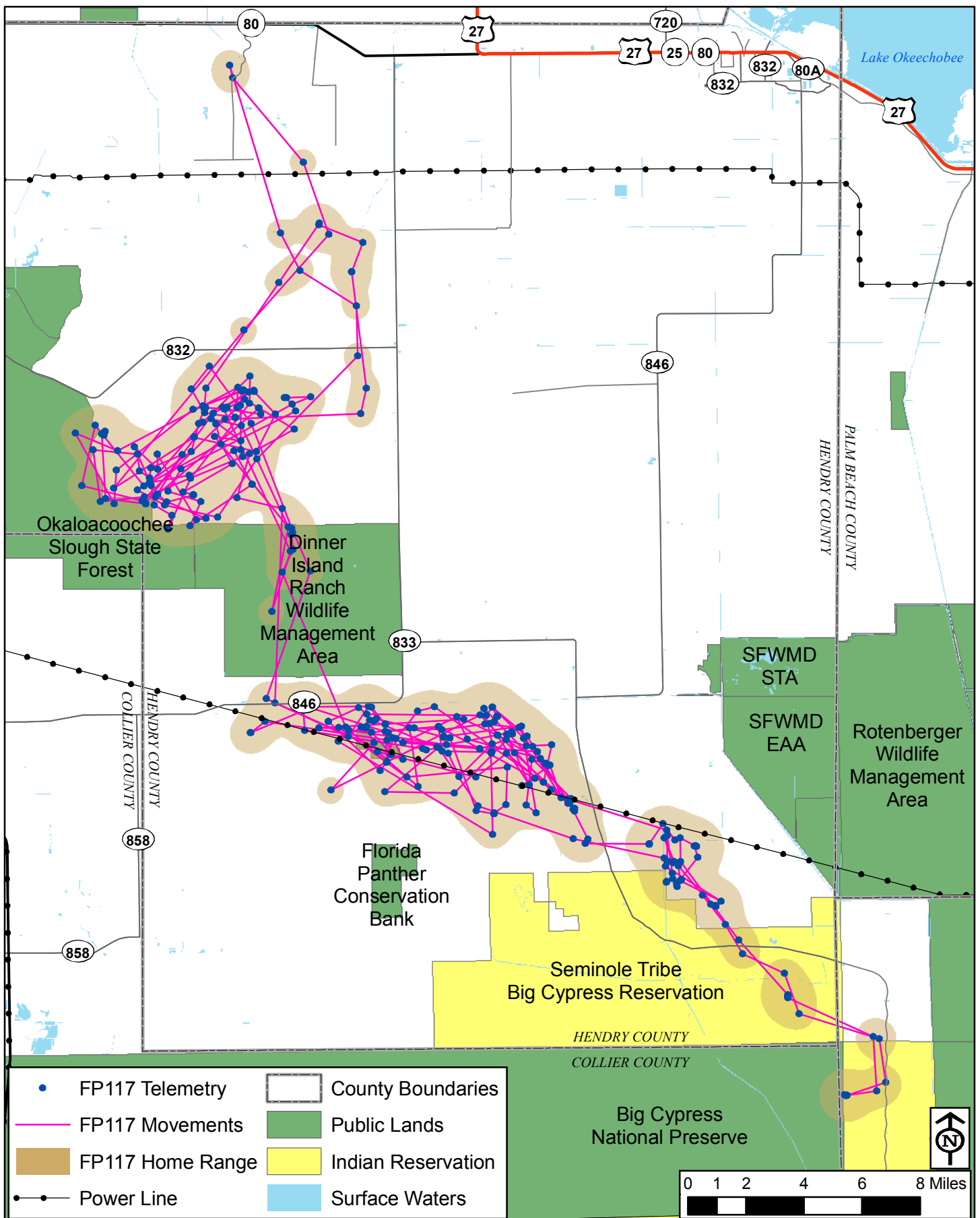
**Figure 3.** Segments of the preferred and secondary west transmission line (TL) corridors and proposed road improvements in relation to the Panther Focus Area Primary and Secondary Zones, and panther telemetry, mortality, and den records.



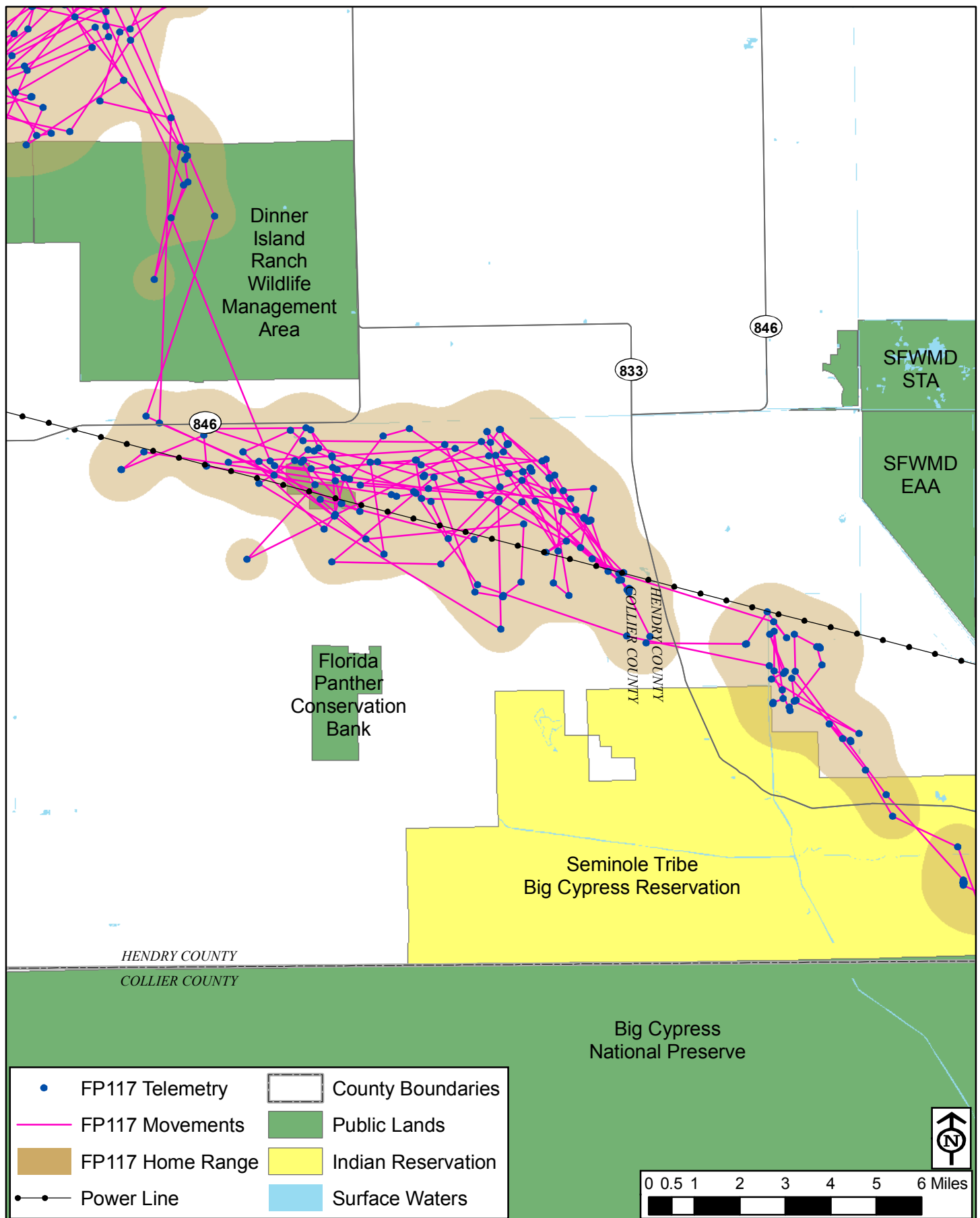
**Figure 4.** Footprint of proposed road improvements west of the Turkey Point power plant in relation to proposed transmission line corridor segments and the Florida panther Primary Zone.



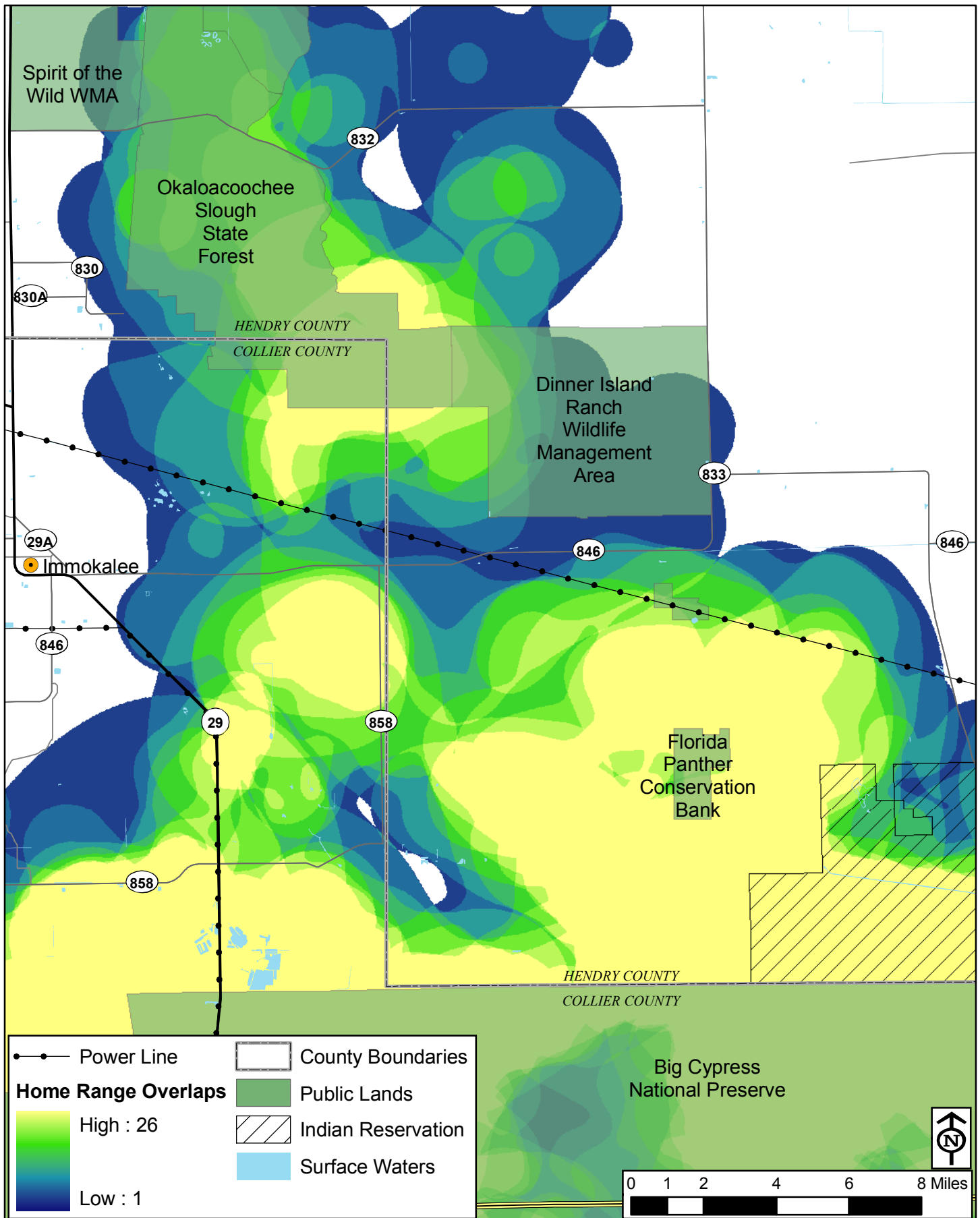
**Figure 5.** Hourly GPS-collar telemetry locations, movements, and 95% contour of fixed kernel home range of male panther FP139 (Mar 31 - Aug 30, 2005) in relation to existing electrical transmission lines east of Immokalee, Florida.



**Figure 6.** GPS-collar telemetry locations, movements, and 95% contour of fixed kernel home range of male panther FP117 (Dec 3, 2003 - Jul 28, 2004) in relation to existing electrical transmission line east of Immokalee, Florida.

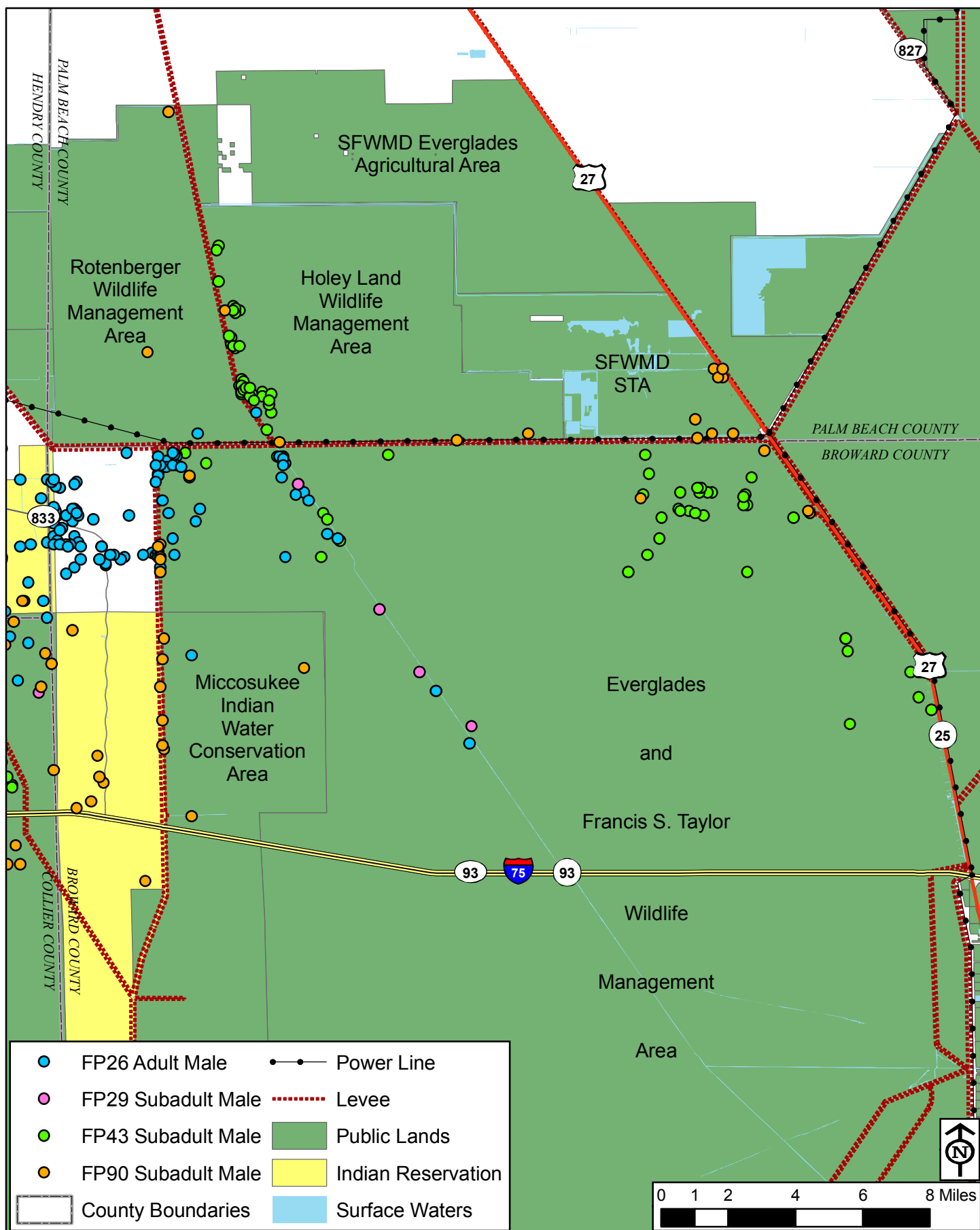


**Figure 7.** GPS-collar telemetry locations, movements, and 95% contour of fixed kernel home range of male panther FP117 (Dec 3, 2003 - Jul 28, 2004) in relation to existing electrical transmission line east of Immokalee, Florida.



**Figure 8.** Overlapping 95% contours of fixed kernel home ranges for 73 female and 48 adult male Florida panthers based on radio-collar telemetry data collected between February 1981 and June 2009 in relation to existing electrical transmission lines.





**Figure 9.** Radio-telemetry records of four male Florida panthers that used habitats along and adjacent to existing electrical transmission lines, canals, and levees in the Florida Everglades between May 1988 and April 2001.