In 2008, the Florida Panther Protection Program partners convened a scientific review team to evaluate the strategy outlined in the Memorandum of Understanding.

The Panther Review Team (PRT), composed of six scientists with expertise in Florida panther ecology and landscape-level natural resource planning, was asked the simple question: does the Florida Panther Protection Program as a whole provide additional conservation benefit to the Florida panther when compared to current programs? The PRT unequivocally and unanimously responded in the affirmative.

The PRT was also invited to offer comments and suggestions on the program. These will be carefully considered by the partners for feasibility and in relation to other issues not addressed by the PRT including private property rights and economic viability.

The final report may be utilized by U.S. Fish and Wildlife Service in the development of a Florida Panther Habitat Conservation Plan which includes a thorough scientific analysis and transparent public process.

For complete and current information on the Florida Panther Protection Program, go to www.floridapantherprotection.com.

The final report is presented in four parts. This is Part 1 of 4.

Part 1 of 4 - Cover through Section 3.5
Part 2 of 4 - Section 4.0 through Section 11.0
Part 3 of 4 - Figures
Part 4 of 4 - Appendix A

Technical Review of the Florida Panther Protection Program Proposed for the Rural Lands Stewardship Area of Collier County, Florida

October 15, 2009

Prepared for
Rural Landowners and Conservation Organizations
as
Parties to a Memorandum of Understanding
Dated June 2, 2008

Prepared by

The Florida Panther Protection Program Technical Review Team

This report should be cited as follows:

Florida Panther Protection Program Technical Review Team. 2009. Technical Review of the Florida Panther Protection Program Proposed for the Rural Lands Stewardship Area of Collier County, Florida. Final Report. 84 pp.

Members of the Florida Panther Protection Program Technical Review Team are listed in alphabetical order as follows*:

Chris Belden
Florida Panther Recovery Coordinator
U. S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960
Phone: 772-562-3909, ext. 237
E-mail: Chris_Belden@fws.gov

Randy S. Kautz, B.S.
Senior Scientist
Breedlove, Dennis & Associates, Inc.
2625 Neuchatel Drive
Tallahassee, Florida 32303
Phone: 850-562-4849
E-mail: rkautz@bda-inc.com

Darrell Land
Panther Team Leader
Florida Fish and Wildlife Conservation Commission
566 Commercial Boulevard
Naples, Florida 34104
Phone: 239-643-4220
E-mail: darrell.land@myfwc.com

Tom H. Logan, M.S., C.W.B.
Vice President
Breedlove, Dennis & Associates, Inc.
1167 Green Hill Trace
Tallahassee, Florida 32317
Phone: 850-942-1631
E-mail: tlogan@bda-inc.com

David Shindle
Biologist
Environmental Science Division
Conservancy of Southwest Florida
1450 Merrihue Drive
Naples, Florida 34102
Phone: 239-325-2665
E-mail: davids@conservancy.org

Daniel J. Smith, Ph.D., A.I.C.P.
Research Associate
Department of Biology
University of Central Florida
4000 Central Florida Boulevard
Orlando, Florida 32816
Phone: 386-785-1565
E-mail: djs3@ufl.edu

Acknowledgment: The above members would like to express our appreciation to Ms. Kim M. Gessner, Environmental Specialist III, Breedlove, Dennis & Associates, Inc., for the contribution she has made to this report. Ms. Gessner graciously and patiently processed and incorporated the many edits and revisions we all submitted for every draft of this report, and she is primarily responsible for its professional format. Ms. Gessner has greatly improved the presentation and readability of our combined efforts in the preparation of this document. We also thank Dr. Lynette Malecki Brown, Associate Scientist III, Breedlove, Dennis & Associates, Inc., for her assistance with the statistical analyses for the RLSA landscape with respect to Florida panther habitat value and use. We appreciate both very much for their assistance in this regard.

Cover photo by David Shindle – Florida Fish and Wildlife Conservation Commission. This photo depicts a male Florida panther that likely is the individual later identified as FP131. The photo was taken before he was captured and equipped with a radio-collar. FP131 was known to use both public and private lands of the RLSA.

* The members of the PRT acknowledge their employment with agencies, organizations, or companies that may have separate but related missions and views regarding conservation of the Florida panther. However, it should be noted that regardless of employment, the information, analyses, and conclusions presented in this report are a sole reflection of the independent and collective professional and biological opinions of the members and should not be construed otherwise.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF FIGURES

LIST OF FIGURES (continued)

LIST OF FIGURES (continued)

LIST OF ABBREVIATIONS

ACOE	U.S. Department of the Army, Corps of Engineers
ACSC	Area of Critical State Concern
ANOVA	analysis of variance
BCNP	Big Cypress National Preserve
CKS	Camp Keais Strand
CR	County Road
CREW	Corkscrew Regional Ecosystem Watershed
DCA	Florida Department of Community Affairs
ENP	Everglades National Park
ESA	U.S. Endangered Species Act of 1973
FDOT	Florida Department of Transportation
FPNWR	Florida Panther National Wildlife Refuge
FPPP	Florida Panther Protection Program
FSA	Flowway Stewardship Area
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FWC	Florida Fish and Wildlife Conservation Commission
GIS	geographic information system
GPS	Global Positioning System
HCP	Habitat Conservation Plan
HSA	Habitat Stewardship Area
I-75	Interstate 75
MOU	Memorandum of Understanding
NRI	Natural Resource Index
OSSF	Okaloacoochee Slough State Forest
PD&E	Project Development and Environment
pdf	Portable Document Format
PFA	Panther Focus Area
PHU	Panther Habitat Unit
PRT	Florida Panther Protection Program Technical Review Team
RLSA	Rural Land Stewardship Area
SFWMD	South Florida Water Management District
SR	State Road
SRA	Stewardship Receiving Area
SSA	Stewardship Sending Area
SSHL	Summerland Swamp Habitat Linkage
US	United States
USFWS	U.S. Fish and Wildlife Service
WRA	Water Retention Area

EXECUTIVE SUMMARY

The Florida panther (*Puma concolor coryi*) is a large, wide-ranging carnivore listed as an endangered species by the U.S. Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC). The current breeding range of the population is located on approximately 2.27 million acres of Florida south of the Caloosahatchee River. Portions of the breeding range overlap with 196,000 acres of rural land in eastern Collier County that is under pressure for future growth. Land development in this area is governed by the 2002 Collier County Rural Lands Stewardship Overlay (RLSA). The RLSA program is an incentive-based system in which Stewardship Credits are generated by voluntarily preserving rural lands with high natural resource values, and the credits are used to entitle new developments on other lands within the RLSA. Despite the intent of the RLSA program to protect lands with high natural resource values, the program is based upon the fact that future development will occur within the RLSA. Furthermore, the program does not exempt proposed developments from review for impacts to panthers and their habitats under the provisions of Sections 7 and 10 of the U.S. Endangered Species Act and Florida Rule 68A-27.003, Florida Administrative Code. Proposals for land development must proceed through federal regulatory processes to satisfy the provisions of federal law independent of approvals obtained under the RLSA program. State review also may be appropriate. The result is a project-by-project piecemeal approach to panther habitat conservation rather than a comprehensive landscape-scale planning approach that would ensure that Florida panthers could continue to occupy protected areas of the RLSA at build-out.

Representatives of eight landowners and four conservation organizations (Parties), recognizing the need for a comprehensive and cooperative approach to planning for the protection of Florida panther habitat as well as planning for future development within the RLSA, signed a Memorandum of Understanding (MOU) on June 2, 2008. The Parties agreed to explore the possibilities of a voluntary strategy to enhance Florida panther conservation within the RLSA in eastern Collier County. This conservation strategy, known as the Florida Panther Protection Program (FPPP), is based upon the structure of the existing RLSA program. The measures that are proposed as modifications of the RLSA program or creation of the FPPP are:

- Provision of 25% more mitigation for impacts to the panther Primary Zone
- Generation and use of panther credits on lands set aside as Stewardship Sending Areas
- Protection of agricultural lands though establishment of Agricultural Preservation areas
- Establishment of a core transportation network to serve 45,000 acres of development
- Proposal by the landowners for two corridors intended to enhance landscape connectivity
- Creation of the Paul J. Marinelli Florida Panther Protection Fund

The Parties also agreed to assemble a team of panther biologists and landscape ecologists to provide a technical review of the proposed conservation measures. The team of scientists, known as the Florida Panther Protection Program Review Team (PRT), was asked by the Parties to determine whether the FPPP as a whole provides additional conservation benefit to the Florida panther when compared to the 2002 RLSA Overlay program. The Parties agreed that, if a consensus was reached at the end of the technical review, rural landowners and conservation organizations would enter into a binding agreement, and the landowners would undergo a formal consultation process with USFWS to develop a Conservation Agreement, or its equivalent, for application to future developments. The intent also was expressed that,

if the proposed FPPP is found to be a benefit to panther conservation, it could serve as a model for application to other privately owned lands in south Florida where panthers also occur.

The PRT conducted a technical review of each of the proposed conservation measures. Some of the measures were reviewed for the soundness and validity of concepts. Other measures required detailed analysis of Geographic Information System data. The PRT determined that some areas of the RLSA would require additional protection to provide the desired benefits to Florida panther conservation and management. These areas were mapped, and their values to panther conservation were described in detail. The PRT also reviewed proposals for a new interchange on Interstate 75 (I-75) even though this was not proposed as a conservation measure. The PRT determined that an indirect effect of future development within the RLSA could be increased demand for a new interchange in an area of occupied panther habitat, and review by the PRT was warranted. The PRT also developed conclusions and recommendations regarding the proposed 45,000-acre cap on development within the RLSA and on the impacts of mining. The PRT recognized that the conclusions and recommendations resulting from these analyses may have economic implications for landowners and others, but an analysis of economic impacts of the FPPP was beyond the PRT's scope of work

The PRT concluded that the proposed FPPP and revisions to the RLSA currently being considered as part of the five-year RLSA review would represent an enhancement of panther conservation over the existing RLSA program. The PRT also concluded that, if its recommendations were incorporated into the RLSA program and the FPPP, the conservation value to panthers would increase. However, the PRT recognizes that the future development within the RLSA has the potential for the loss of panther habitat, and that habitat loss within the historic range of the Florida panther does not aid panther recovery. The conclusions and recommendations of the PRT are summarized as follows:

Proposed Revisions to the RLSA Map:

- The PRT recommends additional protection for approximately 38,746 acres of the RLSA.
- These areas would preserve additional core habitats and adjacent buffers, provide corridors to connect occupied habitats on public lands, and minimize future habitat fragmentation.
- Lands in public ownership, privately owned lands approved as Stewardship Sending Areas (SSAs) or likely to be designated as SSAs, and privately owned lands recommended for preservation by the PRT total 140,922 acres (72% of the RLSA).
- Lands remaining for development would be sufficient to accommodate the 45,000-acre cap.

Additional Mitigation Proposed for Impacts to the Primary Zone:

- More panther habitat would be preserved by the RLSA Stewardship Credit system than by the USFWS Methodology (Panther Habitat Unit [PHU]), even after providing 25% more mitigation for impacts to the Primary Zone.
- More PHUs exist on SSAs than are needed to fulfill USFWS mitigation requirements.
- Use of surplus PHUs from designated SSAs to mitigate panther habitat loss outside of the RLSA would not enhance panther conservation within the RLSA.
- The principal value of a 25% increase in PHUs of mitigation for Primary Zone impacts would be the increased financial contributions to the Panther Fund.

Panther Habitat Units Generated from Stewardship Sending Areas:

- The existing RLSA program will preserve more acres of panther habitat through the Stewardship Credit system than would be accomplished using the USFWS Methodology.

- More PHUs exist on SSAs than are needed to fulfill USFWS mitigation requirements.
- Use of surplus PHUs from SSAs to mitigate panther habitat loss outside of the RLSA would be detrimental to panther conservation.
- Sale of surplus PHUs outside of the RLSA could compete with the economics of establishing panther conservation banks outside of the RLSA.

Agricultural Preservation:

- The PRT identified specific RLSA Open lands in agricultural use that contribute to Florida panther conservation.
- The PRT recommends that changes made to the Stewardship Credit system should provide incentives to encourage preservation of those agricultural lands identified by the PRT as having conservation value to panthers.

Proposed Core Public Transportation Network:

- The PRT recommends that new road construction should avoid bisecting Habitat Stewardship Areas (HSAs), Flowway Stewardship Areas (FSAs), Water Retention Areas (WRAs), or areas identified by the PRT for additional protection.
- Habitat impacts should be minimized if construction in these areas cannot be avoided.
- The need for installation of wildlife crossings and fencing of proven design should be evaluated for upgrades to existing roads and proposals for new roads within the RLSA.
- Mitigation for road projects within the RLSA should occur within the RLSA.

North and South Corridors:

- The PRT recommends that the proposed South Corridor or Summerland Swamp Habitat Linkage should be expanded to include additional agricultural lands and patches of natural habitat to allow this area to continue to function as occupied panther habitat.
- The PRT recommends a redesign of the proposed North Corridor that would increase the minimum width to 1,200 feet; incorporate existing patches of native habitat to function as stepping stones; widen the termini to increase "funneling" effect; and maintain agricultural land uses near the termini.
- Agricultural uses should continue adjacent to the proposed corridor to buffer against more intensive land uses or development.
- The PRT encourages habitat restoration within the North Corridor and recommends continual monitoring to determine success and suggest design changes, as appropriate.

Paul J. Marinelli Florida Panther Protection Fund (Panther Fund):

- The Panther Fund will benefit panther conservation as long as the fund is not considered an alternative to habitat preservation.
- Panther Fund revenues should not be used for mitigation required by regulatory processes.
- Conservation actions within the RLSA should receive priority, but use of revenues should not be restricted to the RLSA.
- Acceptable uses for funds include habitat acquisition, habitat restoration, wildlife crossings, and monitoring of FPPP conservation measures.

Proposed New Interchanges for Interstate 75:

- Construction of an interchange at either Everglades Boulevard or between DeSoto Boulevard and Florida Panther National Wildlife Refuge (FPNWR) could compromise the functionality of occupied panther habitats north of I-75.
- Significant design challenges exist to resolve impacts to panther habitats for either of these interchange options.
- The PRT recommends that the concept of a future interchange with I-75 receive no further consideration due to impacts on panther habitats.

45,000-Acre Development Cap:

- The proposed development cap of 45,000 acres within the RLSA would benefit panther habitat conservation by providing certainty regarding the extent of future urban development that is not provided by the 2002 RLSA.
- The PRT's recommendations should not be construed as an endorsement of 45,000 acres of urban development within the RLSA.

Mining Activities within the RLSA:

- Mining results in a direct loss of panther habitat and may lead to future loss of panther habitats when mine lakes are proposed for waterfront developments after mining operations are completed.
- The PRT recommends that mining should be prohibited in areas of the RLSA identified for additional protection by the PRT.
- The PRT views mining as a form of development, and acreages of future mine lands should be deducted from the 45,000-acre development cap proposed for the RLSA.

1.0 Introduction

Representatives of eight landowners (Landowners) and four conservation organizations (collectively, Parties) signed a Memorandum of Understanding (MOU) (Appendix A) on June 2, 2008, that established a framework for a mutual strategy to voluntarily enhance Florida panther (*Puma concolor coryi*) conservation in eastern Collier County. This conservation strategy, known as the Florida Panther Protection Program (FPPP), is an incentive-based program built upon the 2002 Collier County Rural Lands Stewardship Area Overlay (RLSA). These incentives are generated by a credit-based system whereby credits are earned for preserving rural lands with high natural resource value, and these credits can then be used to entitle new development. The Parties also agreed to assemble a team of panther biologists and landscape ecologists to provide a technical review of the FPPP. This report represents the results of that team's review.

1.1 Status of the Florida Panther

The Florida panther is the last subspecies of *Puma* still surviving in the eastern United States (US). Historically occurring throughout the southeastern US, today the panther is restricted to less than 5% of its historic range in one population located in south Florida. The breeding component of this population is located on approximately 2.27 million acres (Kautz et al. 2006) in Collier, Lee, Hendry, Miami-Dade, and Monroe Counties south of the Caloosahatchee River in southern Florida (Belden et al. 1991). Although confirmed panther sign, male radio-collared panthers, and uncollared males killed by vehicles have been recorded outside of south Florida, no female panthers have been documented north of the Caloosahatchee River since 1973 (Nowak and McBride 1974, Belden et al. 1991, Land and Taylor 1998, Land et al. 1999, Shindle et al. 2000, McBride 2002, Belden and McBride 2006). Although the population recently was estimated at fewer than 100 individuals (Land et al. 2007), the population was estimated to consist of up to 117 adults and juveniles in 2007 (McBride et al. 2008). The panther is federally listed as endangered under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) and is also listed by the State of Florida as endangered.

Panthers are large, solitary carnivores and require large ranges to obtain the necessary prey (white-tailed deer [*Odocoileus virginianus*] and feral hog [*Sus scrofa*] [Maehr et al. 1990, Dalrymple and Bass 1996]) to meet energy needs required for health and reproduction. Their social and reproductive behavior requires access to large contiguous areas of habitat to maintain viable breeding populations. Mean home range sizes of adult males (n=19) and females (n=24) are approximately 95,014 acres (29,528 – 254,686 acres) and 37,488 acres (6,894 – 100,965 acres), respectively (Land et al. 2004, Land et al. 2008).

Radio-collar data and ground tracking indicate that panthers use the mosaic of habitats available to them. Forested cover types, particularly cypress swamp, pinelands, hardwood swamp, and upland hardwood forests are the habitat types most selected by panthers (Belden 1986, Belden et al. 1988, Maehr 1990a, Maehr et al. 1991, Maehr 1992, Smith and Bass 1994, Kerkhoff et al. 2000, Comiskey et al. 2002, Cox et al. 2006, Kautz et al. 2006). Global Positioning System (GPS) data demonstrated that panthers (n=12) use all habitats contained within their home ranges by selecting forested habitat types and using all others in proportion to availability (Land et al. 2008). Compositional analyses by Kautz et al. (2006) showed that forest patches of all sizes comprise an important component of panther habitat in south Florida, and that other natural and disturbed cover types are also present. The diverse woody flora of forest edges likely provides cover suitable for stalking and ambushing prey (Belden et al. 1988, Cox et al. 2006). Female panthers selected upland hardwoods, pinelands, and mixed forests as natal den sites (Benson et al.

2008), and dense understory vegetation comprised of saw palmetto provides some of the most important resting and denning cover for panthers (Maehr 1990a). Shindle et al. (2003) found that 73% of panther dens were in palmetto thickets.

Natural genetic exchange with other *Puma* spp. populations ceased when the Florida panther became geographically isolated over a century ago (Seal 1994). Isolation, habitat loss, reduced population size, and associated inbreeding resulted in loss of genetic variability and diminished health. Measured heterozygosity levels indicated that the Florida panther had lost approximately 60 – 90% of its genetic diversity (Culver et al. 2000). Genetic problems in the Florida panther included atrial septal defects, a high rate of unilateral cryptorchidism, low testicular and semen volumes, diminished sperm motility, and a high percentage of morphologically abnormal sperm. A genetic management program that involved the release of eight Texas female pumas (*Puma concolor stanleyana*) into selected areas of south Florida was implemented in 1995 to address these threats. The results of genetic restoration have been successful as indicated by an increased population; signs of increased genetic health; recolonization of areas in Big Cypress National Preserve (BCNP), Everglades National Park (ENP), and other areas that had been unoccupied; and increased dispersal (McBride 2000, 2001, 2002; Maehr et al. 2002). A comprehensive assessment of this management action is currently underway. Although the genetic restoration program was successful (Pimm et al. 2006), sufficient habitat does not exist in south Florida to sustain a genetically viable panther population without management intervention (U.S. Fish and Wildlife Service [USFWS] 2008).

Limiting factors for the Florida panther are habitat availability, prey availability, and lack of human tolerance. Rapid development in southwest Florida has compromised the ability of landscapes to support a self-sustaining panther population (Maehr 1990b, 1992), and the panther continues to face numerous threats due to an increasing human population. Habitat loss and fragmentation continue to threaten the panther's existence. Leading sources of panther mortality (vehicular collisions and intra-specific aggression), impediments to population expansion and subsequent gene flow, and biological constraints on population growth and other life history traits also are habitat related. The small size and high degree of isolation of the existing panther population also makes it vulnerable to catastrophic events such as disease or parasite outbreaks.

Human intolerance has the potential to be a major challenge to panther recovery. Florida's human population and panther population continue to increase resulting in a more populated urban/wildland interface. Concomitant with these population increases, the number of reported human-panther interactions and livestock depredations have also been on the rise. If human-panther interactions and livestock depredations continue to increase, the potential for complaints from the public and, in some cases, the need for subsequent management responses could result in harassment of panthers through aversive conditioning in an attempt to teach individuals to avoid humans. However, if a panther's location presents a possible threat to public safety (e.g., a dispersing male panther wanders into an urban/suburban area and cannot find its way out) or there is a threat to the survival of the panther (e.g., a panther wanders into an area that contains numerous physical hazards), depending on specific circumstances, the panther may be captured and relocated, or removed to an approved captive facility. If a panther's behavior indicates a threat to human safety, it would need to be permanently removed from the wild. In extreme circumstances, euthanasia may be necessary.

The biological constraints that have to be taken into consideration when planning Florida panther conservation and management actions include the need for large, contiguous landscapes, the need for large prey for successful reproduction, very low population density, and low reproductive and

colonization rates. The fact that the panther is a large predator requires human social considerations in its conservation and management.

The recovery strategy for the Florida panther is to maintain, restore, and expand the panther population and its habitat in south Florida; expand this population into south-central Florida; reintroduce at least two additional viable populations within the historic range outside of south and south-central Florida; and facilitate panther recovery through public awareness and education. The panther depends upon habitat of sufficient quantity, quality, and spatial configuration for long-term persistence. Therefore, the panther recovery plan is based upon habitat conservation and reducing habitat-related threats (USFWS 2008).

Three priority zones were identified by Kautz et al (2006) as important for panther habitat conservation: (1) Primary Zone—lands essential to the long-term viability and persistence of the panther in the wild; (2) Secondary Zone—lands contiguous with the Primary Zone, currently used by few panthers, but which could accommodate expansion of the panther population south of the Caloosahatchee River; and (3) Dispersal Zone—the area which may facilitate future panther expansion north of the Caloosahatchee River (Kautz et al. 2006). Much of the Primary Zone is currently occupied and supports the breeding population of panthers. Although panthers move through the Secondary and Dispersal Zones, they are not currently occupied by resident panthers. Some areas of the Secondary Zone would require restoration to support panthers. Habitat conservation efforts should focus on maintaining the landscapes that are occupied or have potential to be occupied by Florida panthers in southwest Florida to prevent further loss of population viability. The continued loss of habitat through fragmentation and loss of spatial extent poses serious threats to the conservation and recovery of the panther. Therefore, conserving lands that are occupied or have potential to support panthers and securing biological corridors within and among these lands are necessary to help alleviate these threats.

1.2 Status of the Florida Panther within the Rural Lands Stewardship Area

Researchers with the Florida Fish and Wildlife Conservation Commission (FWC), BCNP, and ENP have been monitoring radio-instrumented Florida panthers from February 1981 through the present. One or more Florida panthers have been observed using habitats within the RLSA every year since 1982. A total of 9,447 telemetry records (out of 85,834 records collected rangewide through June 2008) representing 45 male and 25 female, radio-collared panthers (including three female Texas pumas) have been documented within the RLSA over the period of record (Figure 1). The FWC has employed GPS technology to monitor the movements of selected panthers at a greater frequency during daylight and nighttime hours since 2002. Eight Florida panthers wearing GPS collars were documented using habitats within the RLSA between 2002 and 2005 (Figure 2). This documentation of panther occurrence relied almost entirely on panthers captured originally outside the RLSA; the vast majority of panther captures occurred on public lands adjacent to the RLSA. The number of documented panthers and the number of telemetry locations relative to the RLSA are artifacts of sampling intensity, radio-collar technology and where capture effort was concentrated. However, these data clearly show that portions of the RLSA are within the home ranges of several panthers, and the RLSA has been supporting panthers for decades.

GPS-collar data have confirmed the findings from radio-telemetry data that panthers select forested habitats (Land et al. 2008). Highest concentrations of telemetry records are located south of County Road (CR) 858, along the Okaloacoochee Slough east of State Road (SR) 29, and along the Camp Keais Strand (CKS) between CR 858 and CR 846 (Figures 1 and 2) .

Three natal dens of radio-collared female panthers have been recorded within the RLSA, two of which were immediately north of Florida Panther National Wildlife Refuge (FPNWR) and one of which was in the northwest quadrant of the intersection of SR 29 and CR 858 (Figure 1). Additional dens undoubtedly would have been located within the RLSA if more female panthers had been captured and radio-collared here, especially on private lands. This is underscored by the mortality data from this area that include records of uncollared reproductive-aged females and uncollared dependent-aged kittens not previously handled and marked at known dens. The Florida panther mortality database through February 2, 2009, contains 121 records of roadkilled panthers rangewide, and 31 of these records (26%) have occurred within the RLSA. Roadkills generally occurred along SR 29 north and south of CR 858; along CR 858 immediately west of SR 29; along a four- to eight-mile stretch of CR 846 east of Immokalee; along the segment of CR 846 that crosses CKS; and along a segment of CR 858 located approximately two to four miles south of CR 846 (Figure 1). Records of panther mortality due to causes other than collision with motor vehicles also occur within the RLSA (Figure 1).

1.3 Collier County Rural Lands Stewardship Area Overlay

The RLSA program was established in Section 4.08.00 of Collier County's Land Development Code for the purpose of encouraging smart growth patterns within a rural landscape covering 195,846 acres generally in the vicinity of Immokalee, Florida. Collier County's objective was to create an incentive-based land use overlay system referred to as the Collier County RLSA Overlay. The Overlay is intended to protect natural resources and retains viable agriculture by promoting compact rural mixed-use development as an alternative to low-density single use development. The PRT recognizes that new development is the driving force for achieving natural resources conservation within the RLSA program. The RLSA program provides a system of compensation to private property owners for the removal of certain land uses in order to protect natural resources and viable agriculture in exchange for transferable credits that can be used to entitle compact development (Policy 1.2). The system is based upon the principles of rural land stewardship as defined in Chapter 163.3177(11), Florida Statutes.

The RLSA program allows for any land within the RLSA to be designated as a Stewardship Sending Area (SSA). Stewardship Credits are generated from SSAs in return for maintaining the areas in permanent agriculture, open space or conservation uses. Stewardship Credits may be used to entitle a Stewardship Receiving Area (SRA) which can be in the form of self-contained planned urban developments within the RLSA. The SSA Program within the RLSA establishes a method for protecting and conserving the most valuable environmental land, including large connected wetland systems and significant areas of habitat for listed species, while directing compact developments to the least environmentally sensitive areas of the RLSA.

A Natural Resource Index (NRI) was developed to rank lands within the RLSA according to value for wetlands protection, water resource protection and management, and wildlife habitat conservation. Results from the NRI analysis were used to map all areas of the RLSA according to five major categories of land use (WilsonMiller 2002):

- **Flowway Stewardship Area (FSA)**: FSAs are privately owned lands that primarily include wetlands located within the CKS and Okaloacoochee Slough ecosystems.

- **Habitat Stewardship Area (HSA)**: HSAs are privately owned lands that include areas with natural characteristics that make them suitable for listed species as well as areas without these

characteristics. The latter areas are included because they are contiguous to habitat with natural characteristics, thus forming a landscape continuum that can augment habitat values.

- **Water Retention Area (WRA)**: WRAs are privately owned lands that have been permitted by the South Florida Water Management District (SFWMD) to function as agricultural WRAs and that provide surface water quality and other natural resource value. Many of these areas are large natural wetlands that, in some cases, connect to and support FSAs.

- **Open Land**: Open Lands are privately owned lands not otherwise classified as FSAs, HSAs, or WRAs and are generally of lower natural resource quality.

- **Lake Trafford**: The RLSA also includes the open waters of Lake Trafford, which cover approximately 1,460 acres.

Lands designated as FSA, HSA, or WRA are areas of high quality natural resource value based on the NRI analysis. Lands delineated as FSAs, HSAs, or WRAs are the most likely candidates for designation as SSAs because of the greater number of Stewardship Credits available from these lands. Open Lands may be designated as either SSAs or SRAs, but Open Lands are the most likely candidates for SRAs because of the lower Stewardship Credit values applied to these lands. A portion of the RLSA is included within the Big Cypress Area of Critical State Concern (ACSC). Although Big Cypress ACSC lands may be designated as SSAs, additional RLSA standards apply and all Big Cypress ACSC regulations remain in force regardless of SSA designation. In addition, the RLSA contains approximately 15,200 acres of publicly owned lands, which are eligible for designation as FSAs, HSAs, or WRAs, but public lands are not eligible for designation as SSAs or SRAs or for generating or receiving Stewardship Credits.

1.4 U.S. Endangered Species Act and Rural Lands Stewardship Area

Impacts to Florida panther habitats are regulated under Sections 7 and 10 of the ESA, and federal authorization may be required for projects that impact endangered species or their habitats. The provisions of Section 7 apply to projects when a nexus exists with a federal agency, such as projects that impact wetlands under the jurisdiction of the U.S. Department of the Army, Corps of Engineers (ACOE). Section 10, on the other hand, applies to projects with no federal nexus, and negotiations to resolve potential impacts are between individual landowners and the USFWS.

The RLSA includes approximately 71,000 acres of wetlands, and, as a consequence, many proposed development projects are likely to impact wetlands under federal jurisdiction. Authorizations to impact wetlands typically are obtained from the ACOE on a case-by-case basis. The ACOE is required to consult with the USFWS for projects that potentially impact endangered species or their habitats, including the Florida panther, pursuant to Section 7 of the ESA. The ACOE has agreed to consult with the USFWS on all projects that fall within the Panther Focus Area (PFA) (USFWS 2007). The entire RLSA falls within the PFA, and, therefore, the ACOE will consult with USFWS on all projects involving impacts to wetlands within the area. The USFWS employs a Habitat Assessment Methodology (Methodology) to quantify potential impacts to Florida panther habitats in terms of Panther Habitat Units (PHUs). Mitigation of potential impacts to Florida panthers and their habitats most commonly is recommended at a ratio of 2.5:1, although the actual amount of mitigation may vary based on location of impact and mitigation sites. The USFWS typically issues a Biological Opinion with an Incidental Take Statement to complete the consultation process for projects that may impact Florida panthers and their habitats as formal consultation with the ACOE as required under Section 7 of the ESA.

Section 10 of the ESA generally applies to projects that are not anticipated to result in impacts to wetlands. Applicants proposing to impact endangered species or their habitats under Section 10 are required to prepare a Habitat Conservation Plan (HCP) that outlines steps that will be taken to avoid, minimize, and mitigate impacts. Although Section 10 most often applies to individual property owners, the option exists for multiple owners to develop a regional or programmatic HCP, which is essentially a master plan that details the steps that all participating parties agree to follow to ensure the persistence of listed species in the region defined in the HCP. The concept of a regional HCP is attractive for future projects within the RLSA because it would define standard conditions that projects would satisfy to obtain federal authorization for incidental take of the Florida panther or their habitats, and all future projects that conform to the conditions of the HCP generally would be reviewed under an established authorization process.

1.5 Florida Panther Protection Program

Representatives of eight landowners and four conservation organizations (Parties) signed a MOU on June 2, 2008, agreeing to work together to enhance the future of the Florida panther with a focus on the RLSA. The goal of the MOU generally is to protect panther habitat while preserving agricultural lands and identifying appropriate areas for development in eastern Collier County. The MOU proposes an incentive-based land use program, the FPPP, intended to secure a contiguous range of panther habitat connecting major public lands in the region that includes and surrounds the RLSA. The Parties have proposed additional measures to be implemented within the RLSA that are intended to assist the FPPP and conservation of the Florida panther and the habitats upon which they depend. Those measures are described as follow:

- **Paul J. Marinelli Florida Panther Protection Fund (Panther Fund)**: The Parties propose establishment of a fund to be held by the Wildlife Foundation of Florida, Inc. The fund would be governed by a board of directors consisting of representatives of the Parties, USFWS, and FWC. The fund has the potential to generate in excess of $150 million through 2050 with revenues deriving from use or sale of PHUs generated from SSAs, sale and resale of residential housing, and voluntary donations. The fund would be used to underwrite costs associated with underfunded panther habitat restoration and management activities within the region.

- **Additional Mitigation for Impacts to Primary Zone Habitat**: The Parties propose that 25% more PHUs per acre of mitigation would be provided for impacts to Primary Zone habitat within the RLSA.

- **North and South Panther Corridors**: The Landowners propose to incentivize landowners to create, enhance, and restore two corridors intended to facilitate panther movements within selected areas of the RLSA. Proposed locations for a north corridor and a south corridor were mapped by the Landowners.

- **Agricultural Preservation**: The Parties propose the establishment of Agricultural Preservation areas for application to Open Lands within the RLSA that are designated for no greater than agricultural uses in perpetuity. Lands maintained as Agricultural Preservation areas within the Big Cypress ACSC would be eligible to generate an additional 2.6 Stewardship Credits per acre, and lands outside of the Big Cypress ACSC could generate an additional 2.0 Stewardship Credits

per acre. Designation of lands for Agricultural Preservation is proposed as a means of incentivizing landowners to maintain lands in agricultural use in perpetuity.

- **Core Transportation Network**: The landowners propose the establishment of a core transportation network sufficient to support 45,000 acres of development. Conservation measures such as wildlife crossings and fencing have been proposed at specific locations within the network. The Parties had not reached agreement on a conceptual road network at the time of the effective date of the MOU.

- **PHUs Generated from SSA Lands**: The Parties agree that Stewardship Credits and PHUs are both generated from SSA lands whether such land were designated as SSAs prior or subsequent to the effective date of the MOU. The Parties further agreed that PHUs generated from SSAs within the RLSA may be used, transferred, or sold for any project located within the southern PFA (USFWS 2007).

1.6 Florida Panther Protection Program Technical Review Team

The Parties agreed to appoint a FPPP Technical Review Team (PRT) to conduct a technical review of the additional conservation measures that are proposed for implementation within the RLSA. The primary charge of the PRT was to conduct a technical review of the conservation measures proposed by the Parties and to evaluate how those measures may contribute to Florida panther conservation as compared to the status quo. While the PRT recognizes that human development within panther habitat is incompatible with panther conservation and recovery, it recognizes that human development within panther habitat is currently the status quo. The PRT was to focus its review within the RLSA. However, it is anticipated that the findings may have implications for Florida panther conservation throughout the region. This report describes the analyses and findings of the PRT that resulted from the technical review that was requested by the Parties. The report also addresses the potential impacts to Florida panthers associated with two locations proposed for new interchanges on Interstate 75 (I-75) immediately southwest of the RLSA. Although the Parties have not formally advocated a new interchange at one of these locations, these prospective sites have received publicity in the media and would impact panther conservation efforts within the RLSA. The PRT recognized that the conclusions and recommendations resulting from these analyses may have economic implications for landowners and others, but an analysis of economic impacts of the FPPP was beyond the PRT's scope of work

2.0 Proposed Revisions to the Rural Lands Stewardship Area Map

2.1 Introduction

Specific areas have been designated as HSAs, FSAs, and WRAs under the RLSA program with the intent that landscapes of highest resource value within the RLSA would be preserved as SSAs while directing development activities to areas of lesser resource value. A review of radio- and GPS-collar telemetry data revealed that those areas currently designated for preservation within the RLSA support greater use by panthers than other areas within the RLSA. The HSA and FSA categories cover 82,974 acres (42%) of the RLSA (Table 2.1-1) and are comprised of wetlands (60%), pasture and cropland (25%), and natural uplands (14%). Adjacent WRAs account for an additional 13,842 acres that are predominantly wetlands. The existing RLSA system of Stewardship Credits is designed to provide long-term protection for these areas as HSAs, FSAs, and WRAs. However, PRT members concluded during the review of available data that the RLSA contains additional Open Lands that are not designated for protection but that nevertheless could provide and/or complement important habitats being preserved for panthers due to location, existing vegetation types, and records of use by panthers.

The PRT reviewed the RLSA landscape relative to Geographic Information System (GIS) data layers representing various measures of importance to panthers, including telemetry, roadkill, and den records; least-cost-path models of panther dispersal; and various models of panther habitat suitability. The PRT identified and mapped specific areas to consider for additional preservation under an appropriate classification and protected from development. Such additional protection in specific areas will serve to guide planned development into areas of less value to Florida panthers, preserve additional acreages of most important habitats, provide buffers to habitats occupied by Florida panthers, maintain the integrity of the natural habitats of Okaloacoochee Slough and CKS, improve proposed movement corridors connecting larger patches of occupied habitat, and further minimize habitat fragmentation.

2.2 Methods

Creation of a Base Map: The PRT used 2004 Digital Ortho Quarter Quad aerial imagery and applied the following features: 1) major RLSA land use categories; 2) existing public lands; 3) major roads; 4) Big Cypress ACSC; 5) Ave Maria; 6) Town of Big Cypress; and 7) Hogan Mine. Although the Town of Big Cypress and Hogan Mine have yet to be permitted, both projects have active applications for State and Federal permits and are concurrently in the consultation process with the USFWS and FWC. The PRT acknowledges that both project sites include areas of Florida panther habitat that would meet its criteria for consideration for additional preservation. However, the PRT chose to evaluate the FPPP as though the development footprints of the Town of Big Cypress and Hogan Mine had been permitted. . The PRT evaluated the FPPP under the assumption that appropriate conditions regarding preservation of habitat for the Florida panther would be negotiated between the applicants and agencies for these projects. The PRT saw value in evaluating the RLSA landscape with these entities in place because they provide further clarity in its understanding of the potential future development footprint within the RLSA. However, given that the Town of Big Cypress and Hogan Mine have yet to be permitted, the PRT's evaluation in the context stated above should not be construed as an endorsement of these proposed projects.

Identification of Areas Recommended for Preservation: The following GIS data layers depicting various aspects of landscape value to Florida panthers were reviewed in the context of the PRT's base map:

Table 2.1-1 Estimated Acreages, Panther Habitat Units (PHU), and Average PHU-per-Acre Values for Rural Land Stewardship Area (RLSA) Lands by Category and Panther Zone Based on 2004 Land Use/Land Cover Data Obtained from South Florida Water Management District.

RLSA Category	*Primary Zone*			*Secondary Zone*		
	Acres	**PHU**	**PHU/Acre**	**Acres**	**PHU**	**PHU/Acre**
Open	49,881	278,008	5.5734	43,324	197,588	4.5607
Habitat	45,755	346,646	7.5762	22	87	4.0194
Flowway	37,197	329,882	8.8685	0	0	0.0000
Water Retention	15,439	130,147	8.4300	2,789	22,945	8.2279
Lake Trafford	1,461	17	0.0113	0	0	0.0000
Total	**149,732**	**1,084,700**	**7.2443**	**46,134**	**220,620**	**4.7822**

- Florida panther radio telemetry records for the period from February 23, 1981, through June 30, 2008 (FWC) (Figure 1).
- Florida panther mortality records for the period from February 13, 1972, through January 20, 2009 (FWC) (Figure 1).
- Known Florida panther den locations from March 16, 1992, through July 20, 2008 (FWC) (Figure 1).
- Florida panther GPS-collar location records for seven males and one female that used habitats in the RLSA and surrounding lands between 2002 and 2005 (FWC) (Figure 2).
- Least-cost-path models of routes likely to be followed by panthers moving through the south Florida landscape (Swanson et al. 2005, Kautz et al. 2006); panther roadkill records through January 20, 2009 (Darrell Land, FWC, unpublished data); and existing and proposed wildlife crossings (Logan and Kautz 2006, Smith et al. 2006, USFWS 2007, WilsonMiller 2008) (Figure 3).
- Florida panther Primary and Secondary Zones (Kautz et al. 2006) (Figure 4).

These data layers were reviewed on individual computers or by projection onto a large format screen, which allowed for zoomed in review of local areas of interest. Large format E-size maps of selected features were plotted at scales of 1:14,400 (1 inch =1,200 feet) and 1:48,000 (1 inch = 4,000 feet). The maps and data were reviewed in the context of the following criteria:

- **Land Cover Types Used by Panthers**: Forested habitats repeatedly have been shown to be selected by Florida panthers, and other habitats (e.g., prairie, pasture and grasslands, shrub swamps, freshwater marshes) are used in proportion to availability. Some areas of Open Lands contain natural land cover types that have a demonstrated history of use by panthers based on telemetry and other data. Areas with these characteristics were identified based on proximity to and connections with other occupied panther habitats.

- **Documented Use by Panthers**: Florida panther telemetry, mortality, and den records provide documented evidence of use of specific areas. These data were reviewed to assess the degree to which areas of known use are protected by RLSA lands designated as HSAs, FSAs, and WRAs and to determine if there were areas of Open Lands that also provide habitats of value to panthers. Of particular importance were areas where these data show continual use over time and where the panther demographics indicate areas that support breeding females. It should be noted that most of the telemetry data used in this analysis are for panthers captured and instrumented within public lands adjacent to the RLSA. Only three panthers, dependent kittens of females captured initially within the FPNWR, have been captured for initial instrumentation on private lands within the RLSA. Telemetry data, therefore, do not indicate or represent where all panther habitat use or activity has occurred within the RLSA, but rather indicate habitat use preferences by panthers that have moved into and utilized areas of the RLSA, subsequent to initial capture outside the RLSA.

- **Landscape Connectivity**: Landscape connectivity often is viewed as a mechanism to mitigate the effects of habitat fragmentation and loss on declining populations (Lindenmayer and Fischer 2006). Three types of landscape connectivity have been described.

- "Habitat connectivity" refers to the connectedness among patches of suitable habitat for an individual species.
- "Landscape connectivity" refers to human perceptions of the connectedness of patterns of vegetative cover in a given landscape.
- "Ecological connectivity" refers to the connectedness of ecological processes across multiple scales.

Features described by Lindenmayer and Fischer (2006) that contribute to landscape connectivity and that have application to the RLSA include wildlife corridors and stepping stones. Wildlife corridors are physical linkages between patches of native vegetation that are believed to accomplish some or all of the following goals:

- Facilitate the movement of animals through suboptimal habitat;
- Provide habitat for resident populations;
- Enhance dispersal success, such as reducing mortality during dispersal;
- Prevent and reverse local extinctions by recolonization of empty patches; and
- Promote the exchange of genes between subpopulations (thereby increasing effective population size, reducing genetic drift and inbreeding depression, and maintaining inherent species richness at the patch and landscape scale).

Stepping stones are relatively small patches of native vegetation scattered about the landscape that facilitate movements by species able to reach the smaller isolated patches. Stepping stone connectivity designs may be a suitable alternative to corridors composed of continuous native cover to facilitate movements of animals that are adapted to habitat mosaics and have proven capabilities to disperse through fragmented habitats (Hilty et al. 2006).

Corridor dimensions of length and width often are considered when assessing existing and designing new landscape connections (Hilty et al. 2006). Although shorter corridors are generally recommended, corridor lengths must be within the movement capabilities of the target species to be effective (Hilty et al. 2006). Corridor lengths were reviewed relative to the movement capabilities of Florida panthers. McBride et al. (2008) reported that 99% of daily movements were less than 5.97 miles for females and less than 10.38 miles for males. McBride et al. (2008) cite unpublished records from 24-hour GPS-collar data of one female traveling a daily mean distance of 1.3 miles (0.05 – 4.60 miles) and one male moving a daily mean distance of 2.17 miles (0.05 – 5.1 miles). Darrell Land (unpublished data) estimated mean daily movements for three male panthers of 3.59 miles (0.15 – 14.47 miles), 4.25 miles (0.13 – 13.66 miles), and 4.89 miles based on 24-hour GPS-collar telemetry data. Maehr et al. (2002) reported effective mean dispersal distances for females of 7.02 miles (3.85 – 20.03 miles; n=9) and for males of 23.13 miles (15.38 – 138.94 miles; n=18).

Florida panthers require large areas of interconnected suitable habitats. Therefore, the PRT review focused primarily on identification of habitat connections needed by Florida panthers while acknowledging that corridors identified for panthers provide needs of other species, maintain ecological processes, and to some extent are based on human perceptions of landscape connectedness. The PRT identified some small patches of habitat that may function as stepping

stones of connectivity as demonstrated by telemetry records. Corridor widths were reviewed in the context of the recommendations of Beier (1995) and based on PRT measurements of observations of Florida panthers wearing GPS collars and using linear habitat patches.

- **Buffers to Panther Habitats**: Buffers are generally defined as areas of lower intensity land uses that are established adjacent to natural areas and intended to ameliorate the effects of intensive human activity on natural lands (Noss and Cooperrider 1994). Buffer creation around ecologically sensitive areas is an accepted strategy for mitigating adverse impacts of edge effects, which are changes in abiotic and biotic environments occurring at the boundaries of natural and human-modified vegetation types (Lindenmayer and Fischer 2006). Buffer widths are determined as a function of the needs of species inhabiting the natural areas. Although numerous research projects have yielded recommendations for buffer widths needed for amphibians, reptiles, and birds in specific settings (Lindendmayer and Fischer 2006), empirical data useful in determining appropriate widths of buffers for Florida panthers are lacking. Hourly GPS-collar records from several Florida panthers demonstrated that panthers often move along the upland/wetland ecotones of wetlands ecosystems bordered by agricultural fields. This observation suggests that buffers along wetland edges would be beneficial to future panther movements within the RLSA. The PRT opted to draw buffers around selected natural habitats at a distance that either conformed to landscape features (e.g., roads, ditches, fencerows, field edges) based on visual inspection or coincided with the edge of the Primary Zone where obvious landscape features were lacking. Buffers were identified with a vision of the future that included a developed urban landscape in relatively close proximity to preserved and occupied panther habitats. Buffers were specifically intended to protect the natural habitats of Okaloacoochee Slough and CKS, and the North Corridor proposed by the Landowners.

- **Habitat Peninsulas**: Some portions of large wetlands systems exist as narrow peninsulas of habitat that extend into agricultural lands such that they are surrounded on all sides by croplands. These habitat peninsulas are effectively cul-de-sacs with respect to panther movements because there is nowhere for a panther to go to find other suitable patches of habitat beyond the end of the peninsula. Although these areas may be connected to suitable and occupied panther habitats, lands adjacent to peninsulas were not deemed worthy of buffers or other forms of protection for Florida panthers. Conversely, there were some areas where narrow peninsulas of croplands or pasturelands extended into occupied panther habitats, usually wetlands. Such areas were identified as worthy of preservation to avoid intrusions of more intensive human developments into habitat areas that would be occupied on three sides by panthers.

- **Features of the Proposed North Corridor**: Data on the lengths, widths, and land cover types of corridors used by Florida panthers are generally lacking. The PRT analyzed existing panther telemetry data to quantify the dimensions and land cover characteristics of corridors used by two male Florida panthers as an aid to reviewing the proposed North Corridor. The North Corridor was also reviewed relative to the following recommendations made by Beier (1995) for corridor widths for pumas in a California setting of wild lands surrounded by urban areas: 1) corridors less than 0.5 mile in length should be greater than 328 feet wide; 2) corridors with lengths in the range of 0.62 – 4.35 miles in length should be 1,312 feet wide; and 3) corridor width should increase as length increases. More detailed information on the methods used in reviewing the North Corridor is provided in Section 7.3.

- **Restoration**: The value of some areas as panther habitat could be improved through restoration to more natural conditions.

Hard copy maps served as base layers for the PRT to use for hand-drawing boundaries around additional areas determined to be of importance to panthers. Hand-drawn maps were converted to GIS data layers through heads-up screen digitizing and manipulation of existing RLSA data layers. Basic descriptive statistics were derived for lands identified by the PRT as important to panther conservation.

Analysis of Areas Recommended for Preservation: A series of analyses was performed to assess the value of the areas recommended by the PRT for preservation relative to other lands within the RLSA. Individual polygons were created for 1) all areas of the RLSA designated as HSAs, FSAs, and adjacent WRAs (collectively referred to as preserves); 2) lands in public ownership, including the Pepper Ranch which was recently acquired by Collier County; 3) lands identified for preservation by the PRT; and 4) all RLSA Open lands not within a preservation category. The number of VHF-telemetry records for individual female (n=17), adult male (n=14), and sub-adult male (n=12) panthers with >40 observations within the RLSA was determined for each polygon. A minimum of 40 observations within the RLSA was assumed to be a sufficient number for analysis based on a recommendation from Seaman et al. (1999) that home range studies using kernel estimators should employ ≥30 locations, and preferably ≥50 locations. Data normality was determined using the Kolmogorov-Smirnov test (Minitab 2000), and the data were transformed (log [y+1]) to fit a normal distribution. One-way analysis of variance (ANOVA) and multiple comparisons by Tukey's W were used to determine significant (P<0.05) differences among telemetry locations for individual panthers within the RLSA[1]. Tabulations were made by polygon for the number of roadkill records and number of dens, but no statistical testing was performed to determine whether significant differences exist among the four areas based on these measures of value to panthers.

The polygons for the four areas also were used to extract ordinal and continuous data from the following vector and raster databases:

- Acreages of forest cover types contained in the SFWMD 2004-05 land use/land cover database.
- Lengths of least-cost-path model segments within the RLSA (Swanson et al. 2005, Kautz et al. 2006).
- Florida panther potential habitat model (Kautz et al. 2006) (Figure 5).
- Panther habitat suitability model used by Swanson et al. (2005) to derive a cost surface for use in least-cost-path modeling (Figure 6).
- Model of Florida panther habitat suitability based on a Mahalanobis distance analysis of 2003 land cover data in relation to panther home ranges (Thatcher et al. 2006). Dimensionless D^2 distance values ranging from 0 to infinity were converted by Thatcher et al. (2006) to P-values, which range 0 – 1 with values closer to 1 indicating a greater similarity to the landscape

[1] Our enumeration of telemetry points and use of overlapping fixed kernel maps should not be construed as a way to define panther habitat within the RLSA or elsewhere. The PRT used these measures as a way to summarize existing panther information in the context of RLSA preserves, public lands, areas recommended for additional protection by the PRT and Open areas. The number of radio collared panthers represents a small sample of the entire population; the absence of telemetry locations does not indicate the absence of panther habitat.

conditions defined by the panther home ranges (i.e., greater *P*-values correspond to more favorable landscape conditions for panthers) (Figure 7).

- NRI model produced by WilsonMiller (2002) and used to identify major RLSA land use categories (Figure 8).
- Land cover scores used by the USFWS to calculate PHUs at impact and mitigation sites. SFWMD 2004-05 land use/land cover data for the RLSA were reclassified to values of 0 – 10 corresponding to the scores used by USFWS to indicate relative value to panthers (Figure 9).
- Relative use of the landscape by female panthers (*n*=69) as indicated by the sums of inverted distribution probabilities resulting from an analysis of overlapping 95% kernel home ranges derived from 1981 – 2008[2] radio-telemetry records (Figure 10).
- Relative use of the landscape by adult male panthers (*n*=48) as indicated by the sums of inverted distribution probabilities resulting from an analysis of overlapping 95% kernel home ranges derived from 1981 – 2008[3] radio-telemetry records (Figure 11).
- Relative use of the landscape by sub-adult male panthers (*n*=46) as indicated by the sums of inverted distribution probabilities resulting from an analysis of overlapping 95% kernel home ranges derived from 1981-2008[4] radio-telemetry records (Figure 12).

Acreages of forest cover types and lengths of least-cost-path segments within the four polygons were extracted directly from existing vector data layers as continuous data. Analyses of all of the above vector and raster datasets were performed only for those portions of the data that were within the RLSA boundary. The NRI model (WilsonMiller 2002) and the USFWS scores derived from SFWMD land cover data existed as vector data layers. These layers were converted to 30-meter pixel grids with an analysis extent matching the RLSA boundary. The pixel values of each raster data layer were converted to a point shape file using the Raster to Point conversion feature in the ArcToolbox of ArcMap 9.3 (ESRI, Redlands, CA). The point shape files created in this fashion were huge data sets of approximately 880,000 points (i.e., one point for each pixel). The Create Random Selection sampling tool of Hawth's Analysis Tools for ArcGIS (version 3.27) was used to randomly select 10% of the points within each file, and the selected points totaling approximately 88,000 records were saved to a new file. These randomly selected records were exported to a Microsoft Excel spreadsheet and sorted by the four RLSA areas defined above. Data normality was determined using the Kolmogorov-Smirnov test. Parameters that did not follow a normal distribution and could not be transformed to fit a normal distribution were analyzed nonparametrically using the Kruskal-Wallis ANOVA on ranks multiple comparisons test (Minitab 13.32, Minitab Inc., State College, PA). Significance level for all tests was $\alpha = 0.05$.

Comparison of Areas Recommended for Preservation with the 2050 Concept Plan: The Parties provided the PRT with the "Draft 2050 Concept Plan" in Portable Document Format (pdf). The map provided a general depiction of one possible non-binding scenario of the location of SSAs, SRAs, Agricultural Areas, and other features of the RLSA at the 2050 horizon year. The pdf file was converted to jpg format, and the jpg file was imported into ArcView and georeferenced. Polygons depicting RLSA Open Lands were extracted from the master RLSA shape file and overlaid on the jpg image. The Open

[2] Refer to Page 13, Footnote 1.
[3] Refer to Page 13, Footnote 1.
[4] Refer to Page 13, Footnote 1.

Lands polygons were revised through a process of screen-digitizing to create a new shape file depicting the locations of development pods depicted in the 2050 concept plan map. The 2050 concept plan shape file was overlaid on the GIS file of areas recommended for preservation by the PRT, and conflicts between the two layers were identified and quantified.

2.3 Results

Identification of Areas Recommended for Preservation: The map (Figure 13) of additional areas within the RLSA that the PRT recommends receive consideration for some form of protection contains the following features:

1. Revisions to the south corridor proposed by the Landowners (referred to by the PRT as Summerland Swamp Habitat Linkage);
2. Revisions to the north corridor proposed by the Landowenrs;
3. Buffers along CKS in the vicinities of Ave Maria, Town of Big Cypress, and Hogan Island mine;
4. Open Lands of predominantly agricultural uses interspersed with patches of natural habitat within the Big Cypress ACSC;
5. Buffers and natural habitats along the western edge of SSA 16;
6. Agricultural fields south of CR 858 and north of RLSA lands designated as HSAs and WRAs;
7. Natural habitat areas between Immokalee and the Big Cypress ACSC; and
8. Patches of natural habitat and relatively low intensity land use adjacent to Pepper Ranch.

Areas recommended for additional protection outside of the Big Cypress ACSC include 23,362 acres of land that are predominantly pasturelands, citrus groves, and croplands (Table 2.3-1). Open Lands recommended for additional preservation within the Big Cypress ACSC include 15,384 acres that also are comprised predominantly of agricultural lands.

Summerland Swamp Habitat Linkage (SSHL): The SSHL in the northwest quadrant of the intersection of SR 29 and CR 858 was expanded to include approximately 5,542 acres of existing agricultural lands interspersed with natural habitats. This area has been and currently is used by Florida panthers based on recent radio-telemetry, GPS-collar telemetry, and mortality records. One patch of wetland habitat within this area was used as a den site by FP66 in December 1999, and documented vehicle-related mortalities of dependent-aged kittens and reproductive-aged females demonstrates that this area supports a reproductive component of the panther population. This area is a mosaic of natural habitats interspersed within an agricultural landscape that functions as panther habitat, not just as a corridor linking natural areas south of CR 858 to other natural areas northeast of SR 29. The area identified by the PRT includes existing WRAs that serve as effective buffers even though panther telemetry indicates little or no use of these WRAs. The SSHL also was expanded south from CR 858 to the Habitat area associated with SSA 10. The natural habitats interspersed within the agricultural lands of the area south of CR 858 have sustained frequent panther use.

North Corridor: PRT-recommended revisions to the proposed North Corridor create a 10.5-mile-long linear landscape feature comprising approximately 3,178 acres that are predominantly in agricultural uses

Table 2.3-1 Acreages of Land Cover Types Within Areas Proposed by the Panther Review Team for Some Type of Protection to Meet the Long-Term Habitat Conservation Needs of Florida Panthers Within the Rural Land Stewardship Area.

USFWS[1] Land Cover Type	SSHL[2]	North Corridor	Non-ACSC[3] Open	ACSC Open	Total	Percent
	Acres	Acres	Acres	Acres	Acres	
Grassland/Pasture	2,761	833	2,638	5,495	11,728	30
Orchards/Groves	1,452	1,614	3,590	3,767	10,423	27
Cropland	579	20	5,187	3,570	9,356	24
Freshwater Marsh	33	296	727	930	1,986	5
Hardwood Swamp	61	238	659	396	1,353	3
Pine Forest	49	86	697	53	885	2
Water	26.33	0	26	654	707	2
Cypress Swamp	312	0	250	58	620	2
Shrub and Brush	95	22	170	169	456	1
Exotics	137	46	121	28	331	1
Hardwood-Pine Forest	7	0	233	47	287	1
Hardwood Forest	7	3	192	19	221	1
Urban	14	0	113	82	208	1
Dry Prairie	9	20	40	117	186	0
Total	**5,542**	**3,178**	**14,643**	**15,384**	**38,746**	**100**

[1] U.S. Fish and Wildlife Service
[2] Summerland Swamp Habitat Linkage
[3] Area of Critical State Concern

(Table 2.3-1). The North Corridor as revised by the PRT has a minimum width of 1,200 feet, and the corridor has a mean width of 2,276 feet because it incorporates several wider nodes of existing natural habitats. The recommended revisions to the proposed North Corridor are based in part on observed use of linear landscape features by Florida panthers (Tables 2.3-2 and 2.3-3) and recommendations for corridor dimensions to accommodate puma movements in southern California (Beier 1995). The revised North Corridor (Figure 14) follows the same general alignment as the corridor proposed by the Landowners (Figure 15) with the exception of the corridor's western terminus, particularly where the corridor would cross SR 82 and connect to the Corkscrew Regional Ecosystem Watershed (CREW) Marsh Unit near the intersection of CR 850 and SR 82. The PRT alternative is positioned along the shortest distance between existing habitat blocks north and south of SR 82 and, therefore, would minimize the amount of restoration that is required. The narrow 13,000-foot-long corridor segment extending north from Pepper Ranch as proposed by the Landowners would be eliminated in the PRT alternative. The PRT alternative places the corridor's intersection with SR 82 approximately mid-way between CR 850 to the west and the landowner-proposed Grove Road to the east. This is a better location for construction of a wildlife crossing that adheres to the Florida Department of Transportation (FDOT) line-of-sight safety issue regarding changes in slope for overpasses near intersections. The eastern terminus of the corridor was revised to include multiple points of entry to increase the likelihood of eventual use by panthers moving among large patches of protected habitat including Okaloacoochee Slough State Forest (OSSF) and HSAs, FSAs, and WRAs at the east end of the corridor. Restoration of natural habitats within the corridor as land use intensifies adjacent to the corridor should increase the likelihood of eventual use by panthers. A more detailed description of the PRT proposed revisions to the North Corridor is found in Section 7.3.

CKS Corridor: Several patches of agricultural land along CKS were identified as buffers to the corridor. Some of the patches of agricultural lands are surrounded by natural cover types, primarily wetlands. Maintaining agricultural uses within these patches, and perhaps eventually restoring some or all of these lands to more natural cover types, would serve to buffer the natural habitats that comprise the CKS corridor, and would enhance the likelihood of continued use of these areas by panthers. GPS collar data indicate that panthers often use the edges of wetland habitats, and preservation of agricultural uses adjacent to the Strand would provide buffers to these wetland edges.

Big Cypress ACSC: The PRT considered all RLSA Open Lands within the Big Cypress ACSC as having value to panther habitat conservation. The RLSA contains approximately 17,913 acres of Open Lands that are within the Big Cypress ACSC. These areas are predominantly in agricultural uses. Approximately 2,529 acres already are protected by approved SSAs, leaving approximately 15,384 acres in the Big Cypress ACSC that are not currently protected as SSAs or in public ownership (Table 2.3-1). The agricultural lands within the Big Cypress ACSC provide important buffers to the natural habitats that comprise the Okaloacoochee Slough ecosystem, an area of sustained panther use and a natural corridor connecting BCNP to OSSF. Section 4.3 of the MOU provides for Open Lands within the Big Cypress ACSC to be eligible to send 2.6 Stewardship Credits to support development within SRAs. All non-agricultural uses would be removed from areas designated as SSAs, and remaining uses would be limited to agriculture and uses that support agriculture, including, without limitation, farmworker housing. There would be no intensification from Ag2 (e.g., unimproved pasture, grazing, forestry, ranching) to Ag1 (e,g., croplands, groves, plant nurseries, improved pasture, dairy, poultry production) after SSA approval. Maintenance of existing agricultural land uses in the Open Lands of the Big Cypress ACSC would function to buffer the natural areas of Okaloacoochee Slough that are used by panthers. The Open Lands of the Big Cypress ACSC also contain areas of natural habitat that have supported and would continue to support occasional use by panthers.

Table 2.3-2 Dimensions of Nine Linear Landscape Features Repeatedly Used by Florida Panthers that were Monitored by Global Positioning System Collars Programmed to Record Locations at One-Hour Intervals.

Corridor	Width Samples	Mean Width	Minimum Width	Maximum Width	Length	Width to Length
	(*n*)	(feet)	(feet)	(feet)	(miles)	(%)
FP130 - No. 1	70	553	88	1,958	4.48	2.34
FP130 - No. 2	44	2,387	278	5,116	5.84	7.74
FP130 - No. 3	37	2,729	192	6,782	8.38	6.17
FP130 - No. 4	29	3,918	842	7,539	6.99	10.62
FP130 - No. 5	20	1,953	970	3,606	3.73	9.92
FP130 - No. 6	31	1,580	357	3,916	6.06	4.94
FP130 - No. 7	29	2,439	552	8,807	5.96	7.75
FP131 - No. 1	20	1,367	461	2,653	1.97	13.14
FP131 - No. 2	25	1,194	419	3,142	2.55	8.86
	305	**1,878**	**462**	**4,835**	**5.11**	**7.94**

Table 2.3-3 Relative Acreages of Land Cover Types Within Core Corridor Areas and in the Larger Landscape Surrounding Nine Linear Landscape Features Repeatedly Used by Florida Panthers Monitored Hourly. Corridor Axes Were Buffered by 462 feet and 4,835 feet, the Average Minimum and Maximum Widths of the Nine Corridors. Land Cover Acreages were Clipped from 2004-05 South Florida Water Management District Land Use/Land Cover Data, and Land Cover Types were Generalized to Major Habitat Types Analyzed by Kautz et al. (2006).

Land Cover Type	462-Foot Corridor		4,835-Foot Corridor	
	Acres	Percent	Acres	Percent
Grassland/Pasture	752	28.8	12,312	41.0
Hardwood Swamp	635	24.4	3,407	11.3
Pine Forest	329	12.6	5,197	17.3
Freshwater Marsh	291	11.2	3,330	11.1
Cypress Swamp	243	9.3	1,274	4.2
Hardwood Forest	213	8.2	1,092	3.6
Hardwood-Pine Forest	79	3.0	519	1.7
Dry Prairie	36	1.4	1,112	3.7
Exotics	14	0.6	83	0.3
Shrub and Brush	11	0.4	406	1.4
Cropland	2	0.1	1,153	3.8
Urban	1	0.1	42	0.1
Water	1	0.0	68	0.2
Orchards/Groves	0	0.0	66	0.2
Total	**2,608**	**100%**	**30,061**	**100%**

Buffers West of SSA 16: The PRT identified an estimated 1,116 acres west of SSA 16 as a buffer to occupied natural habitats of SSA 16 and adjacent SSAs within the Big Cypress ACSC. This buffer area is predominantly citrus groves (74%) interspersed with small patches of freshwater marsh, pine forest, and hardwood swamp. Although agriculture is the dominant use, this buffer area located between existing WRAs, and the patches of natural habitat within the citrus groves have been used by panthers as indicated by VHF- and GPS-collar telemetry records.

Agricultural Fields South of CR 858: The PRT identified approximately 1,686 acres of cropland and citrus groves south of CR 858 as a buffer area to occupied panther habitats. Although agricultural fields in this area have received little use by panthers based on VHF- and GPS-collar telemetry records, these fields are immediately adjacent to occupied natural habitats that connect to the FPNWR to the south. All of the lands between the agricultural fields and FPNWR have been designated as WRAs, HSAs, or FSAs in the RLSA program, and approximately two-thirds of the fields were designated as Primary Zone habitats (Kautz et al. 2006). Preservation of this area in its current state would provide a significant buffer to occupied panther habitats to the west, south, and east.

Habitats and Buffers East of Immokalee: The PRT identified and mapped approximately 2,254 acres of Open Land east and southeast of Immokalee to consider for additional preservation. These areas consist of natural habitats and unimproved pasturelands interspersed with improved pastures and croplands, and they have a history of documented use by panthers based on VHF telemetry records. Some of the agricultural lands in this area contain no telemetry records, but they nevertheless provide buffers to natural areas with documented use and likely provide support for panther prey (e.g., white-tailed deer and feral hog). The PRT also identified approximately 2,021 acres of land with similar features east of Immokalee but outside of the RLSA boundary. These additional 2,021 acres function together with the 2,254 acres within the RLSA as habitats and buffers valuable to panther conservation.

Four Parcels near Pepper Ranch: The PRT identified four parcels totaling 781 acres in the vicinity of Pepper Ranch as having habitats that would be of conservation value to Florida panthers if preserved. These areas contain a mix of natural cover types, but they also include some low density residential and rural development. Maintaining existing land uses in these areas would protect existing natural areas as panther habitat and would provide buffers to panther habitats on adjacent public lands.

Analysis of Areas Recommended for Preservation: Lands categorized as HSAs, FSAs, and adjacent WRAs (i.e., "preserves") contain approximately 81% – 87% of VHF- and GPS-collar telemetry records that have been recorded in the RLSA, and public lands account for another 3% – 7% of telemetry locations (Table 2.3-4). Lands recommended by the PRT for preservation contain an additional 9% – 11% of telemetry records. These three areas combined contain 98% – 99% of all telemetry locations that have been recorded within the RLSA. Remaining Open Lands not identified for some form of preservation contain only 0.3% – 1.9% of telemetry records. In addition, HSAs, FSAs, and adjacent WRAs contained more dens and roadkill records than other areas, but lands recommended for preservation by the PRT included significant numbers of these records, providing an additional indication of the value of these lands as important to panthers. It should be noted that the VHF- and GPS telemetry data used in this analysis are for panthers captured and instrumented within public lands adjacent to the RLSA. Only three panthers (all dependent kittens of females captured initially on FPNWR) have been captured for initial instrumentation on private lands within the RLSA. Telemetry data, therefore, do not indicate or represent where all panther habitat use or activity has occurred within the RLSA, but rather

Table 2.3-4 Number of Florida Panther Telemetry, Den, and Roadkill Records in Rural Land Stewardship Area Lands Designated for Preservation (i.e., Habitats, Flowways, and Adjacent Wetland Retention Areas), Lands in Public Ownership, Lands Recommended for Preservation by the Panther Research Team, and Areas not Recommended for Preservation.

Area	Telemetry Records			Dens	Roadkills
	VHF Collars		GPS Collars		
	Females	Adult Males	1 Female, 5 Males		
	No.	No.	No.	No.	No.
Preserves	3,248	2,246	2,015	2	17
Public Lands	159	81	182	0	0
PRT Preservation	325	229	267	1	10
No Recommendation	13	50	39	0	4
Total	**3,745**	**2,606**	**2,503**	**3**	**31**

indicate habitat use preferences by panthers that have moved into and utilized areas of the RLSA, subsequent to initial capture outside the RLSA.

PRT analyses show that HSAs, FSAs, and adjacent WRAs had the highest panther value within the RLSA based on the variables we tested except for female panther fixed kernels where public lands were the most important (Tables 2.3-5 and 2.3-6). Although lands recommended for preservation by the PRT generally exhibit lower values as panther habitats than preserves or public lands, they nevertheless add benefit to panther habitat conservation within the RLSA based on the significant differences found between lands recommended for protection by the PRT and lands not specifically recommended for protection. Lands not recommended for protection ranked significantly lower in value to panther conservation than any other areas within the RLSA.

Comparison of Areas Recommended for Preservation with the 2050 Concept Plan: The areas of the RLSA recommended for preservation by the PRT totaled 38,746 acres. Areas identified for potential future development in the 2050 Concept Plan were estimated to contain 42,976 acres. Areas in conflict between the PRT recommendations and the 2050 Concept Plan total 8,904 acres. The principal areas of conflict between the two versions are southeast of Immokalee; the SSHL area in the northwest quadrant of the intersection of SR 29 and CR 858; an area south of CR 858 and east of SR 29; agricultural lands to the south of Ave Maria and CR 858; agricultural lands south of CR 858 in the southwest corner of the RLSA; areas bordering CKS generally north of CR 858 and west of Lake Trafford; and the west entrance to the North Corridor (Figure 16). The two scenarios are in 80% agreement.

2.4 Discussion

The RLSA contains approximately 83,863 acres of privately owned lands designated as HSAs, FSAs, and WRAs within the panther Primary Zone (Table 2.4-1). Approximately 45,389 of these acres (54%) have been approved or are pending approval by Collier County as SSAs (Table 2.4-2). All of these lands are very likely to be preserved in perpetuity under the RLSA program once they are approved as SSAs and Stewardship Credits are transferred to SRAs to support future development. The RLSA also contains approximately 15,236 acres that are protected by public ownership (Table 2.4-3). The PRT identified an additional 38,746 acres of Open Lands that contain natural habitats that support panthers, provide buffers against indirect impacts of future intensive development, or maintain habitat connectivity to support panther movements throughout the landscape in the long term (Table 2.4-3). The PRT recommends that these 38,746 acres of Open Land be considered for additional preservation under an appropriate classification. The areas recommended for preservation by the PRT could remain in existing natural or agricultural uses in perpetuity, thereby expanding the total acreage of panther habitat that would be preserved under the RLSA program. This would be especially true if some portions of these areas would be restored to native cover. However, these lands would not be suitable for mining, an allowable land use under some RLSA categories, because mining constitutes a direct loss of habitat that is not compatible with the conservation of panther habitats.

The entire area that is designated and/or recommended for preservation as panther habitats includes lands already in public ownership; HSAs and FSAs; WRAs that are proximal to important panther habitats; Open Lands within SSAs that have been approved or are pending approval; the additional areas recommended by the PRT; and Lake Trafford (Figure 13). These areas cover 142,383 acres of the RLSA (Table 2.4-3); 59% of which are in HSAs, FSAs, and WRAs; 11% of which are in public ownership; 2% are Open Lands within approved SSAs; 27% of which are in Open Lands that the PRT recommends for consideration and additional protection, and 1% of which is Lake Trafford. Areas that are already in public

Table 2.3-5. Results of Analysis of Variance of VHF-Collar Telemetry Records for Female, Adult Male, and Subadult Male Florida Panthers That Have Occurred within the RLSA and Are Represented by ≥40 Observations.

Analysis of Variance for log (y+1)					
Source	**DF**	**SS**	**MS**	**F**	**P**
Females					
Location	3	35.753	11.918	46.59	0.000
Error	64	16.371	0.256	—	—
Total	**67**	**52.125**	**—**	**—**	**—**
Males					
Location	3	23.483	7.828	41.38	0.000
Error	52	9.837	0.189	—	—
Total	**55**	**33.319**	**—**	**—**	**—**
Subadult Males					
Location	3	18.859	6.286	34.13	0.000
Error	48	8.840	0.184	—	—
Total	**51**	**27.699**	**—**	**—**	**—**

Mean telemetry records for panthers within the RLSA[1].

Location	Mean Female Telemetry[2]	Mean Male Telemetry[2]	Mean Subadult Male Telemetry[2]
Preserve	189.90 A	148.60 A	79.80 A
PRT	19.12 B	14.86 B	11.00 B
Public	8.41 C	4.07 C	3.69 BC
No Protection	0.77 C	3.57 C	1.85 C

[1] Panthers with 40 or more records within the RLSA were used for analysis.
[2] Different letters signify a significant difference at the 0.05 probability level (within each column).

Table 2.3-6 Results of Statistical Analyses of the Value of Lands Recommended by the PRT for Preservation for Florida Panthers in Relation to Other Areas Within the RLSA.

Data Layer	RLSA Area	N	Median	Significant Differences*
Habitat Suitability	Preserves	37,902	9	A
($P < 0.001$)	Public Land	6,870	9	A
	PRT Preservation	18,749	7	B
	No Recommendation	24,561	4	C
	Total	**88,082**		
FWS Land Cover Score	Preserves	37,928	9	A
($P < 0.001$)	Public Land	6,890	9	B
	PRT Preservation	18,479	4	C
	No Recommendation	24,797	4	D
	Total	**88,094**		
Natural Resource Index	Preserves	37,935	1.5	A
($P < 0.001$)	Public Land	6,744	1.5	B
	PRT Preservation	18,657	0.6	C
	No Recommendation	24,529	0.2	D
	Total	**87,865**		
Mahalonobis Distance Rankings	Preserves	37,665	0.2000	A
($P < 0.001$)	Public Land	6,696	0.0800	B
	PRT Preservation	18,443	0.0300	C
	No Recommendation	24,884	0.0001	D
	Total	**87,688**		
Adult Male Kernel Overlaps	Preserves	38,011	82	A
($P < 0.001$)	Public Land	6,762	0	C
	PRT Preservation	18,711	39	B
	No Recommendation	24,598	0	D
	Total	**88,082**		

Table 2.3-6 Continued.

Data Layer	RLSA Area	N	Median	Significant Differences*
Female Kernel Overlaps ($P < 0.001$)	Preserves	37,754	23	B
	Public Land	6,842	33	A
	PRT Preservation	18,752	12	C
	No Recommendation	24,914	0	D
	Total	**88,082**		
Sub-adult Male Kernel Overlaps ($P < 0.001$)	Preserves	38,001	151	A
	Public Land	6,819	114	B
	PRT Preservation	18,516	111	C
	No Recommendation	24,746	22	D
	Total	**88,082**		
Panther Habitat Model ($P < 0.001$)	Preserves	38,786	2	A
	Public Land	7,101	1	B
	PRT Preservation	18,883	0	C
	No Recommendation	25,557	0	D
	Total	**90,327**		
Forest Acres ($P < 0.001$)	Preserves	1,496	7.295	A
	Public Land	239	5.200	B
	PRT Preservation	452	2.655	C
	No Recommendation	353	2.700	C
	Total	**2,540**		
Least Cost Path Segments ($P = 0.001$)	Preserves	445	0.340	AC
	Public Land	190	0.375	AC
	PRT Preservation	94	0.250	C
	No Recommendation	63	0.040	BC
	Total	**792**		

*No significant differences ($\alpha = 0.05$) were observed between data layers with the same letter.

Table 2.4-1 Rural Land Stewardship Area (RLSA) Lands in Natural Resource Categories, Public Ownership, Proposed for Protection by the Panther Research Team (PRT), Approved or Slated for Development, or for which No Protection for Florida Panthers was Identified Based on Location Within the Florida Panther Primary and Secondary Zones.

Panther Focus Area	Protection/Development	Acres
Primary Zone	Area in RLSA	149,742
Protection	Habitat, Flowway, and Panther WRAs[1]	83,863
	Public Land	14,990
	Open Lands Within Approved SSAs[2]	2,684
	Lake Trafford	1,461
	PRT Recommended Protection	34,613
	Total Protection	*137,610*
Development	Ave Maria	2,125
	Town of Big Cypress	3,414
	Hogan Mine	487
	Total Development	*6,026*
Total Protection/Development		**143,636**
Lands Not Identified Above		**6,106**
Secondary Zone	Area in RLSA	46,136
Protection	Habitat, Flowway, and Panther WRAs	388
	Public Land	247
	Open Lands Within Approved SSAs	5
	PRT Recommended Protection	4,133
	Total Protection	*4,773*
Development	Ave Maria	2,902
	Town of Big Cypress	276
	Hogan Mine	488
	WRAs Not Panther Habitat	4,773
	Total Development	*8,140*
Total Protection/Development		**12,912**
Lands Not Identified Above		**33,224**
RLSA	**Total Area**	**195,878**

[1] Wetland Retention Area
[2] Stewardship Sending Area

Table 2.4-2 Estimated Total Acreages and Panther Habitat Units (PHU) by Rural Land Stewardship Area (RLSA) Categories for All Approved and Pending Stewardship Sending Areas (SSAs), SSAs Dedicated to Mitigation for Ave Maria, and Approved and Pending SSAs not Dedicated to Specific Stewardship Receiving Areas (SRAs).

RLSA Category	All SSAs* (Total)		Ave Maria Mitigation* (SSA 1-6)		No SRA Dedication (SSA 7-16)	
	Acres	**PHU**	**Acres**	**PHU**	**Acres**	**PHU**
Flowway	15,508	138,054	6,564	58,081	8,944	79,973
Habitat	28,398	211,089	10,345	70,409	18,053	140,679
Open	2,799	20,270	28	257	2,770	20,014
Water Retention	1,483	12,674	23	179	1,461	12,495
Total	**48,188**	**382,087**	**16,960**	**128,926**	**31,228**	**253,161**

*Acreage and PHU calculations differ slightly due to slight discrepancies in registrations of geographic information system layers. Estimates of acreages and PHUs in Table 4.3-1 have taken into account registration issues and are more accurate than those in Table 2.4-2.

Table 2.4-3 Summary of Rural Land Stewardship Area (RLSA) Lands Currently Protected or Proposed for Protection, Currently Being Developed or Proposed for Development, Wetland Retention Areas (WRAs) Unsuitable as Panther Habitats because they are Surrounded by Open Lands Likely to be Developed in the Future, and Total Acreages of Land Available for Future Development.

Panther Focus Area	Protection/Development	Acres
Total Protection	Habitat, Flowway, and Panther WRAs	84,251
	Public Land	15,236
	Open Lands Within Approved SSAs[1]	2,689
	Panther Review Team Recommended Protection	38,746
	Lake Trafford	1,461
	Total Protection	*142,383*
Total Development	Ave Maria (AM)	5,027
	Town of Big Cypress (TOBC)	3,691
	Hogan Mine (HM)	975
	WRAs Not Panther Habitat	4,473
	Total Development	*14,166*
Future Development	Lands Not Identified Above	39,330
	45,000 Acre Cap Minus AM, TOBC, & HM	35,307
	Area Above 45,000 Acre Cap	4,022
RLSA	**Total Area**	**195,878**

[1] Stewardship Sending Area

ownership, proposed for protection by the Parties and the PRT, part of Lake Trafford, developed as part of Ave Maria, or are currently in the consultation process with the USFWS and FWC pending permit authorization, such as the Town of Big Cypress or Hogan Mine include 143,636 acres of Primary Zone and 12,912 acres of Secondary Zone habitats (Table 2.4-1). A total of 39,330 acres would remain available for future development (Table 2.4-3), approximately 6,106 acres of which are in Primary Zone and 33,224 acres of which are in Secondary Zone habitats (Table 2.4-1).

The Parties have proposed a 45,000-acre cap on future development within the RLSA. The PRT assume that Ave Maria (5,027 acres) would be included within the cap. The PRT determined that the proposed Town of Big Cypress (3,691 acres) and Hogan Mine (975 acres) should also be included within the cap for purposes of analyses. A balance of 35,307 acres remains under the development cap after deducting the acreages for Ave Maria, Town of Big Cypress, and Hogan Mine (Table 2.4-3). The PRT analysis resulted in the identification of 39,330 acres of RLSA lands that would be more suitable for future development after areas of most conservation value to panthers were identified. These areas contain approximately 4,022 acres more than needed to meet the acreage remaining under the 45,000-acre development cap (Table 2.4-3).

Lands identified by the PRT as potentially suitable for future development contain only 33,224 acres of Secondary Zone habitat, which is not enough to absorb the remaining 35,307 acres under the 45,000-acre development cap. Consequently, impacts to the Primary Zone are likely to occur if the maximum allowable acreage of future development allowable under the cap is eventually reached. The PRT acknowledges and supports the Parties' intent as stated in the MOU to avoid, minimize, and mitigate impacts to areas within the Primary Zone as described by Kautz et al. (2006). Therefore, the PRT recommends that future development occurs first in Open Lands that are within the Secondary Zone before lands within the Primary Zone are considered for conversion to urban uses.

The areas of Open Land recommended by the PRT for preservation or maintenance of existing agricultural uses are strategically located and configured to complement the habitats that will contribute to the conservation of the panther population in southwest Florida. The combination of lands currently designated for preservation and the additional lands recommended by the PRT will result in the preservation of core habitat areas and adjacent buffers, provision of corridors to connect occupied habitats on public lands, and the minimization of future habitat fragmentation within the RLSA. Lands remaining available for development would be more than needed to accommodate the proposed development cap of 45,000 acres and would potentially impact only 2,084 acres of Primary Zone habitat. Approximately 80% of areas identified for preservation by the PRT are in agreement with the non-binding future development scenario depicted in the RLSA 2050 Concept Plan. However, the PRT's recommendations should not be construed as an endorsement of 45,000 acres of urban development within the RLSA.

3.0 Analysis of Additional Mitigation Proposed for Impacts to the Primary Zone

3.1 Introduction

The Parties propose to provide 25% additional mitigation for impacts to RLSA lands that are within the Florida panther Primary Zone (MERIT 2002, Kautz et al. 2006, USFWS 2007). The proposal would also result in a 25% additional financial contribution into the Panther Fund for those impacts.

The Methodology prescribed by the USFWS for evaluating impacts to Florida panther habitats within the PFA (USFWS 2007) provides a means to assess panther habitat in terms of PHUs, which are calculated as the sum of the products of scores multiplied by acreages for each land cover type that may be impacted by a project. The USFWS requires that impacts be mitigated at a ratio of 2.5:1, and, therefore, the amount of mitigation recommended is calculated by multiplying the PHUs in the impact area by 2.5. The PHU values of prospective mitigation sites also are calculated using the same Methodology to determine whether the PHUs available for mitigation meet the mitigation recommended for project impacts. However, the final amount of mitigation required may increase or decrease based on the location of impact and mitigation sites within the Primary or Secondary Zones.

The proposal by the Parties to provide 25% more PHUs of mitigation for impacts to lands within the Primary Zone of the RLSA leads to a new mitigation ratio of 3.125:1 (i.e., 2.5 x 1.25 = 3.125) for projects located or proposed within those areas. The Parties further propose a cap of 45,000 acres for the total area available for development at build-out within the RLSA. The Parties requested that the PRT use the USFWS Methodology to provide an assessment of the amount of panther habitat conservation achieved under the proposed increase in PHUs of mitigation relative to the amount expected to occur under existing conditions. However, there are several estimates of the total acreage of possible development at build-out under the existing program. Therefore, the relative value of the current and proposed mitigation ratios to panther habitat conservation was assessed with a GIS analysis of three estimates of allowable development under the existing RLSA program in comparison to benefits associated with capping development at 45,000 acres. The PRT also analyzed the relative values of five scenarios of development of 45,000 acres based on various percentages of future impact in the panther Primary and Secondary Zones. Finally, the PRT analyzed the benefits of the increased mitigation ratio based on a recommendation that all Secondary Zone Open lands be developed before developing in the Primary Zone. The analyses were based on available data layers for land cover, RLSA land use categories, and panther Primary and Secondary Zones. Increased financial contributions to the Panther Fund also were estimated for each scenario.

3.2 Methods

Land use/land cover data for 2004-2005 were downloaded from the SFWMD web site and used as the basis for calculating PHUs. These data were selected because they were the most recent readily available data that depicted the landscape of the RLSA prior to beginning of construction for Ave Maria. Land use/land cover data were clipped to the RLSA boundary, and acreages were recalculated. Fields were added to the resulting land use/land cover data set to crosswalk the SFWMD Florida Land Use, Cover and Forms Classification System (FLUCFCS) (FDOT 1999, as modified by SFWMD) codes to the more general USFWS land cover types and associated land cover scores. The modified land use/land cover data set was clipped to RLSA major categories (i.e., Open, Flowway, Habitat, Water Retention, Lake

Trafford), which were further clipped by Primary and Secondary Zone boundaries. PHUs were calculated for each major RLSA land use category within the Primary and Secondary Zones, and average PHUs per acre were calculated by category and zone (Table 2.1-1). PHUs also were calculated for lands in public ownership as of December 2008 (including lands within the boundary of Pepper Ranch which was recently acquired by Collier County) and within the boundary of Ave Maria.

The PRT conducted three analyses to assess the value of an additional 25% of PHUs for impacts to the Primary Zone to the future of panther conservation. The first analysis was an assessment of the PHUs of impact and mitigation required under three scenarios of baseline conditions for the existing RLSA program as compared to the proposed 45,000-acre development cap. The second analysis was limited to the proposed 45,000-acre development cap and involved an assessment of five scenarios of future development based on varying percentages of panther Primary and Secondary Zone habitats. The third analysis was limited to the proposed 45,000-acre development cap and was based on a recommendation that available Secondary Zone lands be developed before development occurs within the Primary Zone. The following assumptions were made for each analysis:

1. All development will occur only within RLSA Open Lands with no impacts to RLSA lands designated as HSAs, FSAs, or WRAs;

2. PHUs associated with impact and mitigation sites can be estimated using average per-acre PHU values of RLSA lands likely to be impacted or serve as mitigation sites;

3. A reduction factor of 0.69 should be used to calculate mitigation for impacts that occur in the Secondary Zone but which are mitigated in the Primary Zone pursuant to USFWS Methodology;

4. All mitigation will occur within the panther Primary Zone;

5. All areas of the Primary and Secondary Zones within the boundaries of Ave Maria should be deducted from the acreages available for future development, because impacts associated with Ave Maria have been permitted and mitigated;

6. Acreages of impact associated with the Town of Big Cypress and Hogan Mine, which are currently in the consultation process with the USFWS and FWC pending permit authorization, should be deducted from the acreages available for future development, but their permit conditions have not yet been established. Therefore, these projects should be subject to the increased mitigation requirements associated with Primary Zone impacts as proposed in the FPPP;

7. Financial contributions to the Panther Fund should be estimated on a value of $75 per PHU;

8. Pepper Ranch, which was recently acquired by Collier County, was treated as a component of public lands; and

9. Impacts associated with infrastructure (i.e., roads, utilities, communications) or future mining should be included within the 45,000-acre cap and should not be considered as separate from or in addition to the total number of acres utilized for development.

Analysis 1 (Baseline Conditions vs. 45,000-Acre Development Cap): The first analysis was a calculation of the total number of PHUs for impacts and required mitigation associated with three baseline scenarios compared to the proposed 45,000-acre development cap. Baseline conditions for three RLSA build-out scenarios were obtained from analyses completed by WilsonMiller (Anita Jenkins; memo, December 5, 2008) and Collier County (Thomas Greenwood; spreadsheet, September 5, 2008). The build-out scenarios for baseline conditions and the 45,000-acre development cap are described as follows.

1. Collier County "Full Utilization" Scenario: Collier County estimated that dedication of all lands designated as HSAs, FSAs, and WRAs to SSAs would generate a quantity of Stewardship Credits sufficient to accommodate development of 41,040 acres of SRAs. An additional 46,738 acres of RLSA Open Lands would remain available for development at baseline conditions of 1 unit/5 acres with no clustering. Development of the remaining 46,738 acres of Open Land at 1 unit/5 acres would effectively render these areas unsuitable as panther habitat. Therefore, the total development footprint at build-out would include 82,751 acres after subtracting the 5,027 acres within the boundary of Ave Maria (Table 3.2-1).

2. WilsonMiller "Full Utilization" Scenario: This scenario is very similar to the Collier County "full utilization" scenario. WilsonMiller estimated that dedication of all lands designated as HSAs, FSAs, and WRAs to SSAs would generate a quantity of Stewardship Credits sufficient to accommodate development of 43,300 acres of SRAs. An additional 43,700 acres of RLSA Open Lands would remain available for development at baseline conditions of 1 unit/5 acres with no clustering. Development of the remaining 43,700 acres of Open Land at a density of 1 unit/5 acres would effectively render these areas unsuitable as panther habitat. Therefore, the total development footprint at build-out would include 81,973 acres after accounting for the 5,027 acres within the boundary of Ave Maria (Table 3.2-1).

3. WilsonMiller "Partial Baseline" Scenario: WilsonMiller estimated that dedication of all lands designated as HSAs, FSAs, and WRAs to SSAs would generate a quantity of Stewardship Credits sufficient to accommodate development of 43,300 acres of SRAs. However, WilsonMiller noted that market incentives favor well planned, compact, mixed use communities served by high quality infrastructure and services, and that it is unrealistic to expect development of the remaining 43,700 acres at a density of 1 unit/5 acres. The "partial baseline" scenario assumed 10% conversion of ACSC Open Lands and 25% conversion of non-ACSC Open Land. This scenario would result in a build-out estimate of 51,975 acres of development, but only 46,948 acres remain available for future development after accounting for Ave Maria (Table 3.2-1), and 35,025 acres of Open Land would remain in agriculture.

4. "45,000-Acre Development Cap" Scenario: Proposed revisions to the existing RLSA program would impose a 45,000-acre cap on future development. The existing Stewardship Credit system would be recalibrated to yield the protection of the following areas at build-out: 1) 92,000 acres of NRI-based SSAs, 2) 40,000 acres of agriculture SSAs, 3) 2,300 acres of panther corridors, and 4) 16,546 acres of public and miscellaneous lands. This scenario assumed that approximately 39,973 acres of future development would remain after subtracting the 5,027 acres of Ave Maria from the 45,000-acre cap (Table 3.2-1).

The proposal to provide an additional 25% of PHUs of mitigation for impacts to the Primary Zone does not apply to the existing conditions of the RLSA program as characterized by the three baseline scenarios. The value of the proposed 25% increase in PHUs was evaluated by comparing results from the three baselines

Table 3.2-1 Estimated Benefit to Florida Panther Habitat Conservation Associated with a 25% Increase in the Mitigation Ratio for Impacts to the Florida Panther Primary Zone for Three Scenarios of Future Build-Out Compared to a 45,000-Acre Cap on Future Development Within the Rural Land Stewardship Area.

Development Potential	Development Scenario			
	Baseline Conditions			Proposed
	WilsonMiller Partial Utilization	***WilsonMiller Full Utilization***	***County Full Utilization***	***45,000-Acre Development Cap***
SRAs[1] Established for Development (Acres)	43,300	43,300	41,040	45,000
Open Lands at 1 Unit/5 Acres (Acres)	8,675	43,700	46,738	0
Total Developable Lands (Acres)	51,975	87,000	87,778	45,000
Ave Maria (Acres)	5,027	5,027	5,027	5,027
Total Area for Future Development (Acres)	46,948	81,973	82,751	39,973
Primary Zone (PZ)				
Fraction of Open Lands in PZ	0.53	0.53	0.53	0.53
Estimated Impact in PZ (Acres)	24,891	43,460	43,872	21,193
Average Panther Habitat Value (PHU^2/Acre)	5.5734	5.5734	5.5734	5.5734
Estimated Impact on Panther Habitat (PHU)	138,725	242,220	244,519	118,115
Mitigation Required at 2.5:1 (PHU)	346,813	605,549	611,296	295,288
Mitigation Required at 3.125:1 (PHU)	0	0	0	369,110
Secondary Zone (SZ)				
Fraction of Open Lands in SZ	0.47	0.47	0.47	0.47
Estimated Impact in SZ (Acres)	22,057	38,513	38,879	18,780
Average Panther Habitat Value (PHU/Acre)	4.5607	4.5607	4.5607	4.5607
Estimated Impact on Panther Habitat (PHU)	100,598	175,648	177,315	85,652
Mitigation Required at 2.5:1 (PHU)	251,495	439,120	443,288	214,131
Reduction Factor for Mitigation in PZ	0.69	0.69	0.69	0.69
Total Mitigation Required (2.5 * 0.69) (PHU)	173,532	302,993	305,868	147,750

Table 3.2-1 Continued.

Development Potential	Development Scenario			
	Baseline Conditions			Proposed
	WilsonMiller Partial Utilization	*WilsonMiller Full Utilization*	*County Full Utilization*	*45,000-Acre Development Cap*
Total PHU Mitigation Requirements				
Existing 2.5:1 Ratio (PHU)	520,345	908,542	917,165	443,038
Proposed 3.125:1 Ratio (PHU)	0	0	0	516,860
Net Benefit of 3.125 Mitigation Ratio (PHU)	0	0	0	73,822
Acreage Benefits				
Existing 2.5:1 Ratio (Acres)	63,801	111,400	112,457	54,322
Proposed 3.125:1 Ratio (Acres)	0	0	0	63,374
Net Benefit of 3.125 Mitigation Ratio (Acres)	0	0	0	9,052
Panther Fund Benefits ($75/PHU)				
Existing 2.5:1 Ratio	$0	$0	$0	$33,227,843
Proposed 3.125:1 Ratio	$0	$0	$0	$38,764,487
Net Benefit of 3.125 Mitigation Ratio	$0	$0	$0	$5,536,644

[1] Stewardship Receiving Area.
[2] Panther Habitat Unit

with similar calculations of impact and mitigation requirements associated with the proposed 45,000-acre cap on future development. Mitigation requirements were calculated using the existing 2.5:1 ratio for the baseline scenarios, but both the existing 2.5:1 and the proposed 3.125:1 ratios for impacts occurring in the panther Primary Zone were calculated for the 45,000-acre cap scenario. Development impacts were assumed to be distributed in the Primary and Secondary Zones in proportion to their occurrence within RLSA Open Lands. RLSA Open Lands available for development are comprised of 53% Primary Zone and 47% Secondary Zone after subtracting acreages that are in public ownership or are within the boundary of Ave Maria. The total area of impact was estimated by zone based on these fractions because, with the exceptions of Ave Maria, the Town of Big Cypress, and Hogan Mine, actual locations of future developments were unknown at the time of this analysis. Average PHU/acre values for Open Lands in the Primary Zone and Secondary Zone were used to estimate the number of PHUs of mitigation required as a function of location of impact.

Analysis 2 (Five Scenarios for the 45,000-Acre Development Cap): The second analysis was a calculation of the total number of PHUs for impacts and mitigation associated with five scenarios of impact to Primary and Secondary Zone habitats under the 45,000-acre cap on future development. This analysis was intended to assess a range of possible benefits associated with a 25% increase in PHUs for impacts to the Primary Zone because, with the exceptions of Ave Maria, the Town of Big Cypress, and Hogan Mine, specific locations for the maximum of 45,000 acres of future development have not yet been determined. Current and proposed mitigation ratios were applied to the mitigation requirements for each scenario to evaluate benefits to Florida panther conservation.

The calculations for this analysis were based on a total future development footprint of 39,973 acres, the acreage of potential future development remaining after the 5,027 acres of Ave Maria were subtracted from the 45,000-acre development cap. The acreage for Ave Maria was subtracted from this analysis because the project has been permitted for development, impacts have been mitigated, and the Parties have agreed that Ave Maria would be included within the 45,000-acre development cap. However, the 3,691 acres of the Town of Big Cypress and 975 acres of Hogan Mine were included with the 39,973 acres remaining under the development cap for this analysis of potential benefits of the FPPP to panther conservation because those projects are currently in the consultation process with the USFWS and FWC pending permit authorization, and the permit conditions for those projects have not yet been established. Although the locations and sizes of these projects are known, the PRT determined that they should be evaluated under the provisions of the proposed FPPP and that they would be included under the 45,000-acre development cap. The proposed conservation measures (i.e., 25% more PHUs for Primary Zone impacts and generation of revenue to the Panther Fund) will apply to the Town of Big Cypress, whereas, they do not apply to Ave Maria. The following scenarios for development of the 39,973 acres within the RLSA were evaluated.

1. Scenario 1: Assumes that 100% of future impacts occur within the panther Secondary Zone.

2. Scenario 2: Assumes that 75% of future impacts occur within the Secondary Zone and 25% of future impacts occur within the Primary Zone.

3. Scenario 3: Assumes that 50% of future impacts occur within the Secondary Zone and 50% of future impacts occur within the Primary Zone.

4. Scenario 4: Assumes that 25% of future impacts occur within the Secondary Zone and 75% of future impacts occur within the Primary Zone.

5. Scenario 5: Assumes that 100% of future impacts occur within the Primary Zone.

Analysis 3 (Development of Secondary Zone Before Primary Zone): The third analysis was a calculation of the total number of PHUs for impacts and mitigation associated with a scenario which follows the PRT recommendation that development should occur within the Secondary Zone before development occurs in the Primary Zone. The PRT recommended that 38,746 acres of RLSA Open lands should be dedicated to protection as areas important to conservation of the Florida panther (Table 2.4-3). No protection needs under existing or proposed RLSA categories were identified for 39,330 acres (Table 2.4-3), of which 33,224 acres were in the Secondary Zone and 6,106 acres were in the Primary Zone (Table 2.4-1). A total of 35,307 acres would remain available for development after the acreages for Ave Maria, the Town of Big Cypress, and Hogan Mine are subtracted from the 45,000-acre development cap (Tables 2.4-1 and 2.4-3). This scenario assumes that all 33,224 acres of Secondary Zone lands not identified for protection are developed, and the 2,084 acres remaining for future development under the cap occur in the Primary Zone.

3.3 Results

Analysis 1 (Baseline Conditions vs. 45,000-Acre Development Cap): The combination of the existing RLSA program and baseline development densities applicable in areas that would not be designated as SRAs have the potential to result in 46,948 – 82,751 acres of future development (Table 3.2-1). The "full utilization" scenarios would require approximately 913,000 PHUs of mitigation, which would be sufficient to protect approximately 112,000 acres of Primary Zone habitat (Table 3.2-1). However, the cost for protecting 112,000 acres of panther habitat would be the development of approximately 87,000 acres of Open Lands, some areas of which are important panther habitats. The "partial utilization" scenario would require approximately 520,000 PHUs of mitigation, which would be sufficient to protect approximately 63,800 acres of Primary Zone habitat (Table 3.2-1). However, the "partial utilization" scenario would leave approximately 35,000 acres in agricultural uses without protection from future development. These acres could be developed at baseline densities of 1 unit/5 acres if future market conditions increased the demand for this type of development. The proposal for 25% more PHUs of mitigation for impacts to the Primary Zone does not apply to the "full utilization" or "partial utilization" scenarios.

The proposed 45,000-acre cap on development would result in a requirement for approximately 443,000 PHUs of mitigation under the 2.5:1 ratio and 517,000 PHUs of mitigation under the 3.125:1 ratio, for a net benefit of approximately 74,000 additional PHUs (Table 3.2-1). These PHUs would result in the protection of approximately 54,300 and 63,400 acres, respectively, of panther Primary Zone under the existing and proposed mitigation ratios for a net benefit of approximately 9,000 acres of added protection. The PHUs of mitigation needed under the proposed 3.125:1 mitigation ratio would protect approximately the same number of acres as the "partial utilization" scenario. However, there is a significant difference between these two scenarios in terms of protection of panther habitats. The "partial utilization" scenario would leave approximately 35,000 acres of agricultural land at risk of future development at baseline densities of 1 unit/5 acres. Conversely, the 45,000-acre development cap scenario is achieved by a recalibration of the Stewardship Credit system such that all lands that are not developed at build-out will be protected as NRI-based or agriculture SSAs because all of these areas are needed to generate enough Stewardship Credits to enable development of 45,000 acres. Most of the NRI-based SSAs and many of the agriculture SSAs provide habitats valuable to the conservation of Florida panthers. Protection of these areas would be achieved by the Stewardship Credit system without involving PHUs. Implementation of

the proposed 3:125 mitigation ratio would result in a total financial benefit to the Panther Fund of approximately $38.8 million compared to no financial benefit under the three baseline scenarios.

Analysis 2 (Five Scenarios of 45,000-Acre Development Cap): A greater acreage of impact in the Primary Zone results in a greater number of PHUs of additional mitigation credit, a greater number of acres of panther habitat protected, and a higher financial contribution to the Panther Fund (Table 3.3-1). The additional 25% of PHUs for impacts to the Primary Zone results in 0 – 139,241 PHUs of additional mitigation with a net result of 0 – 17,073 acres of additional panther habitat protection assuming the average value of 8.1557 PHU/acre applies to all areas of Primary Zone habitat likely to be protected. Total financial benefits to the Panther Fund ranged from $0 to approximately $52.2 million.

Analysis 3 (Development of Secondary Zone Before Primary Zone): The existing 2.5:1 mitigation ratio would require approximately 301,045 PHUs of mitigation compared to 310,000 PHUs resulting from the proposed 3.125:1 ratio, for a net benefit of 8,956 PHUs (Table 3.3-2). The proposed mitigation ratio would yield net benefits of approximately 1,098 acres of additional protection and $671,682 of revenue to the Panther Fund.

3.4 Discussion

The principal conclusion of this analysis at first inspection is that the FPPP, which proposes to cap development at 45,000 acres and provide an additional 25% of PHUs of mitigation for impacts to the Primary Zone, would result in greater benefit to Florida panther habitat conservation than the three baseline scenarios of the existing RLSA program. The 45,000-acre development cap apparently would provide certainty that the future extent of development would be limited to a specific number of acres (although not tied to known locations), and all remaining areas of the RLSA, including important panther habitats, would be protected as SSAs. Moreover, financial benefits to the Panther Fund would range from $23.6 million to $52.2 million depending on the acreage of Primary Zone impacted by future development (Table 3.3-1). However, the unsettling and perhaps counterproductive aspect of this conclusion is that greater benefit would accrue as a consequence of greater impacts to the Primary Zone, an area that has been described as essential to the survival of the Florida panther (Kautz et al. 2006). This concern is addressed by the PRT recommendation to protect an additional 38,746 acres for panther conservation because it leaves approximately 39,330 acres in which future developments could be located with certainty. The additional PRT recommendation to develop all 33,224 acres of Secondary Zone and only 2,084 acres of Primary Zone remaining under the development cap further minimizes future development impacts on panther habitats. The scenario recommended by the PRT would result in approximately $23.25 million to the Panther Fund using the 3.125:1 mitigation ratio, for a net benefit of approximately $672,000 over the existing 2.5:1 mitigation ratio.

The value of the proposed 45,000-acre cap and additional PHUs of mitigation can be compared with the baseline scenarios in terms of total number of acres eventually protected. The 45,000-acre cap scenario would result in the protection of virtually all RLSA lands not developed, which amounts to approximately 150,878 acres, because every acre of undeveloped land would be protected as natural resource or agriculture SSAs to generate the Stewardship Credits needed to develop 45,000 acres. Protected lands and waters would include approximately 15,236 acres currently in public ownership, 84,251 acres of HSAs, FSAs, and WRAs that are outside of public ownership, 1,461 acres of Lake Trafford, and 49,930 acres of agricultural lands designated as agricultural SSAs (Table 2.4-3).

Table 3.3-1 Estimated Benefit to Florida Panther Habitat Conservation Associated with a 25% Increase in Mitigation for Primary Zone Impacts for Five Scenarios of Primary and Secondary Zone Impacts Under the Proposed 45,000 Acres Cap on Development.

		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
		100% SZ	75:25	50:50	25:75	100% PZ
Secondary Zone (SZ)	Acres	39,973	29,980	19,987	9,993	0
	Panther Habitat Unit (PHU)/Acre	4.5607	4.5607	4.5607	4.5607	4.5607
	Impact (PHU)	182,307	136,730	91,153	45,577	0
	PZ Reduction Factor	0.69	0.69	0.69	0.69	0.69
	Mitigation Required (PHU x 2.5 x 0.69) (PHU)	314,479	235,859	157,240	78,620	0
Primary Zone (PZ)	Acres	0	9,993	19,987	29,980	39,973
	PHU/Acre	5.5734	5.5734	5.5734	5.5734	5.5734
	Impact (PHU)	0	55,696	111,393	167,089	222,786
	Mitigation Required at 2.5:1 (PHU)	0	139,241	278,482	417,723	556,965
	Mitigation Required at 3.125:1 (PHU)	0	174,051	348,103	522,154	696,206
Total Mitigation Required (PHU)	Status Quo 2.5:1 (PHU)	314,479	375,100	435,722	496,343	556,965
	Proposed 3.125:1 (PHU)	314,479	409,911	505,342	600,774	696,206
	Net Benefit (PHU)	0	34,810	69,621	104,431	139,241
Mitigation Provided in Primary Zone Habitat and Flowways (Acres)	2.5:1 Ratio (Acres)*	38,559	45,992	53,425	60,858	68,291
	3.125:1 Ratio (Acres)*	38,559	50,261	61,962	73,663	85,364
	Net Benefit (Acres)	0	4,268	8,536	12,805	17,073
Panther Fund Impacts ($75/PHU)	2.5:1 Ratio (Dollars)	$23,585,931	$28,132,533	$32,679,135	$37,225,736	$41,772,338
	3.125:1 Ratio (Dollars)	$23,585,931	$30,743,304	$37,900,677	$45,058,050	$52,215,422
	Net Benefit (Dollars)	$0	$2,610,771	$5,221,542	$7,832,313	$10,443,084
*Assumes combined average of 8.1557 PHU/acre for Habitat and Flowways in PZ.						

Table 3.3- 2 Estimated Benefit to Florida Panther Habitat Conservation Associated with an Increase in the Mitigation Ratio for Developing 45,000 Acres of Rural Land Stewardship Area Lands Within the Primary Zone Based on a Scenario Which Follows the Panther Research Team Recommendations for Protection.

		Panther Research Team Scenario
Secondary Zone (SZ)	Development Area (Acres)[1]	33,712
	PHU/Acre	4.5607
	Impact (PHU)	153,752
	PZ Reduction Factor	0.69
	Mitigation Required (PHU x 2.5 x 0.69) (PHU)	265,222
Primary Zone (PZ)	Development Area (Acres)[1]	2,571
	PHU/Acre	5.5734
	Impact (PHU)	14,329
	Mitigation Required at 2.5:1 (PHU)	35,823
	Mitigation Required at 3.125:1 (PHU)	44,779
Total Mitigation Required (PHU)	Status Quo 2.5:1 (PHU)	301,045
	Proposed 3.125:1 (PHU)	310,000
	Net Benefit (PHU)	8,956
Mitigation Provided in Primary Zone Habitat and Flowways (Acres)	2.5:1 Ratio (Acres)[2]	36,912
	3.125:1 Ratio (Acres)[2]	38,010
	Net Benefit (Acres)	1,098
Panther Fund Impacts ($75/PHU)	2.5:1 Ratio (Dollars)	$22,578,347
	3.125:1 Ratio (Dollars)	$23,250,028
	Net Benefit (Dollars)	$671,682

[1] Acres of impact due to Ave Maria and Town of Big Cypress have been subtracted from the 45,000-acre development cap.
[2] Assumes combined average of 8.1557 PHU/acre for Habitat and Flowways in PZ.

The "full utilization" scenarios would result in the development of approximately 87,000 acres within the RLSA (Table 3.2-1). Protected lands within the RLSA would include approximately 16,846 acres of public and miscellaneous land and 92,000 acres of NRI-based SSAs (WilsonMiller 2008). In addition, the "full utilization" scenarios have the potential to protect panther habitats outside of the RLSA. The "full utilization" scenarios would result in a need for approximately 913,000 PHUs of mitigation (Table 3.2-1), or approximately 212,350 PHUs more than would be available from remaining NRI-based SSAs. These additional PHUs of mitigation would have to originate outside of the RLSA because all areas within the RLSA would either be developed or protected. The 212,350 PHUs of additional mitigation have the potential to protect approximately 26,000 acres of Primary Zone outside of the RLSA. The total area ultimately protected would then be 134,900 acres consisting of 16,846 acres of public and miscellaneous lands, 92,000 acres of NRI-based SSAs inside the RLSA, and 26,000 acres outside of the RLSA.

The "partial utilization" scenario would result in the development of approximately 52,000 acres (WilsonMiller 2008). This scenario includes the protection of 92,000 acres of NRI-based SSAs and 16,846 acres of public and miscellaneous lands. The remaining 35,000 acres of Open Land would continue to be used for agriculture; however, these lands would have no protection from being developed at baseline conditions of 1 unit/5 acres. The "partial utilization" scenario would result in a need for approximately 520,345 PHUs of mitigation under existing conditions. Therefore, the total area likely to be protected under the "partial utilization" scenario would include approximately 108,846 acres consisting of 92,000 acres of NRI-based SSAs and 16,846 acres of public and miscellaneous lands. The "partial utilization" scenario would leave approximately 35,000 acres of Open Land in agricultural use with no protection from future development at baseline conditions.

3.5 Conclusions

The Parties have proposed to limit future development within the RLSA to 45,000 acres. The existing Stewardship Credit system with proposed revisions would result in the eventual protection of approximately 150,846 total acres within the RLSA. WilsonMiller (2008) indicates that the protected areas would include 92,000 acres of HSAs, FSAs, and WRAs; 16,546 acres in public ownership; approximately 40,000 acres of agricultural lands that contain natural habitat areas or have some value as buffers to natural areas used by panthers; and 2,300 acres of proposed panther corridors. The Wilson Miller (2008) estimate that 40,000 acres of agriculture would remain as a result of the development cap would be sufficient in size to accommodate the 38,746 acres (Table 2.4-3) recommended for preservation by the PRT. The "full utilization" scenarios, on the other hand, would be expected to protect a total of 134,900 acres of total habitat, 26,000 acres of which would be outside of the RLSA; and the "partial utilization" scenario would protect an estimated 108,846 acres while leaving approximately 35,000 acres of agricultural lands at risk of future development at baseline densities. The net benefit generated by an additional 25% PHU mitigation ratio for Primary Zone impacts ranges from 0-17,073 acres of additional protected panther habitat depending on the acreage of Primary Zone impacts (Table 3.3-1). The total number of acres protected through the use of PHUs, with or without the proposed increase in mitigation ratio, is significantly less than the number of acres that would be protected by the Stewardship Credit system. Therefore, the principal value of the proposed 25% increase in PHUs of mitigation for Primary Zone impacts would be the increased financial contributions to the Panther Fund.